April 25, 1939. C. VON DEN STEINEN 2,155,456

STABILIZING DEVICE FOR SHIPS

Filed Jan. 18, 1938

Fig. 1

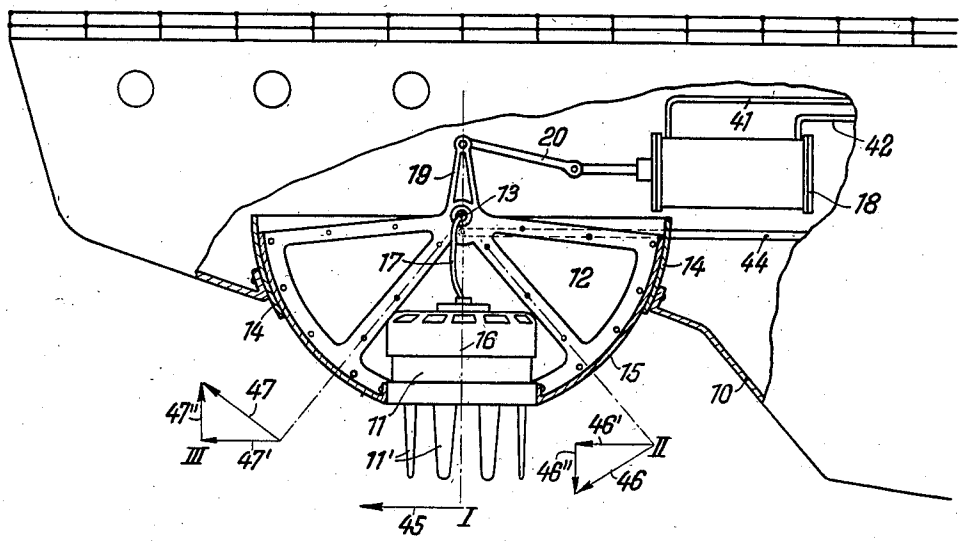
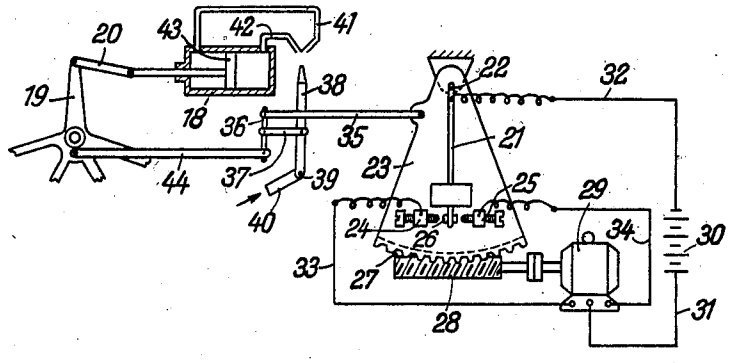


Fig. 2



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STABILIZING DEVICE FOR SHIPS

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Application January 18, 1938, Serial No. 185,579
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2 Claims. (Cl. 115—52)

This invention relates to stabilizing devices for ships, more particularly to devices for stabilizing a ship against pitching movements, i. e. an inclination of the longitudinal axis of the ship with respect to the horizontal.

It is an object of this invention to provide a simple and reliable stabilizing device which will not only maintain the longitudinal axis of the ship aligned with the horizontal, but also provide propelling energy for the ship.

According to this invention I provide in a ship a Schneider propeller near one end thereof together with means for inclining the axis of rotation of the propeller in response to pitching movements of the ship, whereby a force will be exerted on the ship counteracting the pitching movement.

The Schneider propeller is well known in the art and described, for example, in my copending application Ser. No. 185,580, filed January 18 1938. The Schneider propeller includes a plurality of substantially parallel blades which are adjustably mounted in a rotatable support and extend into the water. A force is exerted on the water by rotating the support about an axis parallel to the direction of the blades and by simultaneously adjusting the blades in pitch relatively to the support.

It is well known in the art that a Schneider propeller mounted near one end of a ship will exert a propelling force on the same, the direction of which may also be varied for the purpose of steering the ship in any desired direction.

According to this invention, I propose to mount the Schneider propeller for inclination about a substantially horizontal axis, normal to the longitudinal axis of the ship, whereby upon inclination of the propeller axis the propeller will exert a vertical force on the ship for stabilizing the same.

Further aims, objects and advantages of this invention will appear from a consideration of the description which follows with the accompanying drawing showing for purely illustrative purposes an embodiment of this invention. It is to be understood, however, that the description is not to be taken in a limiting sense, the scope of this invention being defined in the appended claims.

Referring to the drawing:

Fig. 1 is an elevation, partly in section, of a Schneider propeller mounted on a ship according to this invention.

Fig. 2 is a diagram illustrating a form of control device for adjusting the propeller.

In the body of a ship 10 near to one end thereof a Schneider propeller 11 is mounted in a semi-cylindrical cradle 12 movable about a rocking axis 13 disposed substantially horizontal and normal to the longitudinal axis of the ship. The body of the ship is provided with semi-cylindrical surfaces 14 into which the cylindrical surface 15 of the cradle is fitted to prevent water from entering the ship.

The Schneider propeller in the illustrated example is of the electrically driven type in which an electric motor in the casing 11 rotates the blades 11' about the propeller axis 16. Electric energy is supplied to the propeller through a cable 17 passing through the hollow axis 13 in the cradle.

For rocking the cradle about the axis 13 a servo-motor 18 is shown in the illustrated embodiment connected to an arm 19 of the cradle through a connecting rod 20.

A suitable form of apparatus for controlling the movements of the servo-motor 18 will now be described.

A device responsive to inclinations of the longitudinal axis of the ship with respect to the true vertical is shown in the illustrated example as being a pendulum 21 which may be of the short or long period type. The short period type will respond to deviations of the ship from the direction of the apparent vertical, while the long period type will respond to deviations from the true vertical.

The pendulum 21 is mounted about an axis 22 for oscillating movements parallel to the longitudinal axis of the ship.

For the deriving positional impulses for actuating a control device the pendulum is shown as combined with a follower member 23 having contacts 24 and 25 between which contacts 26 of the pendulum are arranged. The follower member has a toothed edge 27 meshing with a worm 28 driven by a reversible motor 29. A source of electric energy 30 is connected with the motor through a lead 31, a further lead 32 leading to the movable contact 26 of the pendulum 21. Leads 33 and 34 connect the contacts 24 and 25 with the motor 29.

The operation of the follower device so far described is as follows:

Upon a relative displacement of the pendulum and the follower member one of the pair of contacts 24, 26 or 25, 26 will be closed causing the motor 29 to turn the follower member into alignment with the pendulum. It is easily seen that the position of the follower member following the

movements of the pendulum will provide a measure for the pitching movements of the ship.

A positional impulse is taken off the follower member through a link 35 pivotally connected to one end of a double-armed lever 36. The double-armed lever is connected through a link 37 to the movable part of a relay, in the illustrated example a jet-pipe relay of the well known "Askania" jet-pipe type. The relay comprises a movable jet-pipe 38 pivoted at 39 and supplied with pressure fluid through a conduit 40. The jet-pipe issues a jet of pressure fluid into reception orifices 41 and 42 depending upon the relative position of the jet-pipe and the orifices.

The reception orifices communicate with the interior of the servo-motor 18 in which a piston 43 is movably connected to the arm 19 of the cradle to the connecting rod 20.

For making the movements of the servo-motor proportional to the movements of the relay, a follow-up connection is provided, in the illustrated embodiment a link 44 connected to the second arm of the double-armed lever 36.

The operation of the device is as follows:

Assuming that the longitudinal axis of the ship be inclined to cause the front part of the ship to project out of the water while the stern is covered with water, the pendulum 21 will move clockwisely relatively to the follower member. The follower member will move the jet-pipe to register with the orifice conduit 42, whereby the motor 18 is caused to rock the cradle in counterclockwise direction. The rod 44 will after a certain inclination of the cradle cause the relay to return to its neutral position, whereby the movements of the cradle are interrupted after a certain inclination proportional to the pitch of the ship.

The propeller 11 which exerts a horizontal force indicated by the arrow 45 when in the normal position I, will now in the new position II exert a force indicated by the arrow 46 which may be split up into a horizontal component 46' propelling the ship and a vertical component 46'' counteracting the pitching movement of the ship and tilting to lift the stern of the ship out of the water.

When the ship pitches in the opposite direction, the cradle will move the propeller into a position III in which a force 47 is exerted by the propeller. The force 47 may again be split up into a horizontal component 47' propelling the ship and a vertical component 47'' counteracting the pitching movement.

Obviously, the present invention is not restricted to the particular embodiment herein shown and described.

What is claimed is:

1. The combination with a ship's body; of a propeller having a plurality of blades arranged parallel with the axis of rotation of the propeller; means for mounting said propeller on said body for movement about a tilting axis normal to the axis of rotation of the propeller and substantially normal to the longitudinal axis of the ship; and means responsive to longitudinal inclinations of the ship with respect to the horizontal for inclining the axis of rotation about said tilting axis, whereby the propeller is caused to exert a force on the ship counteracting the longitudinal inclinations of the ship.

2. The combination with a ship's body; of a semicylindrical cradle forming part of the bottom of the ship's body and positioned near one end thereof, said cradle being mounted for rocking movement about an axis normal to the longitudinal axis of the ship; a propeller having a plurality of blades arranged parallel with the axis of rotation of the propeller, said propeller being mounted on said cradle with its axis of rotation normal to the rocking axis and with the blades extending into the water; and means responsive to longitudinal inclinations of the ship with respect to the horizontal for rocking said cradle, whereby a vertical component of the propeller force will counteract the inclinations of the ship, stabilizing the same.

CARL VON DEN STEINEN.