

PATENT SPECIFICATION

(11) 1 293 738

DRAWINGS ATTACHED

- (21) Application No. 17501/71 (22) Filed 27 May 1971
(31) Convention Application No. P 20 32 716.6 (32) Filed 2 July 1970 in
(33) Germany (DT)
(45) Complete Specification published 25 Oct. 1972
(51) International Classification B63H 25/46
(52) Index at acceptance
B7V 52
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(54) TRANSVERSE JET STEERING SYSTEM FOR WATER CRAFT

BECKER KG a German company, of 5401 Spay/Rhein, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a transverse jet steering system for water craft.

- 10 Transverse jet steering systems are known and are installed as a handling aid in the bow and/or stern sections of water craft and, upon actuation of the same, provide a transverse thrust which is used to assist the steering action of the conventional rudder systems, especially when manoeuvring in narrow waters, and running into ferry docks.

- 15 The effectiveness of transverse jet steering systems diminishes considerably with the increase of forward or astern speed of the craft so fitted. The effect is appreciable even at low forward or astern speeds.

- 20 An object of the present invention is to reduce this defect of transverse jet steering systems.

- 25 The present invention consists in transverse jet steering system for water craft, including at least one tunnel directed athwart-ship, leading from one side of the ship to the opposite side and containing at least one drivable propeller and at least one separate duct associated with the or each tunnel, which also leads from one side of the ship to the opposite side.

- 30 In the accompanying Figures 1 to 4, Figure 1 as a section along line I-I in Figure 2, shows the bow of a water craft equipped with a transverse jet steering system according to the invention.

- 40 Figure 2 shows an elevation of the bow with the transverse jet steering system according to Figure 1.

- Figure 3 shows an embodiment of the invention (section along the line III-III in Figure 4.).

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Figure 4 shows an elevation of the form of embodiment according to Figure 3.

In carrying the invention into effect according to one convenient mode by way of example, Figures 1 and 2 show a part of the bow of a water craft wherein is situated a tunnel or duct 1 in which is arranged a propeller 2 which is driven by an engine situated within the water craft or in the hub or mounting of the propeller. The tunnel extends athwart the ship from one side 3 of the ship to the opposite side 4 & is closable by remotely controlled means not shown. Close to the tunnel, that is to say behind the same in the direction of motion, a duct or passage 5 is equally wrought to extend from one side of the craft to the opposite side. As seen in the direction of motion, an overpressure area is engendered behind the tunnel at the jet intake side, and a powerful negative pressure area is engendered at the jet egress side, which act against the pressure distribution corresponding to transverse thrust. The locations of these pressure areas depend on the shape of the water craft. The pressure differences which act against transverse jet thrust under way, are largely eliminated by the incorporation of one or more equalisation ducts or passages interconnecting the locations of maximum pressure difference.

Figures 3 and 4 show another embodiment of the present invention. A tunnel 6 is incorporated, which contains a drivable propeller 14. A duct 7 and 8 is incorporated in each case in front and behind the tunnel. The ducts may be closed off by means of flaps 9, 10 or of a sliding shutter which may for example also be situated at the middle of the duct. A remote control system may be incorporated for this purpose.

An arrow 11 shows the direction of motion of the water craft. For transverse thrust, the propeller 14 impels the water in the direction of the arrows 12, so that a

transverse thrust acts on the craft in the direction of the arrow 13. In these conditions of travel, a pressure area (marked with the positive or plus sign) is engendered behind the tunnel at the side towards which the transversal movement 13 is directed, and a suction area (marked with a minus sign) is engendered at the other side of the water craft. These two areas act against the thrust.

According to the invention, the duct which is opened is that situated behind the tunnel in the direction of motion, so that the opposing pressure difference can be cancelled.

In a direction of travel opposed to that of the arrow 11, the duct 7 would be opened and the duct 8 would be closed.

The embodiment according to the invention renders it possible to secure a substantial reduction in the effect of motion on the effectiveness of a transverse jet steering system, by balancing local pressure and suction areas by incorporation of pressure-equalisation ducts. The steering action of a transverse jet steering system is thus also available for manoeuvres to be performed during travel of the ship, special craft or floating equipment, in particular at slow speed, when the action of the main rudder system is ineffective.

WHAT WE CLAIM IS:—

1. Transverse jet steering system for water craft, including at least one tunnel directed athwartship, leading from one side of the ship to the opposite side and containing at least one drivable propeller, and at least one

separate duct associated with the or each tunnel which also leads from one side of the ship to the opposite side.

2. Transverse jet steering system according to claim 1, wherein the duct or ducts is or are always situated abaft the or each tunnel relative to the direction of motion of the water craft.

3. Transverse jet steering system according to claim 1, wherein at least one said duct is situated ahead of and another abaft the or each tunnel relative to the direction of motion of the water craft.

4. Transverse jet steering system according to claim 1, wherein the ducts are closable.

5. Transverse jet steering system according to claim 1, wherein the or each tunnel as well as the duct or ducts, are closable.

6. Transverse jet steering system according to claim 1, wherein the or each tunnel and/or duct or the ducts are closable by means of a remotely controlled driving mechanism.

7. Transverse jet steering system substantially as described with reference to the accompanying drawings.

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