Feb. 23, 1954 M. A. E. THOMAS 2,669,961

APPARATUS FOR REDUCING THE FRICTION OF WATER ON THE HULL OF A SHIP

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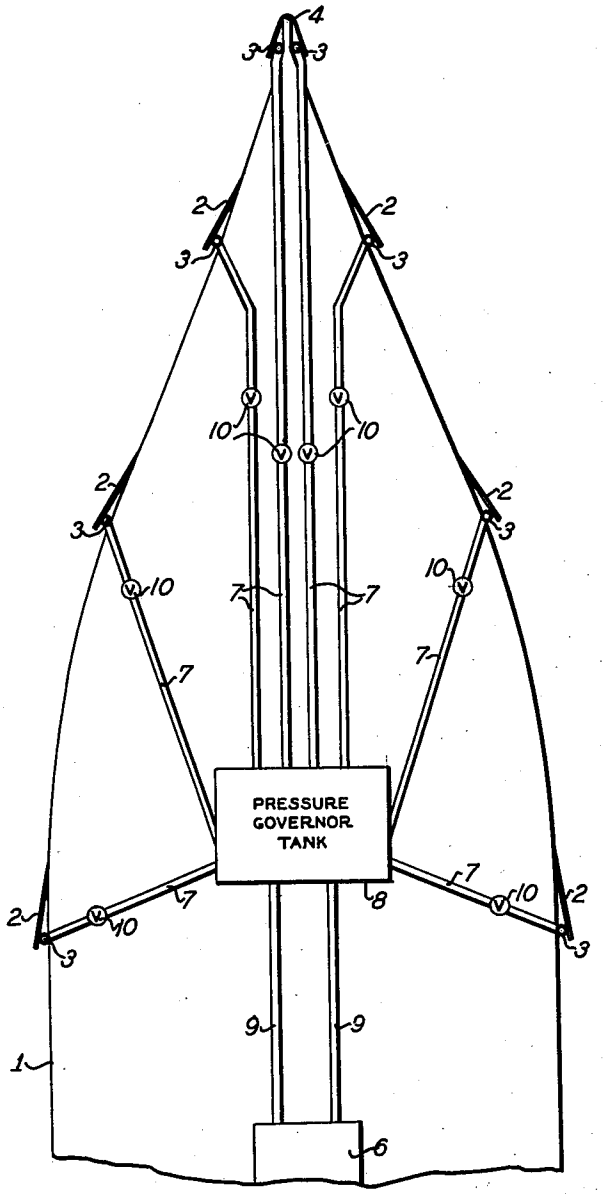


Fig. 1

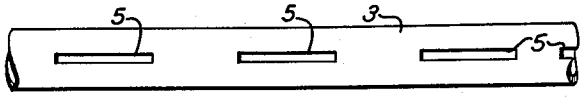


Fig. 2

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APPARATUS FOR REDUCING THE FRICTION OF WATER ON THE HULL OF A SHIP

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5 Claims. (Cl. 114—67)

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The present invention relates to a method for improving the coefficient of friction of the water on the keels, in which, along the outer wall of the ship and at intervals, substantially vertical ducts are provided, which have, under the water-line, escaping holes for the compressed air supplied by a compressor.

The aim of the invention is to materially improve the above-mentioned method. Indeed it has been found of very great importance to judiciously distribute the ducts through which the compressed air escapes, which must form, along the hull of the vessel, the emulsion required for lowering the coefficient of friction of the water on the wall. It has also been stated quite necessary to provide a space without any air duct, not only as the air acts differently according to the point where it is blown along the wall of the ship but also as said action may rather often be prejudicial in certain determined points.

To this end, the ducts are disposed only on the forepart of the ship.

In a particularly advantageous embodiment of the invention, the ducts are provided from the stem on a distance varying between a third of the length of the ship from the stem and half said length.

Another feature of the invention is that a distance increasing from the fore-part to the rear part is provided between the above-mentioned ducts.

Other details and particularities of the invention will become apparent from the description which will be given hereinafter by way of non-limitative example with reference to the accompanying drawing.

Figure 1 is a plane view diagrammatically showing the arrangement of the ducts and the feeding members thereof.

Figure 2 shows a detail referring to a duct for blowing air.

In these figures, the same numbers of reference refer to identical elements.

The method illustrated by said figures shows in which way the invention may be applied to a sea-ship, for instance, which, in the quoted example, does not exceed the dimensions of a mean tonnage ship the length of which is approximately of 150 m. for 17 m. width at the main-frame.

Along the outer wall of the hull 1 of the ship, the perforated ducts 3 are provided under the protecting wings 2. Said ducts are arranged, as shown in Fig. 1, only on a part of the ship which may vary between a third of the whole length of the ship from the stem and half said length.

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The two first ducts 3 have been arranged along the stem itself and are protected by the false stem 4. Said ducts have under the water-line air blowing holes 5, the dimensions and number of which holes increase with the depth of immersion of said duct.

The number of the blowing ducts is evidently not limited but it is to be noted that if they are not arranged by direct reason of the velocity of the ship only, they are however arranged in function of a ratio of diverse elements in which namely intervene the penetrating strain of the stem into the body of water, the relative velocity of the ship relating to the element in which she moves and the moving velocity of the emulsionized particles along the hull of the ship.

The consideration of said diverse elements involves the necessity of arranging the air blowing ducts at intervals increasing from the stem of the ship. Likewise, the blowing holes will be larger to a deeper level. The form of the air blowing holes 5 is so devised that the air which escapes from them, and which must pass the length of the hull of the ship, forms rapidly and intimately with the water a mixture which lowers the density of the liquid in contact with the said hull, and, consequently, diminishes the friction of the latter. To this end, the air-blowing orifices 5 will have the form of a longitudinal slot orientated in the same direction as the axis of the duct 3.

Said arrangements have been imagined not only by taking into account that the friction of the water on the keel is greater in its fore-part (the term "fore-part" meaning that part of the ship extending on one third of the hull thereof from the stem or half that distance) but also in order to avoid the disastrous effects produced on the moving propeller by the masses of emulsified water in which said propeller must operate. A last consideration resulting of facts noted in the field of the hydrodynamics, favours the suppression of the blowing ducts along the rear part of the ship.

It is indeed known that the working of the water masses shrinking along the broad-sides of the rear part of the ship has a propelling effect in the running direction of the ship.

In the course of the effected tests, it has been found impossible to get a regular and constant air blowing when not using a pressure governor-tank 8 between the compressor-motor group 6 and the feeding ducts 7 towards the blowing ducts. It is clear indeed that the movements of the ship on confused-sea and particularly the pitching have for effect to uncover at intervals, regular or not, a part of the blowing ducts. This

phenomenon leads of course to abnormal falls of pressure in the ducts 7 and in the blowing ducts.

It may be pointed out by way of example that a compressor delivering an active pressure amounting to 6 kg. will necessitate a governor-tank the inner pressure of which must remain in the range of 2.5 kg. to 3.5 kg. In the ducts 9, connecting the compressor-motor group to the tank 8, valves may be arranged which allows the compressor to be used for other purposes for instance when the ship is not running. Similar valves 10 may also be arranged in the ducts 7; they are however to be so calculated as to oppose to the abnormal air losses when one or more ducts come to be uncovered. Moreover the tank 8 is provided with the usual manometers and securing valve.

It is clearly understood that the invention is not limited to the single embodiment herein above described and that many modifications could be made namely as regards the number, arrangement and composition of the constituting elements.

I claim:

1. An apparatus for reducing the coefficient of friction of water on the hull of a ship comprising a plurality of substantially vertical ducts positioned on each side of the hull of the ship in spaced relation between the stem of the ship and a point varying between one third and one half of the length of said ship from said stem, each of said ducts having a plurality of vertically spaced air escape holes positioned below the water line of the hull, a shield associated with each duct, each shield extending the length of the duct, and having its forward portion fixed to the hull forwardly of the duct and its rear portion extending aft of the duct and spaced from the hull, and means including a compressor for supplying air under pressure to said ducts for discharge through said holes in the ducts.

2. An apparatus according to claim 1 in which the spacing distance between adjacent ducts on each side of the hull increases from the fore part of the ship aft.

3. An apparatus according to claim 1 in which the size of the holes in the ducts increases with the depth of the holes below the water line of the ship.

4. An apparatus according to claim 3 in which the holes are in the form of slots, the major axis of which is parallel with the axis of the vertical ducts.

5. An apparatus according to claim 1 further including a tank positioned between the compressor and the vertical ducts for stabilizing the pressure of the air supplied to the ducts.

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