

SPECIFICATION

Barrier Attached to the Side of a Ship

The invention relates to a barrier which is attached to and extends outwardly from the side of a ship, the barrier comprising a float section and a skirt section depending therefrom.

It is known to provide a barrier which is attached to a side of a ship so as to extend forwardly at an angle relative to the side of the ship, usually at an angle of about 20° , which barrier is adapted to collect and contain oil pollution and the like so that it may be led into tanks inside the ship through suitable openings provided in the side of the ship.

In barriers of this type, the transition region between the barrier and the side of the ship is a vulnerable area. The barrier must be connected to the side of the ship with a certain degree of free play in several directions, i.e. the coupling provided between the barrier and the side of the ship must be of the universal joint type, or at least approximately so. The ship also moves in the sea, and the ship's rolling movements in particular must be taken into account in determining the configuration of the barrier-to-ship transition, so that the ship's rolling does not cause the barrier to become ineffectual in this important region.

The object of the invention is to provide an improved barrier of the aforesaid kind.

According to the present invention there is proposed a ship having a barrier attached to a side thereof and extending outwardly therefrom, said barrier comprising a float section and a skirt section depending therefrom, characterised in that the barrier, in a transition region at the side of the ship, increases in height toward the side of the ship, thus forming a barrier sail, the float section of the barrier extending along the upper edge region of the barrier sail and gradually decreasing in diameter toward the side of the ship, and said barrier sail being inserted into a vertical slot affixed to the side of the ship.

The barrier sail preferably extends from the height of the deck and down to the beginning of the bilge section at the side of the ship.

The increased height of the barrier near the side of the ship is preferably obtained in that the upper and lower edges of the barrier sail diverge and deviate from the horizontal, i.e. the still water surface.

Preferably, the float section of the barrier has an approximately circular cross-section and contains a succession of inflatable float bodies disposed along the length of the barrier.

A ballast chain is preferably provided along the bottom edge of the skirt; at the skirt-to-barrier sail transition, the ballast chain is connected to another chain that extends along the lower edge of the barrier sail to the side of the ship, the coupling being such that at least approximately full freedom of movement is obtained in the transition area. At the lower edge of the float section of the barrier, a longitudinal rope is preferably provided, being connected at the

transition to the barrier sail to a plurality of other ropes which diverge in the barrier sail and extend to that edge of the barrier sail adjacent the side of the ship. The connection between the ropes and between the chains is by means of a rigid connector.

Said rigid connector is preferably built into a fixed float body in the float section.

To facilitate its insertion into the slot, the edge of the barrier sail adjacent the side of the ship is preferably provided with a plurality of reciprocally flexible interconnected T-bars whose cross beams are inserted into the vertical slot on the side of the ship.

The structure outlined above provides a suitable and flexible connection and transition between the side of the ship and the barrier.

The invention will now be described further, by way of example only, with reference to the accompanying drawings which illustrate a preferred embodiment of the invention and in which:—

Fig. 1 depicts a ship with deployed barriers, in plan view;

Fig. 2 is a schematic drawing of a barrier in the transition region to the side of a ship, in elevation; and

Fig. 3 shows the embodiment of Fig. 2 in plan view.

The drawings are schematic and are merely intended to illustrate the principle of the idea on which the invention is based. Figure 1 shows a tanker 1 or a vessel adapted to take on oil floating on the surface of the water through an opening, not shown, in the side of the ship, in the region lying within a barrier 2 which extends out from a point 3 on the side of the ship and forward, forming an angle of about 20° with the side of the ship. The outer end 4 of the barrier 2 is held out from the side of the ship by means of a rigid boom 5 which has universal coupling supports at both ends, i.e., at the side of the ship and at the barrier 2, respectively. An additional barrier 6 is attached to a tugboat 7. From the point 4, a line 8 also runs in to the side of the ship, optionally having the configuration of a type of barrier, but having large openings such that the oil floating on the water surface can be collected in the bilge space between the side of the ship and the barrier 2.

The barrier 2 has the configuration shown on Figs. 2 and 3. In essence, the barrier is constructed of a float section 9 which has an approximately circular cross section and contains a plurality of separate, inflatable float bodies 10. Depending from the bottom of the float section 9 is a skirt 11 which is weighted at the bottom by a chain 12. To absorb tensile stresses in the barrier 2, a longitudinal rope 13 is disposed in the area between the float section 9 and the skirt 11.

As seen on Fig. 2, the height of the barrier increases toward the side of the ship 1, and the float section extends all the way in to the side of the ship, but with decreasing diameter; similarly, the inflatable float bodies 10 gradually decrease in diameter in this region. This section of the

barrier is designated the barrier sail.

The ballast chain 12 has an articulated connection to a rigid structure 14, and a similar chain 15 continues further from the point of connection 27 to the side of the ship. In this region, therefore, an approximately free connection is formed between the two chains 12 and 15. The rope 13 is also connected to the rigid structure 14, which can be made of steel, for example, and in this example illustrated here, four ropes 16, 17, 18 and 19 extend out from the rigid structure 14, diverging in direction toward the side of the ship and being connected to respective T-bars at the edge of the barrier sail adjacent to the side of the ship. The T-bars are designated 20, 21, 22 and 23, and the cross beams thereof fit into a slot 24 (Fig. 3) which is welded onto the side of the ship 1. The chain 15 is also connected to a T-bar 25 which also is inserted into the slot 24.

The rigid structure 14 is in this case built into a fixed float body 26. This float is disposed in the float section of the barrier, in the transition region between the conventional barrier and the barrier sail, as can be seen on Figs. 2 and 3.

In a practical embodiment, the float section could have a diameter of about 3 meters, for example. The distance from the side of the ship to the transition region 14, could be about fifteen metres, while the total length for the barrier 2 (Fig. 1) could be about sixty five meters and the length of the barrier 6, two hundred metres. The skirt could extend to a depth of about two and one half metres. The total height of the barrier sail at the side of the ship would in this case preferably be about nine metres.

The longitudinal rope 13 and its tension-counteracting ropes 16, 17, 18 and 19 are preferably "aramide" ropes. Such ropes can have a breaking strength of 160,000 kp, for example. The ballast chain at the lower edge of the skirt preferably has a weight of 100 kg/m and a breaking strength of over 160,000 kp. The chain will thus function both as ballast weight and as a longitudinal strengthening member.

Claims

1. A ship having a barrier attached to a side thereof and extending outwardly therefrom, said barrier comprising a float section and a skirt

50 section depending therefrom, characterised in that the barrier, in a transition region at the side of the ship, increases in height toward the side of the ship, thus forming a barrier sail, the float section of the barrier extending along the upper edge region of the barrier sail and gradually decreasing in diameter toward the side of the ship, and said barrier sail being inserted into a vertical slot affixed to the side of the ship.

2. A ship according to claim 1 wherein said barrier sail extends from the height of the deck and down to the beginning of the bilge section at the side of the ship.

3. A ship according to claim 1 or claim 2, characterised in that the float section has an approximately circular cross-section and contains inflatable float bodies arranged in succession in the longitudinal direction of the barrier.

4. A ship according to any one of claims 1 to 3, characterised in that a ballast chain along the bottom edge of the skirt is connected, at the transition to the barrier sail, to a chain which extends along the lower edge of the barrier sail, the connection being such that relative movement between said chains is obtained at said transition.

5. A ship according to any one of claims 1 to 4, wherein there is provided a longitudinal rope at the bottom edge of the floating section of the barrier which, at the transition to the barrier sail, is connected to a plurality of ropes which diverge in the barrier sail and extend forward to the edge of the barrier sail adjacent to the side of the ship.

6. A ship according to claim 5 when dependent on claim 4 wherein a rigid connector is provided at the transition between the ropes and between the chains to which said ropes and chains are connected.

7. A ship according to claim 6, characterised in that said rigid connector is built into a fixed float body disposed in the floating section.

8. A ship according to any one of claims 1 to 7, characterised in that the edge of the barrier sail adjacent the side of the ship comprises a plurality of T-bars whose cross beams are inserted into the vertical slot on the side of the ship.

9. A ship having a barrier attached thereto substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.



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