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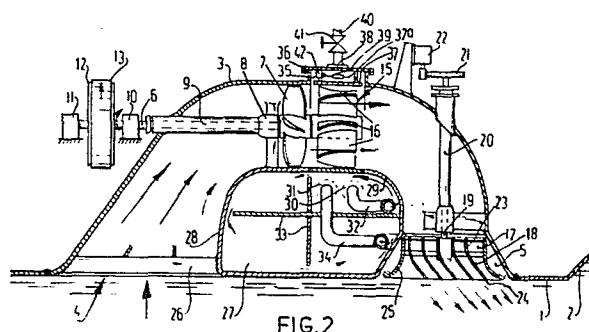
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⑳ Device for steering a ship's bow and device constructed as a built-in unit.

㉑ Device for steering a ship's bow with the aid of a directional water stream. According to the invention the interior of the ship comprises a tunnel, a screw propeller pump followed by a guide blade wheel, said tunnel having a discharge opening directed substantially vertically and holding a control-grating adapted to rotate about a vertical axis and having a plurality of equally directed blades with a vertical inflow rim and an outflow rim imparting to the outflow of water a horizontal speed component which is in a fixed position relative to the grating.



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Device for steering a ship's bow and device constructed as a
built-in unit

The invention relates to a device for steering a ship's bow with the aid of a directional water stream. The devices of this kind hitherto employed involve the problems of low efficiency and low propelling power so that they do not 5 provide the desired manoeuvrability.

The invention has for its object to provide a device of the kind set forth which yields a very high propelling power and has a high degree of efficiency.

According to the invention the interior of the ship 10 comprises a tunnel, a screw propeller pump followed by a guide blade wheel, said tunnel having a discharge opening directed substantially vertically and holding a control-grating adapted to rotate about a vertical axis and having a plurality of equally directed blades with a vertical inflow rim and an outflow 15 rim imparting to the outflow of water a horizontal speed component which is in a fixed position relative to the grating. By means of the guide blade wheel arranged after the screw

propeller pump it can be ensured that the water flowing towards the discharge opening will not perform a rotary movement. The water striking the blades of the control-grating will, therefore, not exert a torque on the control-grating and in all 5 positions of the grating the same horizontal speed component with respect to the grating will be obtained. This means that the steering effect is invariably the same and that all energy is utilized for producing propelling force in the desired direction. Since the whole device is located inside the ship, 10 projecting parts likely to be readily damaged in the known devices are omitted.

According to the invention the vertical shaft of the control-grating may be provided with a transmission device and a driving device comprising a remote-controllable electric 15 motor. Thus the device can be actuated the wheel-house.

According to the invention it is advantageous for the tunnel to extend substantially in the direction of length of the ship and to open out in the bottom of the ship, the discharge opening lying near the front side of the ship and the 20 entrance opening further to the rear. Thus the risk of the air entering the tunnel during the operation of the devive is minimized.

According to the invention the entrance opening of the tunnel is provided with a grating for retaining undesirable 25 objects. Thus damage of the device by such objects is avoided.

According to the invention the tunnel may have at its highest point a connection for a low-pressure air pump, which can be actuated by means of a float and a float switch. If, for example, in an empty vessel air has entered the tunnel 30 through the discharged opening, whilst the control-device is out of operation, the water will have flowed out of the tunnel. Owing to the low pressure air pump and the float switch the air will always be automatically sucked out, so that the tunnel will always be filled with water and be constantly ready for 35 use.

According to the invention the screw propeller may be coupled with a Diesel engine by means of a belt transmission. The Diesel engine can, therefore, be disposed at the side of

the tunnel and a smooth transmission is obtained.

According to the invention the space bounded on the lower side by the ship's bottom and on the top side by the horizontal part of the tunnel and on the front and rear sides 5 by wall portions of the bends joining the inlet and the outlet of the tunnel may be closed on the sides by partitions provided with an inlet and an outlet for the cooling water of the Diesel engine.

Furthermore, in accordance with the invention, 10 partitions may be disposed in the closed space for compelling the cooling water to flow along the cooled walls of the cooling water space.

In the drawing

fig. 1 is a plan view of a partly developed bow 15 steering device in accordance with the invention,

fig. 2 is a sectional view taken on the line II-II in fig. 1.

Figure 2 shows only the bottom 1 of the ship equipped with the device and at 2 the lower edge of the bow is just 20 visible. The device comprises a tunnel 3 having an entrance opening 4 and a discharge opening 5 said openings lying in the bottom 1 of the ship. The tunnel 3 extends in the direction of length of the ship and in the horizontal part a shaft 6 is provided with a pump impeller 7, said shaft being journalled 25 in a bearing 8 and a shaft pipe 9. The shaft 6 is furthermore journalled in bearings 10 and 11 and is provided with a pulley 12. With the aid of this pulley 12 the shaft 6 can be driven via a belt 13 together with the impeller 7 by a Diesel engine 14, represented schematically. After the impeller 7 is disposed 30 a guide blade wheel 15. The fixed guide blades 16 of the wheel 15 ensure that the stream produced by the impeller 7 passes free of rotation to the discharge opening 5. In the discharge opening is arranged a grating 17 comprising blades 18. This grating 17 can be rotated with the aid of a shaft 19 extending 35 through a pipe 20 and projecting out of the tunnel. The vertical shaft 19 can be rotated with the aid of a transmission device 21 and an electric motor 22 coupled herewith. The electric motor 22 may be remote-controlled, for example, in

the wheel-house of the ship.

The blades 18 have vertical inflow rims 23 and the outflow rims 24 are directed so that the stream leaving the blades 18 has a horizontal component. The grating 17 5 is fastened in a diffusor-shaped ring 25.

The inlet opening 4 holds a grating 26 for retaining unwanted objects, which might be carried by the water into the tunnel.

A space 27 is bounded on the lower side by the ship's 10 bottom, on the top side by the horizontal part of the tunnel 3, on the rear side by the wall 28 of the inflow bend and at the front side by the wall portion 29 of the outflow bend. On the sides said space is bounded by walls (not shown) so that the space 27 is closed on all sides. With the space 27 communicate an inlet 30 and an outlet 31 communicating with the Diesel engine 14. Through the inlet 30 the cooling water passes 15 into the space 27. By means of the pipe 32 this cooling water is distributed in the space 27 and by partitions 33 the water is compelled to flow along the outer side of the space 27. Through a pipe 34 having collecting apertures the cooling water 20 is discharged through the outlet 31. The water flowing through the tunnel 3 and the water flowing along the ship's bottom intensely cool the cooling water inside the space 27.

On the top side the tunnel 3 has a rectangular opening 25 35 closed by a cover 36. Via this cover the guide blade wheel 15 and the propeller 7 can be removed. To the cover 36 is fastened a plate 37, which forms a prolongation of the circular passage of the tunnel 3. Between the plate 37 and the cover 36 is located a float 37a, which can block an opening 38 with the aid of a flap 39. With the opening 38 communicates a conduit 40 having a closing member 41. Furthermore a switch 42 is provided for switching on an air pump (not shown), 30 in the case that the float 37a drops as a result of the presence of the air. The pump not shown is connected with the conduit 40.

The device operates as follows. When the ship equipped with the device according to the invention is, for example in a stationary position and if it is desired to displace the

ship's bow to one side, the Diesel engine 14 is switched on and a water stream is produced in the tunnel 3 with the aid of the screw propeller pump 7. Owing to the guide blades arranged after the propeller screw the water enters the 5 discharge opening without rotating. Owing to the blades 18 of the control-grating the water flows out with a horizontal component. By turning the shaft 19 with the aid of the electric motor 22 the grating can be set in a position such that with respect to the ship the horizontal velocity component brings 10 about the desired displacement of the ship's bow.

Since the discharge opening 5 is located near the ship's bow, with an empty ship air might get into the tunnel 3 so that the tunnel empties. Then the float device 37a with the flap 39 and the switch 42 is of importance. Thanks to 15 this float device the air pump (not shown) ensures that air is immediately sucked out so that the tunnel 3 is again filled with water and is, therefore, always ready for use. Since the water enters the discharge opening without rotation, the same steering effect is obtained in all directions, 20 whilst no additional directional force is exerted on the control-grating.

The device shown may be constructed as a built-in unit, which can be readily mounted in a vessel. It is only necessary to cut openings in the ship's bottom, where the inlet 25 and outlet openings of the unit can be connected. In this way a device for steering a ship's bow can be simply and readily mounted at low costs in a ship already in use.

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Device for steering a ship's bow and device constructed as a built-in unit

CLAIMS:

1. A device for steering a ship's bow with the aid of a directional water stream characterized by a tunnel located inside the ship and a screw pump propeller arranged therein, after which a guide blade wheel is disposed, said tunnel having 5 a discharge opening extending substantially vertically and holding a control-grating adapted to rotate about a vertical shaft and having a plurality of blades extending in the same direction and having a vertical inflow rim and an outflow rim imparting to the outflow of water a horizontal speed component 10 which is in a fixed position with respect to the grating.

2. A device as claimed in claim 1 characterized in that the vertical shaft of the control-grating is provided with a transmission device and a driving device having a remote-controllable electric motor.

3. A device as claimed in claim 1 or 2 characterized in that the tunnel extends substantially in the direction of length of the ship and opens out in the ship's bottom, the discharge opening being located near the front side of
5 the ship and the entrance opening being located further to the rear.

4. A device as claimed in anyone of the preceeding claims characterized in that the entrance opening of the tunnel is provided with a grating for retaining unwanted ob-
10 jects.

5. A device as claimed in anyone of the preceeding claims characterized in that at the highest point of the tunnel a connection is provided for a low pressure air pump, which can be actuated by means of a float and a float switch.
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6. A device as claimed in anyone of the preceeding claims characterized in that the screw propeller pump is coupled by means of a belt transmission with a Diesel engine.

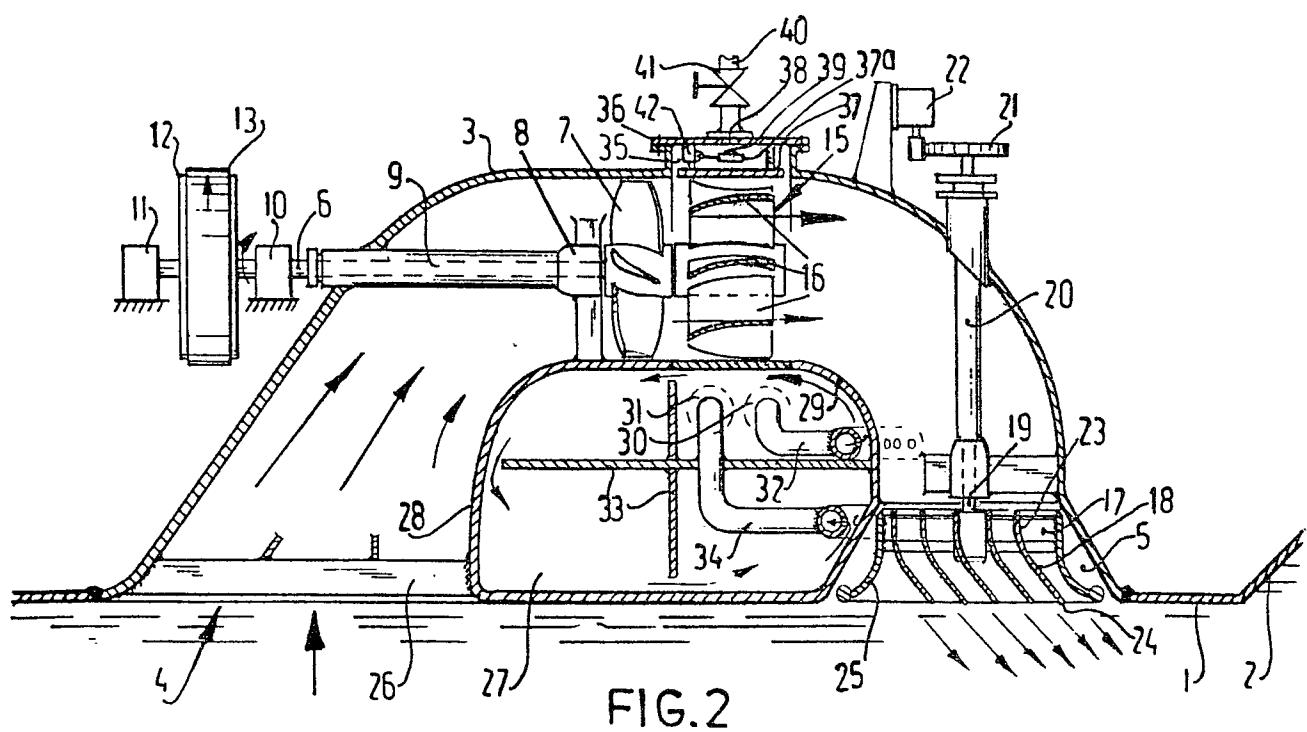
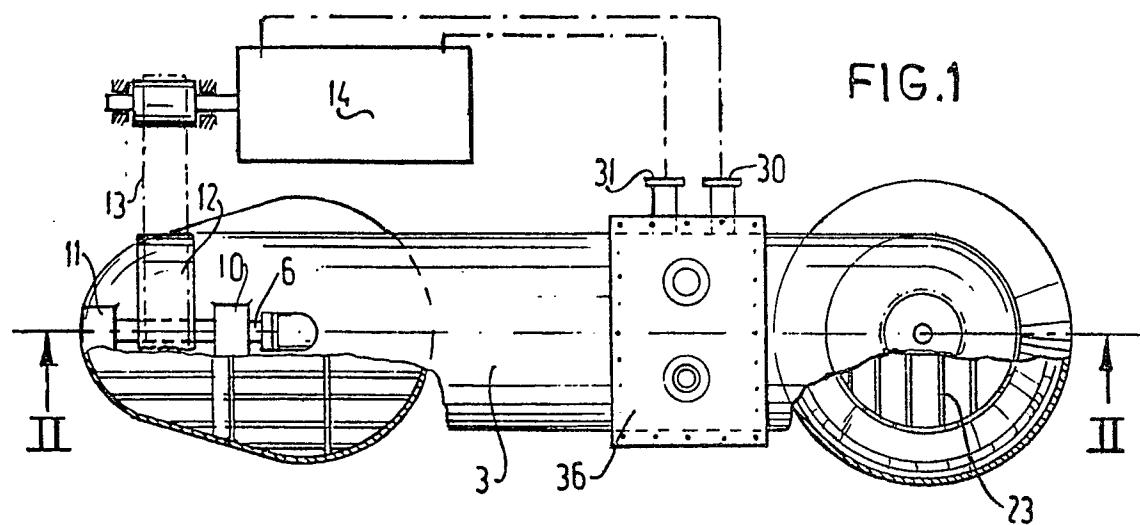
7. A device as claimed in claim 6 characterized in that the space bounded on the lower side by the ship's bottom, on the top side by the horizontal part of the tunnel and at
20 the front and the rear by wall portions of the bends joining the openings of the tunnel is closed on the sides by partitions and is provided with an inlet and an outlet for cooling water of the Diesel engine.

25 8. A device as claimed in claim 7 characterized in that said closed space comprises partitions for compelling the cooling water to flow along the cooled walls of the cooling-water space.

9. A device constructed as a built-in unit for a
30 ship for steering the ship's bow with the aid of a directional water stream, characterized by a tunnel-shaped part comprising a screw pump propeller after which is disposed a guide blade wheel, said tunnel-shaped part having an entrance opening and a discharge opening directed substantially vertically for
35 communication with openings in the ship's bottom, said discharge opening holder a control-grating adapted to rotate about a vertical shaft and having a plurality of blades ex-tending in the same direction and having a vertical inflow rim

and an outflow rim imparting to the outflow of water a horizontal velocity component which is fixed with respect to the grating, the vertical shaft of the control-grating being provided with a transmission device and a driving device having an electric motor, which can be remote-controlled, by a chamber formed near the highest point of the tunnel-shaped part and having a connection for a low pressure air pump, which can be controlled by means of a float and a float switch, by a connection of the screw propeller with a Diesel engine and by laterally closing by means of partitions a space bounded on the lower side by the ship's bottom, on the top side by a horizontal part of the tunnel-shaped part and at the front and the rear by wall portions of the bends joining the openings of the tunnel-shaped part, said partitions joining the ship's bottom on the lower side, and said space having an inlet and an outlet for the cooling water of the Diesel engine, said space being provided with partitions compelling the cooling water to flow along the walls of the space, which walls are cooled in operation.

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EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	GB - A - 662 973 (GILL) * The whole document *	1,2,3, 9	B 63 H 25/46 F 01 P 3/20

X	GB - A - 866 033 (GILL) * The whole document *	1,2,3, 4,9	

X	GB - A - 503 593 (GILL) * The whole document *	1,2,3, 4,9	
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X	FR - A - 2 187 602 (WHITE) * The whole document *	1,2,3, 4,9	B 63 H F 01 P B 63 J

X	GB - A - 658 822 (GILL) * The whole document *	1,2,3, 4,9	

X	US - A - 1 519 580 (GILL) * The whole document *	1,2,3, 9	

X	DE - A - 1 926 454 (WHITE) * The whole document *	1,2,3, 9	CATEGORY OF CITED DOCUMENTS
	---		X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
	GB - A - 936 950 (FLEMING) * The whole document *	1,2,3, 5,9	

	US - A - 3 335 691 (CAHILL)	5	
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X	The present search report has been drawn up for all claims		
Place of search	The Hague	Date of completion of the search	Examiner
		28-03-1980	DE SCHEPPER



EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT		Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages		
	<p>* Column 3, lines 15-24; figure 3 *</p> <p>---</p> <p><u>FR - A - 2 147 683 (DILZER)</u></p> <p>* Page 6, lines 11-13; figure 2 *</p> <p>---</p> <p><u>FR - A - 1 514 519 (PORSCHE)</u></p> <p>* The whole document *</p> <p>---</p> <p><u>GB - A - 1 038 569 (YANMAR)</u></p> <p>* The whole document *</p> <p>-----</p>	*	5
		7,8	7,8
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)