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[54] **BOW CONTROL SYSTEM FOR SHIPS**
3 Claims, 2 Drawing Figs.

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[50] **Field of Search** 114/151, 148

[56] **References Cited**
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ABSTRACT: A ship is provided with a bow control system which is completely located in a bulbous enlargement extending forwardly from the bow of the ship at the bottom of the hull. The control system comprises a longitudinal flow passage opening at the front of the enlargement and a propulsion unit in the passage with two transverse flow passages opening from the longitudinal passage behind the propulsion unit to both sides of the enlargement. Means are provided in the transverse passages for controlling the flow of water therethrough. The enlargement together with the control system comprises a unitary structure which can be mounted on the hull of a ship.

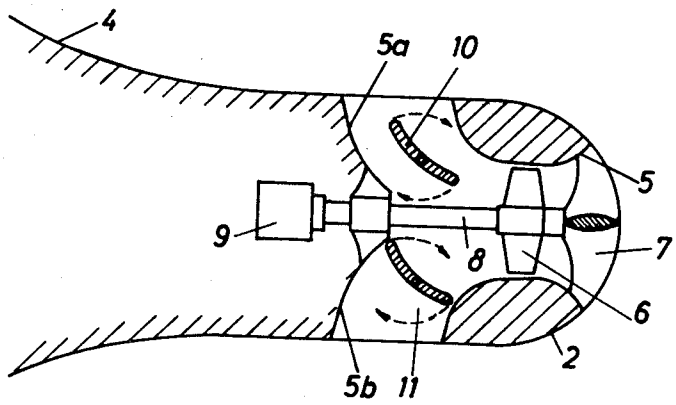


Fig. 1

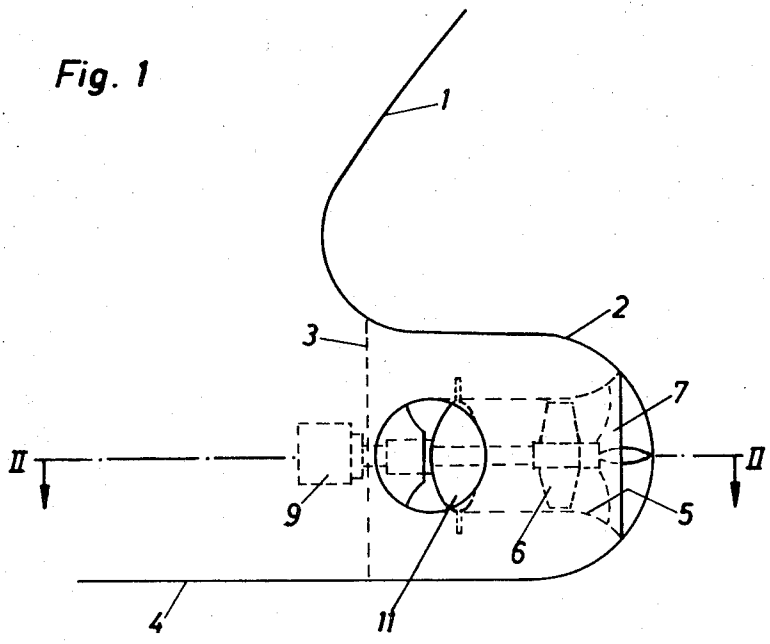
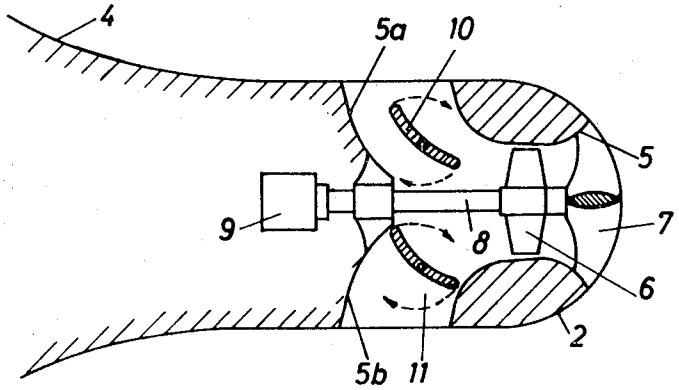


Fig. 2



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BOW CONTROL SYSTEM FOR SHIPS

The present invention relates to systems for controlling the movement of ships, more particularly, to such a system mounted as a complete unit on the bow of a ship.

As the size and dimensions of ships increase, it has become necessary to improve their movement control systems to assure that the ships will have the requisite maneuverability in spite of their large size. Among others, heavier and more maneuverable barges, tankers and tug boats have been constructed, and the control equipment mounted on the sterns of these ships has been improved. As a relatively recent development, such movement control equipment has been increasingly mounted also in the bows of the ships. Because of the absence of inflow velocity, the conventional rudder has not been a satisfactory movement control device. The inflow velocity—which determines the effect of a rudder—while providing a satisfactory rudder effect at high running speeds, is inadequate at low running speeds, such as when the ship is maneuvering in port. Therefore, active controls are provided which are propulsion units with a separate drive and which produce the entire thrust for movement control of the vessel. These propulsion units are usually mounted in transverse tunnels or passages in the forward portion of the ships. To produce control or steering forces, i.e. forces acting athwartships or obliquely to the longitudinal axis of the ship, water is drawn in at one end and discharged through the other end of the tunnel. To obtain control in the opposite direction, either the direction of rotation of the propulsion unit must be reversed or the flow of water reversed by turning the profile through 90°. Other bow control systems involve the pumping of water either upwardly or rearwardly through suitable passages with the water being guided by rotatable discs blades, vanes or flaps (rotatable valves) to be discharged through an opening on one or the other sides of the hull.

The bow control equipment installed in such transverse tunnels has not been satisfactory, since the flow of water to the propulsion unit is rapidly reduced as soon as the controlled ship has reached a particular running speed. In general, it may be said that at any speed over 5 knots directional control of a ship through such a system is almost impossible. This difficulty of control is attributable to the fact that the flow of water at the entrance of the tunnel breaks off, while the stream of water discharged from the other end of the tunnel adheres to the body of the ship so that hardly any free forces can be developed. In order to prevent such a breaking off of the stream of water at the entrance of the tunnel when the ship is moving, it has been proposed to arrange the entrance opening right at the bow. However, such a structure would substantially increase the resistance of the ship, since with the entrance openings closed no orderly flow can develop.

It is the principal object of the present invention to improve the above mentioned disadvantages of known bow control systems.

It is another object of the present invention to provide a movement control system mounted on the bow of a ship wherein there exists an effective flow of water through a transverse passage to a control propulsion unit at both high and low running speeds but the resistance of the ship through the water at both high and low speeds is not increased so that a good control effect is achieved.

In one aspect of the present invention the bow control system for a ship may comprise an enlargement extending forwardly from the bow at the bottom of the hull. There is a longitudinal flow passage within the enlargement and opening at its forward end. A propulsion unit is mounted within the flow passage and first and second transverse flow passages connect to the longitudinal flow passage behind the propulsion unit and open to both sides of the enlargement. Flow control means are mounted within the transverse passages for controlling the flow of water therethrough. The passages, propulsion unit and flow control means are all in the enlargement and together with the enlargement comprise a unitary structure for mounting on the hull of a ship. The motor for driving the propulsion unit may be mounted either within the enlargement or within the hull of the ship and drivingly connected to the propulsion unit.

Other objects and advantages of the present invention will be apparent upon reference to the accompanying description when taken in conjunction with the following drawings wherein:

FIG. 1 is a side elevational view of the lower portion of the bow of a ship provided with the bow control system of the present invention; and

FIG. 2 is a sectional view taken along the line II–II of FIG. 1.

In FIG. 1, the bow of a ship provided with the present invention is indicated at 1, and a bulbous enlargement is indicated at 2 which extends forwardly from the bow from a plane marked as line 3 at the bottom of the ship's hull indicated at 4. The line 3 divides the enlargement 2 and the hull of the ship. The entire structure to the right of line 3 may be a unitary structure at the left of which a driving motor (engine) may be connected and within which the bow control system of the present invention is accommodated. The line 3 may be inclined at an angle so that the engine may also be included in the unitary structure.

In the enlargement 2, there is provided a tunnel or flow passage 5 which begins at the forward end of the enlargement and which, when viewed in the horizontal cross section (FIG. 2), branches into discharge tunnels 5*a* and 5*b* which form a T. The propulsion unit 6 is mounted within the tunnel 5, and is supported by the hull 4 of the ship at the one end and at the other by a supporting spider 7 at the forward end of the tunnel. At the other end of a drive shaft 8 of the propulsion unit 6 a driving motor (engine) 9 is connected, such as by flanges. The tunnel branches 5*a* and 5*b* are each equipped with a rotatable disc or flap, blade or vane (rotatable valve) 10 and 11 respectively.

It will be apparent that the bow control system as described above enables the water to readily enter the control system without any difficulty when the ship is stationary or travelling at slow or fast speeds. When the transverse passages 5*a* and 5*b* are closed the water will then back up in passage 5 which hydraulically, will have the same result as when the enlarged portion of the bow is closed. As a result of this construction a desired decrease of the water pressure in the vicinity of the enlarged bow portion occurs and thus the resistance of the ship as it passes through the water is correspondingly decreased.

It is pointed out that the two transverse passages 5*a* and 5*b* can also be used as entrances for drawing water through the passages by reversing the direction of rotation of the propulsion unit 6. Such a reversal of direction of flow would be advantageous to the bow control system in certain circumstances.

It is thus apparent that the present invention has disclosed a bow control system comprising a single unitary structure which can be mounted on the hull of a ship. The bow control system includes the enlargement on the bow together with the passages, propulsion unit and flow control means. The drive motor for the propulsion unit may or may not be mounted within the enlargement. It is also apparent that the bow control system as disclosed herein avoids the disadvantages of previously known bow control systems as described above. The present bow control system has the further advantage that the unit can be mounted toward the front of the ship at the greatest possible distance from the fulcrum of the ship so that the controlling forces exerted by the bow control system will have increased leverage.

It will be understood that this invention is subject to modification in order to adapt it to different uses and conditions and, accordingly, it is desired to comprehend such modification within this invention as may fall within the scope of the appended claims.

I claim:

1. In a bow control system for a ship, the combination of an enlargement extending forwardly from the bow at the bottom of the hull, a longitudinal flow passage completely within said

enlargement with one end terminating within said enlargement and the other end opening at the forward end thereof, a propulsion unit within said longitudinal flow passage, first and second transverse flow passages from said longitudinal passage behind said propulsion unit and opening to both sides of said enlargement, means within said transverse passages for controlling the flow of water therethrough, the longitudinal and transverse passages, propulsion unit and flow control means being within said enlargement.

2. In a bow control system as claimed in claim 1 wherein said enlargement with said passages, propulsion unit and flow control means comprises a unitary structure for mounting on the hull of a ship.

3. In a bow control system as claimed in claim 2 wherein said unitary structure comprises a motor driving said propulsion unit.