Sept. 21, 1926. 1,600,419

R. MAINELLI

RUDDER WITH HORIZONTAL AXIS

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Fig. 1

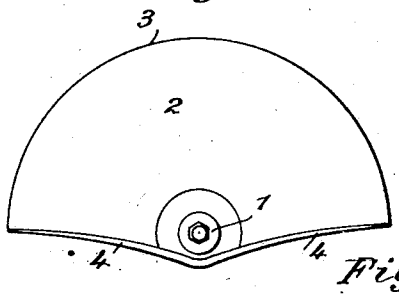


Fig. 2

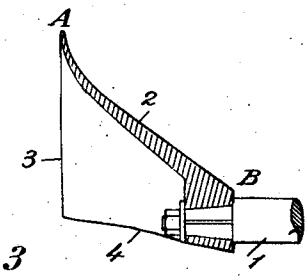


Fig. 3

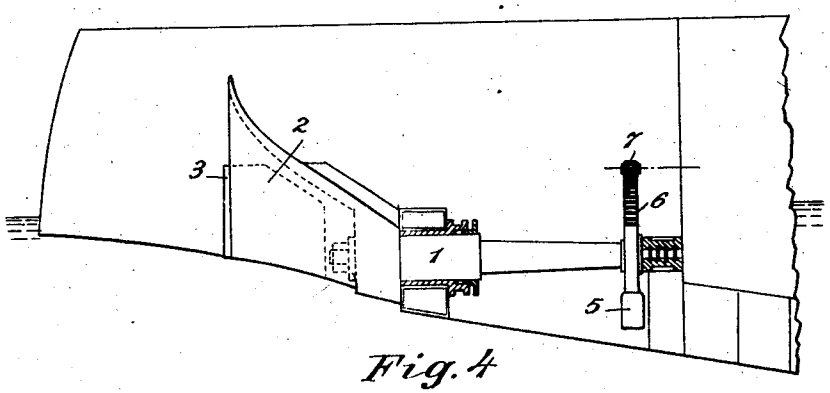
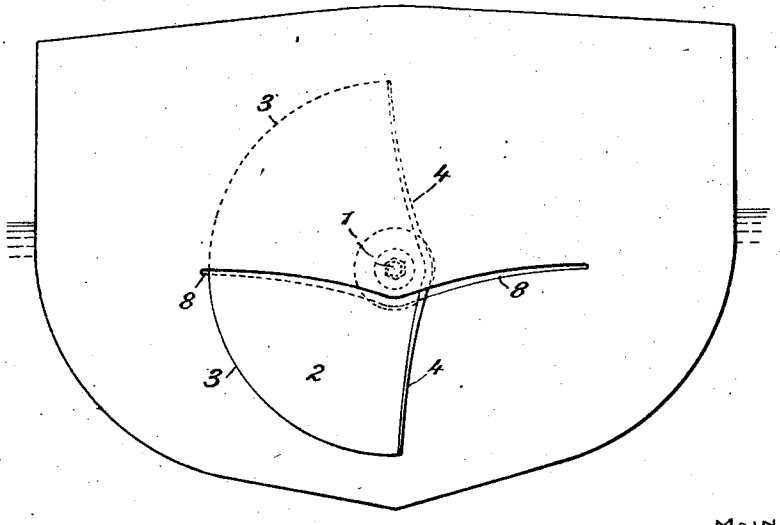


Fig. 4



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Fig. 5.

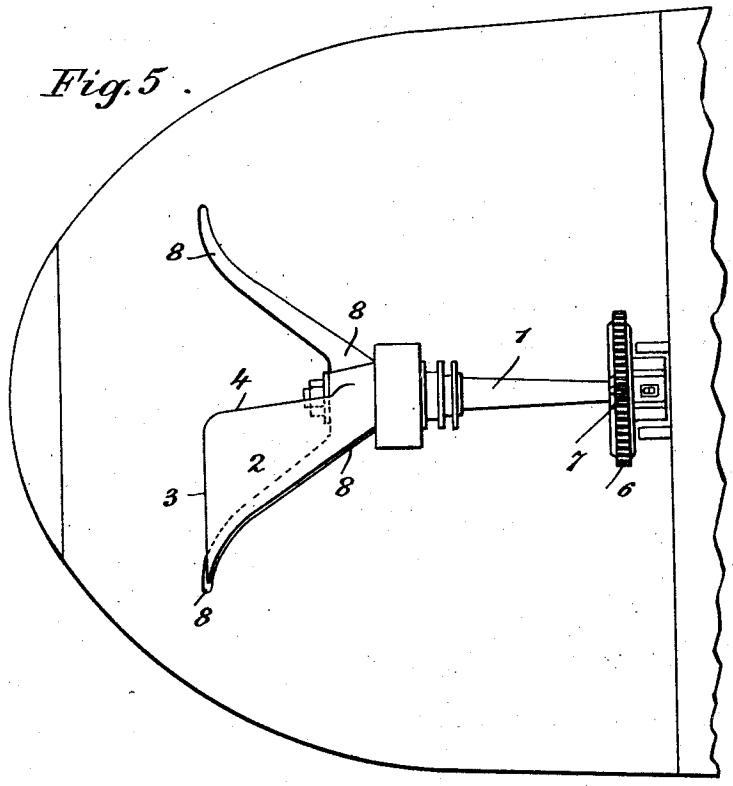


Fig. 7

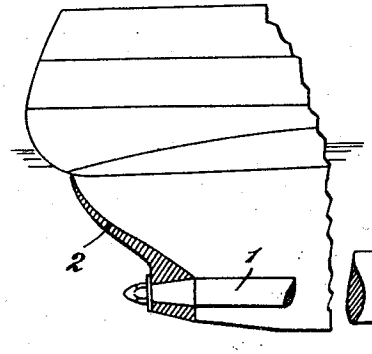
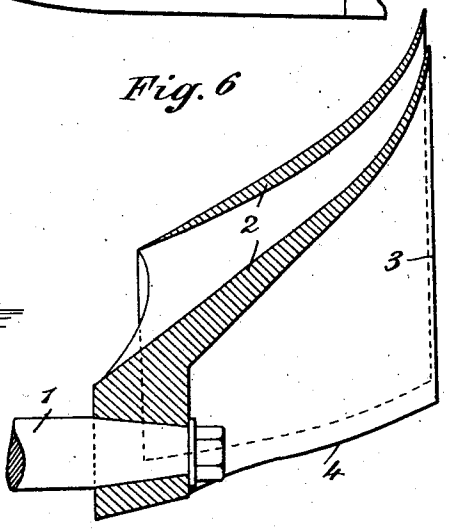


Fig. 6



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UNITED STATES PATENT OFFICE.

ROBERTO MAINELLI, OF NAPLES, ITALY.

RUDDER WITH HORIZONTAL AXIS.

Application filed December 8, 1925, Serial No. 74,037, and in Italy January 2, 1925.

The present invention relates to a rubber with horizontal axis for hulls of sea boats or flying machines characterized in that no resistance is opposed to the movement of the hull when going straight ahead, that is when the hull has not to deviate from a straight course.

The rudder is remarkable, as said, for having the axis of rotation horizontal, parallel or nearly parallel to the line from stem to stern of the ship, the shape of the rudder being like the half of a bell (divided by a nearly axial plane).

The invention is illustrated in the accompanying drawings, in which:—

Fig. 1 shows a back elevation of the rudder.

Fig. 2 is a vetrical longitudinal section of the rudder.

Fig. 3 is the rudder shown in Fig. 2 but applied to the stern of a ship.

Fig. 4 shows a back elevation of a stern rudder according to invention but rotated about 90° to the left.

Fig. 5 is a plan view of Figs. 3 and 4, the rudder being, however, rotated to the right about 90°, the opening provided in the submerged hull or bottom of the ship being shown at the same time.

Fig. 6 shows a longitudinal vertical section of a modification of the invention, the rudder being provided with two blades.

Fig. 7 shows a longitudinal vertical section of a further modification, the rudder lying outside the ship.

The rudder is allowed to rotate according to a horizontal or nearly horizontal axis placed in symmetry plane of the ship.

The rudder is shaped like half of a bell or more exactly the shape resembles a surface of revolution having for its own rotation axis the rotation axis of the rudder, the generating line being a section of a right line or curve with one end on the axis of rotation, the other end on a circumference lying in a plane perpendicular to the axis of rotation the centre being on the same axis.

This surface of revolution does not comprise the whole circumference, but is generally limited to 180°, or even less.

With reference to Figures 1 and 2, whatever may be the modification of the invention, reference number 1 represents the axle of rotation of the rubber, 2 the blade of the rudder, 3 the circular edge on which the end A of the line portion A B, generatrix of the effective surface, bears. 4 shows the lower edge of the rudder, this edge being geometrically the intersection of the said surface of revolution (of the rudder) with the external surface of the submerged hull or bottom of the ship, the said hull or bottom being accordingly provided with a slit 8 generally submerged, out of which the rudder may project by about 90° on the right or left.

The mass of the blade 2 forms, with respect to axle 1, a system in unstable equilibrium, the equilibrium is restored to the indifferent condition by means of a counterweight 5 provided on the part of the axle inside the ship (Fig. 3).

There also is keyed the gear 6 engaged with pinion 7 connected to the servomotor of the rudder, as generally used today for the rudders with vertical axis; 8 in Fig. 6 shows the slit of the chamber out of which the rudder enters into the water to cause the socalled "dissymmetry of careen".

Such slit, impairing of course the resistance of the careen must be reinforced by devices technically known in the art.

The edges of said slit may lie in to the submerged hull or bottom without interruption or the edge lying astern may be bent inside in such a way as to form a step on the hull or bottom so that the resistance opposed to the movement is diminished. Small lids may be also provided to be shut when steering course.

The rudder according to invention and above description, when the ship is on the course does not project out of the submerged hull or bottom, consequently not opposing to the movement any remarkable resistance (direct and indirect) offered by the vertical rudders generally used.

Theoretically speaking no device is required for the action of the rudder, there being only frictional resistances to be overcome more or less remarkable according to the more or less favorable technical realization of the invention and of course according to the size of the same rudder.

But if desired the rudder may be more or less rapidly worked by using servomotors of a comparatively very small power.

The rudder according to invention may however also be arranged outside the ship as illustrated in Fig. 7 and be provided with two, three or more blades with openings or not, and reinforced or not by convenient devices.

Many different modifications of the invention especially as to the shape of the rudder may be suggested, the invention being applicable not only to water craft, but also to air craft and submersible apparatus of every kind, all said modifications being comprised within the scope of the invention.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

Rudder for dirigible marine and aerial vehicles, having no portion projecting in its inoperative position, from the body or hull of the vehicle and having its horizontal or nearly horizontal axis placed in the vertical plane of symmetry of said vehicle, the blade of said rudder having the shape of a surface of revolution generated by the revolution, through an angle of 180° around said horizontal axis, of a portion of a line right or curved with one end of said axis.

In testimony whereof I have hereunto signed my name.

ROBERTO MAINELLI.