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(71) Applicant: **Bedendo, Michele**
02026 Roccasinibalda (RI) (IT)

(72) Inventor: **Bedendo, Michele**
02026 Roccasinibalda (RI) (IT)

(54) A device to reverse the srew-propeller thrust, with the functions of hydrodynamic brake and rudder

(57) A device to reverse the screw-propeller thrust, with functions of hydrodynamic brake and rudder.

The object of the invention is to provide a simple and efficient device which carries out the reversal of the screw-propeller thrust in a short time, with a hydrodynamic brake and rudder capability.

Said device has a couple of main movable components facing each other, with vertical axes of rotation(7,8). One main movable component has two secondary plane vertical surfaces(9,10) one of which is movable(9), the other(10) is fixed. When the two main components make an angle with its vertex on the opposite side of propeller, this shape first makes the device cause the division of the propeller flow followed by the reversal of it. Without the propeller thrust, the device operates like a hydrodynamic brake. When the two main movable components rotate in parallel fashion, they will operate like a rudder.

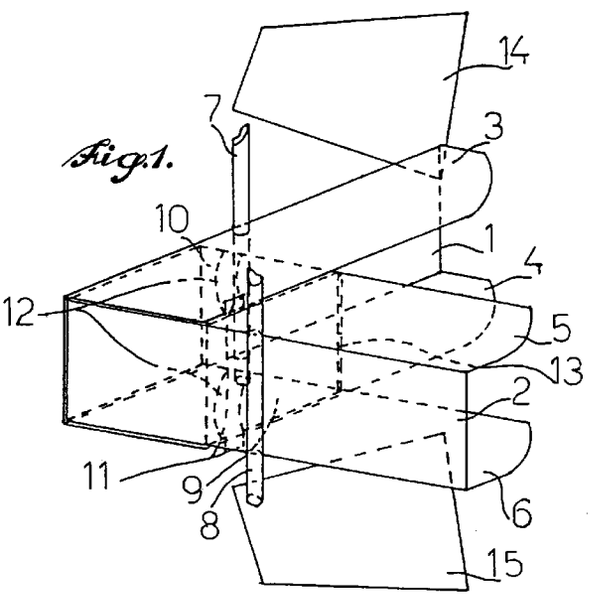

Fig.1.

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Description

[0001] A device to reverse the screw-propeller thrust, with the functions of hydrodynamic brake and rudder.

[0002] In the naval field, the reversal of the motion of craft is generally achieved by means of reversing gears. This solution is quite for limited power engines, while other systems are recommended for bigger power engines especially for those used by ships. The systems used for the reversal of the movement of ships are usually: turbines for moving backwards, variable screw pitch, stop and reverse the direction of rotation of the main engine.

[0003] The present invention concerns a device that carries out three different functions: to reverse the screw-propeller thrust, hydrodynamic brake and rudder functions. The first and the third functions can also be performed by a naval jet, whose power flow creates the pulsion force. In naval jet propulsion the rudder function is generally carried out by turning the jet flow horizontally. Instead, the reversal of the propulsion force is carried out by means of a big spoon-like tool which, when placed in front of the jet flow, directs it underneath the keel of the craft. As of the moment no device is being used with a specific hydrodynamic brake function, a function obtained with a statical structure. Further, no ship has in use any system placed behind the propeller to reverse the screw-propeller thrust.

[0004] This invention seeks to provide a simple, economical and efficient device that can carry out the reversal of the screw-propeller thrust in a short time, without changing the direction of rotation of the main engine. In addition, the device, which is the object of the invention, can be used like a hydrodynamic brake, so that it will be possible to reduce and stop the ship headway without the engines. Finally, the device operates normally like a main rudder.

[0005] On the basis of the present invention, this object is accomplished in a device, placed behind the propeller, consisting of two main movable components which can be rotated on their vertical axes. When rotating together in parallel manner they constitute the rudder. When rotating in opposite directions,thus forming an angle with its vertex on the opposite side of propeller, the device serves to reverse the screw-propeller thrust. In the above condition, with a much larger spread of the angle, and without the propulsion force of propeller, the device will operate like a hydrodynamic brake. This device, which is the aim of the invention, will have a number of advantages as a result. Since the two main movable components rotate together in parallel fashion, they will function as a rudder. And as the two main components constitute a directed duct for the propeller flow, the rudder effect is improved.

[0006] In order to obtain the reversal of the screw-propeller thrust, it is enough to rotate the two main movable components in the opposite directions so as to get an angle with its vertex on the opposite side of propeller. As a result, it is not necessary to operate on the rotating direction of the main engine but to reduce its power. No reversing gears, no moving astern turbine, no variable screw pitch is required, with economical advantages, and above all the operating time of the reversal manoeuvering is quite immediate and the effectiveness of the device is more than seventy percent of the at the disposal of the ship propeller power.

[0007] By changing, also in asymmetrical fashion, the spread of the angle formed by the two movable components, it is possible to change the direction of the propeller thrust as one wishes, from a maximum inverse axial propeller thrust to a maximum side propeller thrust, as a result there will be greater advantages in steering the ship. Moreover, the effectiveness of the device is not connected with the naval propulsion system which is used.

One more advantage of the device, object of the invention, is that it can be used like a hydrodynamic brake. Without the use of the propeller, by rotating the two movable components, in order to form an angle with its vertex on the opposite side of the propeller, and adjusting this angle from approximately zero to a flat angle or more, it will be possible to reduce and stop the ship headway.

[0008] The control system of such a device, object of the invention, is slightly more complex than what it is necessary for a normal main rudder, so that reliability of service is improved.

[0009] The invention will now be described by means of an example and with reference to the accompanying drawings in which:

Figure 1 is a perspective view illustrating the device, object of the invention, in reversal of the screw-propeller thrust order, the plane-fixed trapezoidal surfaces are in exploded view; and

Figure 2 is a perspective view illustrating the device, object of the invention, in rudder order, the plane-fixed trapezoidal surfaces are in exploded view.

Figure 1 illustrates the two main movable components with the principal plane vertical surfaces 1,2 of different vertical width, each of them has two plane-fixed surfaces 3,4,5,6 which are at right angles to them. Both main movable components rotate on their vertical axes 7,8 and these axes are fixed to the respective principal plane vertical surfaces 1,2.

[0010] The main movable components, which has the principal vertical surface of smaller vertical width 2, has two secondary plane vertical surfaces 9,10, one of them is fixed 10 and, with its horizontal sides, it 10 is joined to the posterior part of the horizontal free sides of the two plane-fixed surfaces 5,6 which are at right angles to the principal plane vertical surface of the smaller vertical width 2. The other secondary plane vertical surface 9 is movable, and through the hinge 13 and with its front vertical side it 9 is joined to the front vertical side of the sec-

ondary plane-fixed vertical surface 10. The secondary plane movable vertical surface 9 has on each of its horizontal sides, the upper and lower sides, one appendix 11 to which corrispondence, on each plane-fixed surface 5,6 at right angles, a part of circular corona-shaped area 12, whose centre angle has its vertex in the hinge 13, is missing.

[0011] Two trapezoidal plane surfaces 14,15, here in exploded view, parallel to the horizontal plane passing through the longitudinal axis of the device, object of the invention, form the fixed structure. These two trapezoidal plane surfaces 14,15 are placed between the propeller and the axes of rotation 7,8 outside the two main movable components.

Claims

1. A device, object of the invention, which performs the functions of the reversal of the screw-propeller thrust, hydrodynamic brake and rudder, characterised in having at least two main movable components with the principal plane vertical surfaces(1,2) of different vertical width between them and of quadrangular shape, each of which has two plane-fixed surfaces(3,4,5,6) which are at right angles to these two(1,2), both main movable components rotate on their vertical axes(7,8) and these axes are fixed to the respective principal plane vertical surface(1,2), the main movable component which has the principal plane vertical surface of the smaller vertical width (2), has two secondary plane vertical surfaces(9,10), one of which is fixed(10) and it(10) has its horizontal sides joined to the posterior part of the horizontal free sides of the two plane-fixed surfaces(5,6) which are at right angles to the principal plane vertical surface of the smaller vertical width(2), the other secondary plane vertical surface(9) is movable, and with its front vertical side it(9) is joined through the hinge(13) to the front vertical side of the secondary plane-fixed vertical surface(10), the secondary plane movable vertical surface(9) has on each of its horizontal sides, the upper and lowers ones, one appendix(11) to which corrispondence, on each plane-fixed surface at right angles(5,6), a part of circular corona-shaped area(12), whose centre angle has its vertex in the hinge(13), is missing, two trapezoidal plane surfaces(14,15), parallel to the horizontal plane passing through the longitudinal axis of the device, form the fixed structure, said trapezoidal surfaces(14,15) are placed between the propeller and the axes of rotation(7,8) outside the main movable components which have the principal plane vertical surfaces(1,2), further more the framework made of bars and spars forms the support structure of the device which is the object of the invention.

2. The device as claimed in Claim 1, characterised in that the principal plane vertical surface(2), of the main movable component with the two secondary plane vertical surfaces(9,10), has a smaller vertical width than the one(1) of the other main movable component.

3. The device as claimed in Claim 1, characterised in that both principal plane vertical surfaces(1,2) have fixed to each one of their horizontal sides, the upper and lower ones and for all their length, a plane-fixed quadrangular-shaped surface(3,4,5,6) at right angles to the respective principal plane vertical surface(1,2), as said plane-fixed quadrangular-shaped surfaces(3,4,5,6) overhanging towards the longitudinal axis of the device, object of the invention.

4. The device as claimed in Claim 1, characterised in that the secondary plane movable vertical surface(9) has a more limited vertical width, appendices(11) excluded, than the internal vertical width of the principal plane surface(2).

5. The device as claimed in Claim 1, characterised in that the position of the main movable component with the two secondary plane vertical surfaces(9,10) can be at the right side or at the left side, looking from stem to stern of the ship, with reference to the longitudinal axis of the device, object of the invention.

6. The device as claimed in Claim 1, characterised in that the secondary plane vertical movable surface(9) has on each one of its two horizontal sides, the upper and lower aides, one appendix(11) obtained in this case by extension of one part of the plane surface that forms the secondary plane vertical movable surface(9), in any case, this appendix(11) can be substituted by any other equivalent pin.

7. The device as claimed in Claim 1, characterised in that the main movable components, by rotating in opposite directions on their vertical axes(7,8), can get a "V" shape with its vertex on the opposite side of the propeller.

8. The device as claimed in Claim 1, characterised in that the secondary plane vertical surfaces(9,10) by rotating of the main movable components, as claimed in Claim 7, get a "V" shape with its vertex on the same side of the propeller.

9. The device as claimed in Claim 1, characterised in that the outlines of the surfaces whose device, object of the invention, is made up, for purposes of construction and/or use, can be modified or changed always on the basis of the concept of the invention.

10. The device as claimed in Claim 1, characterised in that it is made of various metals and/or in reinforced plastic materials and/or in reinforced synthetic resins and/or in other materials having equivalent mechanical properties.

Fig.1.

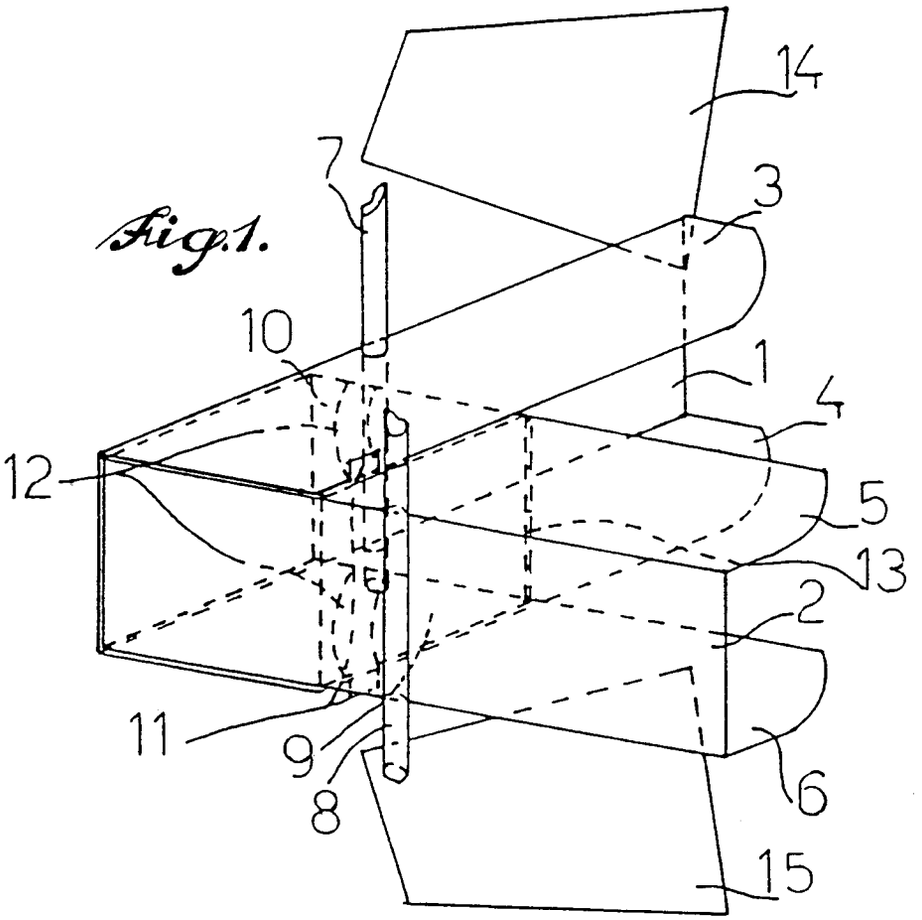
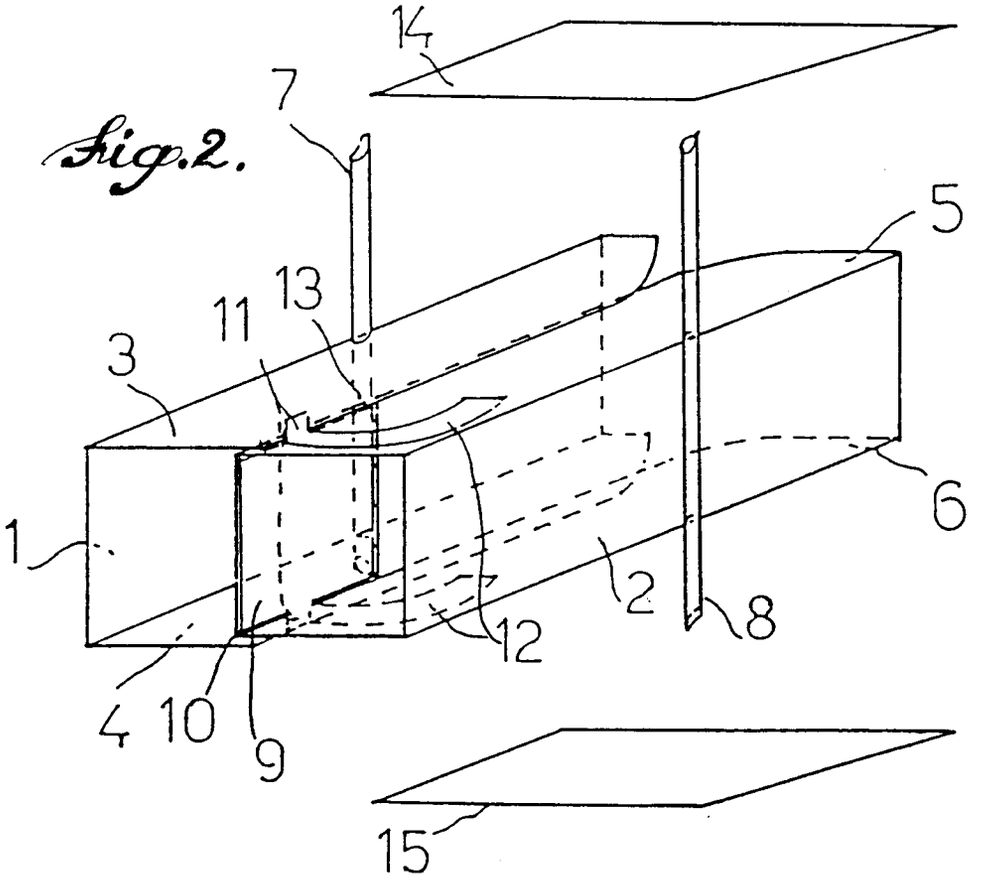


Fig.2.



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EUROPEAN SEARCH REPORT

Application Number
EP 97 10 7688

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	GB 195 301 A (KITCHEN'S REVERSING RUDDER COMPANY LTD) * page 2, line 75 - page 3, line 8; figures 1-3 *	1-9	B63H25/38
A	US 1 572 812 A (REES) * the whole document *	1-9	
A	US 1 402 080 A (MC NAB) * page 1, line 62 - line 94; figures 1-4 *	1-9	
A	BE 342 225 A (MOTTE) * the whole document *	1-9	
A	US 2 544 642 A (ABBOTT) * column 2, line 12 - line 13; figures 1-3 *	1-10	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B63H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 June 1997	DE SENA, A

CATEGORY OF CITED DOCUMENTS

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09-06-1997

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 1572812 A	09-02-1926	NONE	
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US 2544642 A	13-03-1951	NONE	

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