Nov. 29, 1960 H. MELLO 2,961,987

RUDDERS FOR SHIPS

Filed Aug. 13, 1958

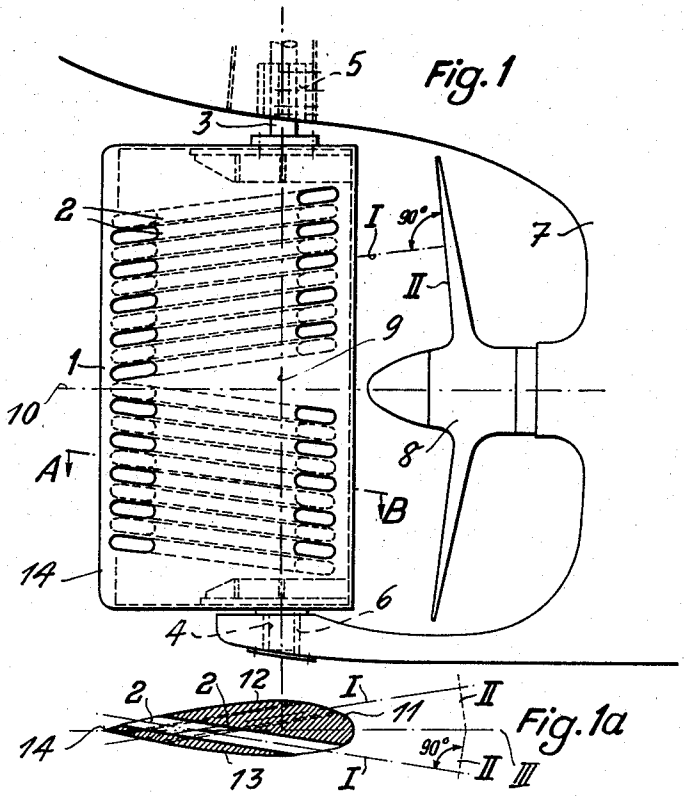


Fig. 1

Fig. 1a

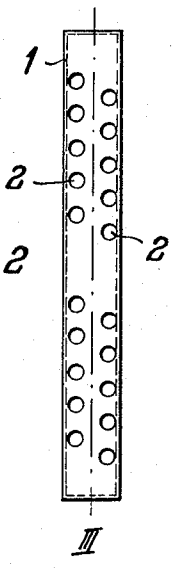


Fig. 2

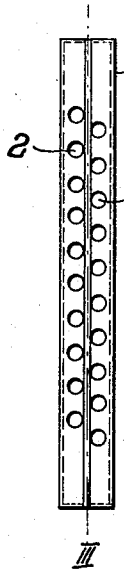


Fig. 3

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RUDDERS FOR SHIPS

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1 Claim. (Cl. 114—162)

This invention relates to ships' rudders, and is concerned more especially, but not exclusively, with rudders for propeller driven ships.

Conventional rudders for ships offer an unnecessarily high resistance to the water. When the helmsman puts the wheel over, a hydrodynamic pressure is set up on the upstream side of the rudder and a sub-normal pressure on the downstream side thereof, whereby a strong eddy formation is produced in the vicinity of the rudder. These phenomena produce a restraint on the speed of the ship, without being necessary for the desired influencing of the course of the ship.

One object of the invention is to provide a ship's rudder which, in use, has smaller flow resistance and with which eddy formation can be avoided, so that the result hereby obtained is that the propulsion power of the ship is better utilised, whereby the speed can be increased with the same fuel consumption or the fuel consumption can be reduced with the same speed.

A further object of the invention is to provide a ship's rudder which has a particularly high transverse force in order to reduce the angle of deflection of the rudder when turning the wheel and/or to reduce the dimensions of the rudder, so as to be able to relieve the strain on the steering gear and improve the manoeuvrability of the ship.

According to the invention, the rudder body is formed with passages or ducts which are arranged one above the other and which extend through the rudder body alternately from the port side at the front of the rudder body to the starboard side at the rear thereof and from the starboard side at the front to the port side at the rear.

According to a further feature of the invention, the passages may be so arranged that the point at which the passages intersect, when seen in horizontal plan view, is to the rear of the pivot axis of the rudder body.

The outer boundary walls of the rudder body can be made streamlined in a manner known per se. The rudder can, however, take the form of a flat plate with plane wall surfaces.

For a better understanding of the invention and to show how it may be carried into effect, the same will now be described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a diagrammatic side elevation of a ship's rudder according to an embodiment of the invention, the rudder being shown fitted to a ship having a propeller,

Figure 1*a* is a section along the line A—B of Figure 1,

Figure 2 is a view of the rudder as seen from the front, and

Figure 3 is a view of the rudder as seen from the rear.

In the illustrated embodiment, the rudder comprises a body **1** formed with passages or ducts **2** which pass through the rudder body alternately from the port side at the front towards the starboard side at the rear and from the starboard side at the front to the port side at the rear. The rudder body has at its upper and lower ends, axle members **3** and **4** respectively, mounted in co-operating

bearings **5** and **6** secured in the hull of the ship, of which part of the outline is shown diagrammatically at **7**. The arrangement permits pivotal movement of the rudder body about an axis **9** extending in the medial plane III of the rudder body. The rudder body is disposed, in the present embodiment, so that its transverse axis **10** is in substantial alignment with the axis of rotation of the ship's propeller shown at **8**.

In the present constructional embodiment, the rudder body is of streamlined form, as shown in Figure 1*a*, the body being of curved formation along its front part **11** and having opposite curved side faces **12, 13** disposed symmetrically with respect to the medial plane III and extending rearwardly and merging along the rear edge **14** of the body. If desired, however, the rudder body may be in the form of a flat plate with plane wall surfaces. In the illustrated embodiment, the axes I of the passages are substantially at right-angles to the generatrices II of the propeller when the rudder is amidships. The point of intersection of the passages, when seen in horizontal plan view, are to the rear of the pivot axis of the rudder body. Thus, as shown in Figure 1, there is formed in the body an upper series of passages **2** arranged generally above the transverse axis **10**, wherein the passages are inclined rearwardly and downwardly, and a lower series arranged generally below the transverse axis **10** and wherein the passages are inclined rearwardly and upwardly. Moreover, the passages disposed one above another in each series, are alternately inclined to the medial plane III so that, when viewed from above as in Figure 1*a*, the passages intersect at a point located rearwardly of the pivot axis **9**.

The invention renders it possible that a negative pressure is obtained in two systems of passages. This negative pressure, being cross-effective, stabilizes the course in the straight ahead position of the rudder. In the port or starboard positions of the rudder, this stabilizing effect is transformed into torque whereby the reaction and steering effect of the rudder is enhanced. Both passage systems actually form additional stabilizing planes or steering planes, which are combined in one single rudder body. Further, when its propeller is stopped, a ship provided with a rudder in accordance with the invention has a better course constancy.

When the helm is put over, not only the external surface of the rudder on the upstream side is acted upon by the flow pressure, but also the wall surfaces of the passages or ducts in the rudder body through which the water is flowing. In this way, the transverse force for turning purposes and the steering action are improved, so that the angle of deflection of the rudder which is necessary for producing an alteration in the course of the ship, can be smaller and/or the rudder can be made of smaller dimensions. At the same time, the strain on the complete steering gear is reduced. The rudder itself, the steering engine and the parts serving to transmit the steering force can be made smaller. A ship equipped with the rudder also responds more quickly to the wheel than when it is equipped with one of the conventional constructional forms of rudders and, since the angle of deflection of the rudder is smaller, the losses in speed which occur when changing course are also smaller. The smaller angle of deflection of the rudder is particularly advantageous for sea-going ships, since a continuous movement of the wheel is necessary because of the winds and the waves at sea in order to keep course.

The possibilities of the use and design of the invention are not restricted to the example which is described herein and shown in the drawings. A ship's rudder according to the invention can be adapted to the particular requirements which are met with vessels of all types and equipped with rudders.

I claim:

A rudder for a ship, said rudder comprising a body, axle means at opposite ends of said body for movement thereof about a pivot axis located in the medial plane of said body, said body being provided with passages disposed one above another, said passages extending through said body alternately from the port side thereof at the front of said body to the starboard side thereof at the rear of the body, and from the starboard side at the front of said body to the port side at the rear of said body, the passages crossing one another rearwardly of said pivot axis.

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