TURRET MOORING FOR AN OIL TANKER

The present invention relates in general to a turret type mooring system for a seagoing vessel, such as an oil tanker.

The use of a turret type mooring for mooring all types of vessels, especially oil tankers, is now becoming more widespread. These types of moorings are typically employed to allow oil to be pumped to and from an oil tanker off-shore, and include a fluid swivel joint which allows an oil pipe on the tanker to rotate relative to a supply or discharge pipe so that excess strain will not be imposed upon the joint by motion of the tanker relative to the mooring. In prior art moorings of this type, a turret support structure is attached externally to the bow of the vessel. As a result, all of the mechanisms of the turret mooring including the fluid swivel joints, flexible piping connections, bearings, etc. are external to the vessel and below the waterline thus making maintenance, repairs and monitoring of the turret mooring and associated equipment difficult or impossible while the mooring is in use.

It is therefore the object of the present invention to provide a turret type mooring for use with a sea going vessel such as an oil tanker, which permits maintenance, repairs and monitoring of the turret mooring and associated equipment to be easily carried out while a vessel is moored and in any loading condition.

The present invention provides a mooring arrangement for a vessel, such as an oil tanker, comprising:

a vessel having a hull;

a mooring mounted within a watertight compartment in the hull; and

means to gain access to said mooring for servicing or monitoring the mooring from within said hull, the means to gain access comprising a door in the watertight compartment.

In a preferred embodiment the present invention also provides a mooring arrangement for a seagoing vessel, comprising:

(a) a vessel having a hull, a bow and a watertight compartment in said bow below a waterline of said vessel;

(b) a turret mooring disposed in said hull at said bow, said turret mooring including:

(i) a fluid swivel disposed in said hull at said bow having a top exposed to said watertight compartment and a bottom exposed to an exterior of said hull; and

(ii) a spider attached to said bottom of said fluid swivel and disposed external of said hull;

(c) a length of piping attached to said top of said fluid swivel and disposed in said watertight compartment; and

(d) at least a first access door disposed in said compartment for gaining access to the compartment from within said vessel.

This and other objects of the invention are achieved through use of a turret mooring which in a preferred embodiment includes a fluid swivel which is disposed in the hull of the vessel at the vessel's bow. A conventional turret spider element is attached to the bottom of the fluid swivel external of the bow, while a length of piping is attached to the top of the fluid swivel within a watertight compartment disposed in the bow below the vessel's waterline. Access to the watertight compartment can be gained either from within

the vessel through a first access door, or from outside the vessel through a second access door. The first access door thereby enables maintenance of the fluid swivel and its associated bearings and fluid connections to be made from within the vessel. In addition unless the external access door is employed for access, the watertight compartment remains in a dry condition which further facilitates maintenance and repair of the fluid swivel and its associated mechanisms.

The foregoing and other objects, features and advantages of the present invention will become apparent from the following detailed description thereof taking in conjunction with the accompanying drawings in which:

FIG. 1 is a side elevation of a vessel with a prior art vessel turret mooring;

FIG. 2 is a side elevation of a vessel with a vessel turret mooring constructed in accordance with the present invention, with the various elements of the turret mooring shown in phantom; and FIG. 3 is a partially sectioned side elevation of a vessel showing the turret mooring of FIG. 2 in greater detail.

Turning now to a more detailed consideration of the invention, there is illustrated in FIG. 1 a prior art vessel mooring system 10 for a vessel 11 which includes a turret mooring 12. The mooring 12 is mounted externally of a hull 13 of the vessel 11 adjacent a bow 14 by means of a turret support structure 16. The turret mooring 12 includes a fluid swivel joint 18 and a spider 20 to which are attached a plurality of anchor pendants 22 and a flexible hose or pipe 24 for connection to a fluid source or receiver (not shown).

The fluid swivel joint 18 rotatably connects the flexible hose or pipe 24 to a length of flexible piping 26 that is attached externally to the vessel structure and leads to oil receiving compartments therein (not shown). Access to the piping 26, swivel joint 18 and associated mechanisms and bearings must be achieved below the waterline external to the vessel 11 for maintenance, repair or monitoring. This is undesirable because it requires either that a diver be employed or that the vessel be put in dry dock to service or monitor the turret mooring 12.

The present invention remedies this drawback and a preferred embodiment thereof is illustrated in FIGs. 2 and 3. With specific reference to those figures, it can be seen that the fluid swivel 18, piping 26 upper and lower bearings 42,44, shaft 40, and associated mechanisms are all positioned within the bow 14 of the vessel hull 13. An additional bulkhead 30 is built into the front of the bow 14 to form a compartment 32 for reception of the turret mooring assembly. The piping 26, fluid swivel joint 18 and associated connections and bearings can be accessed through a watertight door 34 that is formed in the bulkhead 30. An additional access opening 36 is provided to allow access to be gained to the turret mooring assembly externally as illustrated in FIG. 3. The fluid swivel joint 8 includes two bearings 42,44 and a seal 46, with the seal acting to prevent sea-water from coming into contact with the bearings and entering the watertight compartment 32. The seal 46 thus ensures that the watertight compartment 32 stays dry. A notch 38 is removed from the bow 14 to make room for the spider 20. The present invention permits dry access to be gained from within the vessel to the fluid swivel 18 and its associated mechanisms by way of the watertight compartment 32. In addition, access can be made to the watertight compartment 32 from outside the vessel by access opening 36 in circumstances where this might be desirable. Thus the present invention enables the turret mooring to be

serviced or monitored from within the vessel hull 13 without taking the vessel 11 or turret mooring out of operation. The watertight compartment 32, turret moorings and its associated mechanism are all below the waterline of the vessel under normal working conditions.

Although the invention has been disclosed in terms of a preferred embodiment, it will be understood that numerous modification and variations could be made thereto without departing from the scope of the invention as set forth in the following claims. For example, although the vessel 11 illustrated in FIGs. 2 and 3 is shown as having a bulbous bow 14 in which is formed the watertight compartment 32, a similar watertight compartment could be formed in a vessel having any other type of bow construction as well. Further, it is not necessary that the mooring assembly be mounted in the bow of the vessel and it will be understood that it could be mounted in any other portion of the hull of the vessel if desired.

* C L M S *

CLAIMS

1. A mooring arrangement for a vessel, such as an oil tanker, comprising:

a vessel having a hull;

a mooring mounted within a watertight compartment in said hull; and

means to gain access to said mooring for servicing or monitoring the mooring from within said hull, said means to gain access comprising a door in said watertight compartment.

2. The mooring of claim 1, wherein said mooring is mounted within a bow of the hull of said vessel.

3. The mooring of claim 1, wherein said mooring is a turret mooring for connecting a first pipe within said vessel to a second pipe external of said vessel.

4. A mooring arrangement for a seagoing vessel, comprising:

a) a vessel having a hull, a bow and a watertight compartment in said bow below a waterline of said vessel;

b) a turret mooring disposed in said hull at said bow, said turret mooring including:

i) a fluid swivel disposed in said hull at said bow having a top exposed to said watertight compartment and a bottom exposed to an exterior of said hull; and

ii) a spider attached to said bottom of said fluid swivel and disposed external of said hull;

c) a length of piping attached to said top of said fluid swivel and disposed in said watertight compartment; and

d) at least a first access door disposed in said compartment for gaining access to the compartment from within said vessel.

5. The mooring arrangement of claim 4, further including at least a second access door disposed in said compartment for gaining access to said compartment from an exterior of said vessel.

6. A mooring arrangement for a vessel substantially as described with reference to Figures 2 and 3 of the accompanying drawings.