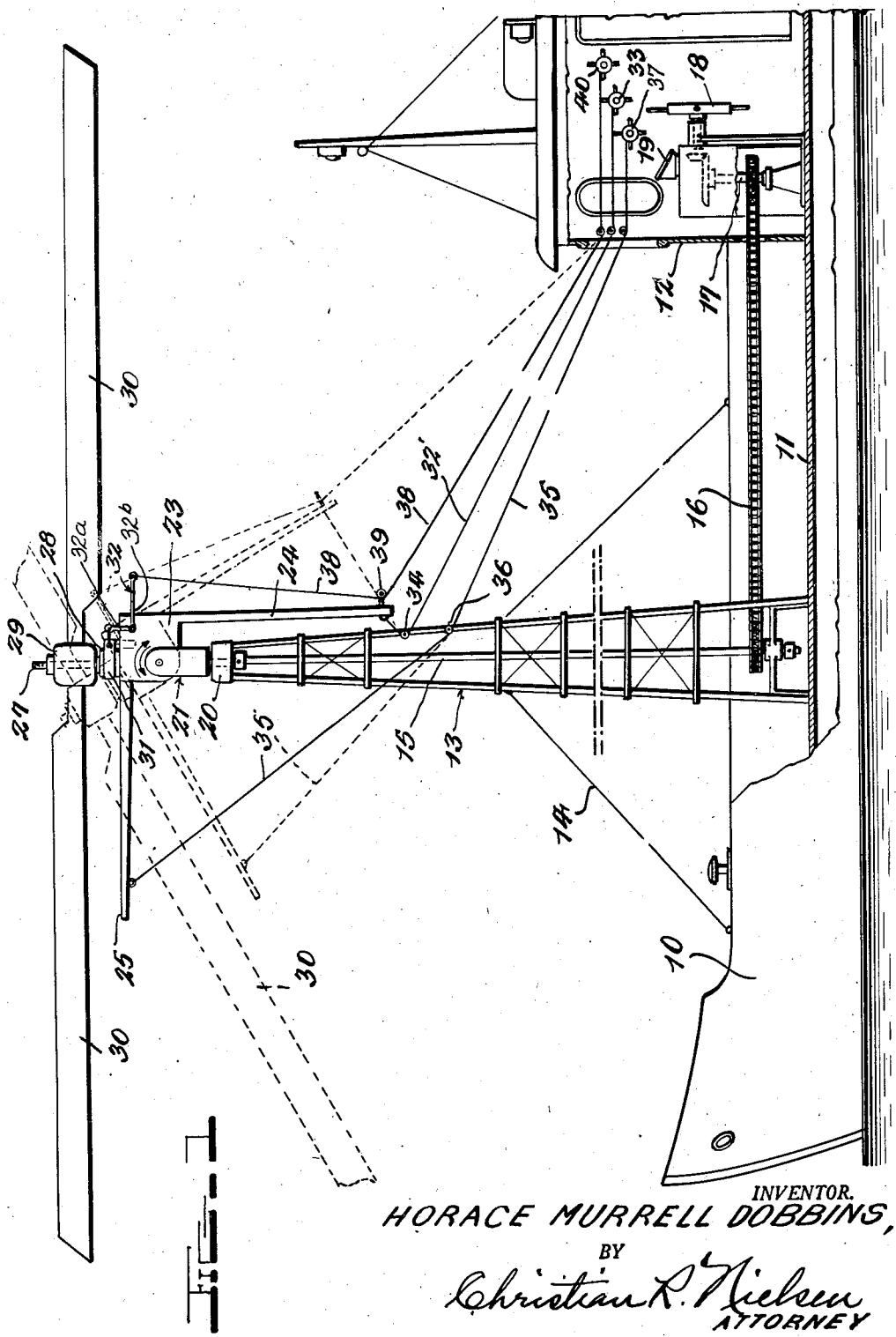
Oct. 1, 1946. H. M. DOBBINS 2,408,412

PROPULSION AND STABILIZATION OF WATERCRAFT AND THE LIKE

Filed Feb. 16, 1944 2 Sheets-Sheet 1



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FIG. 2

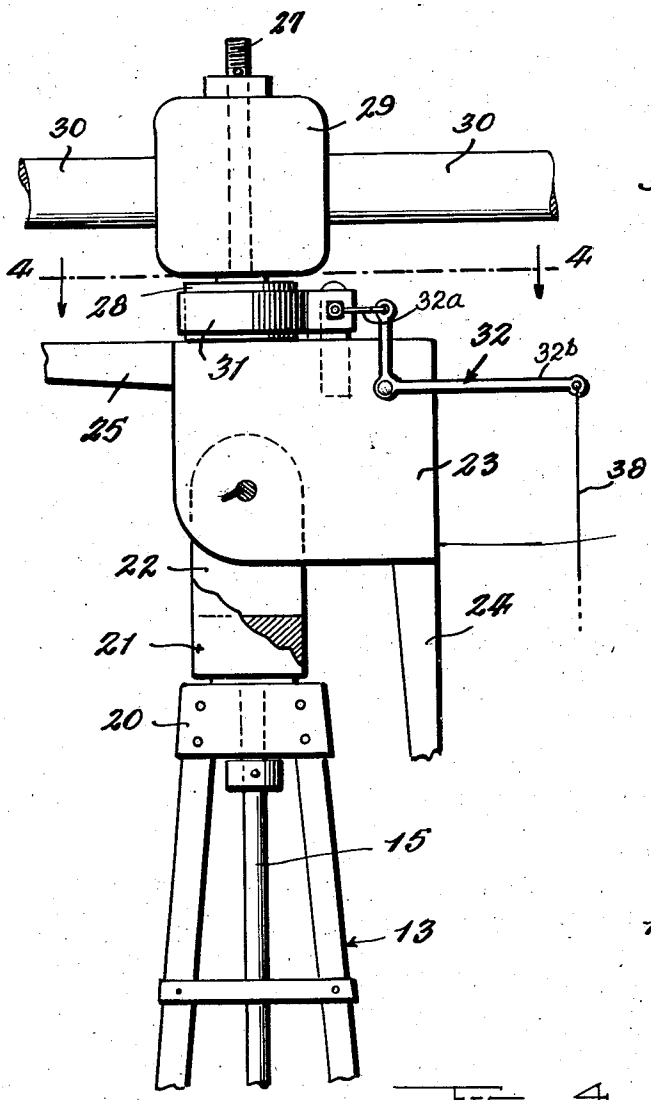


FIG. 3

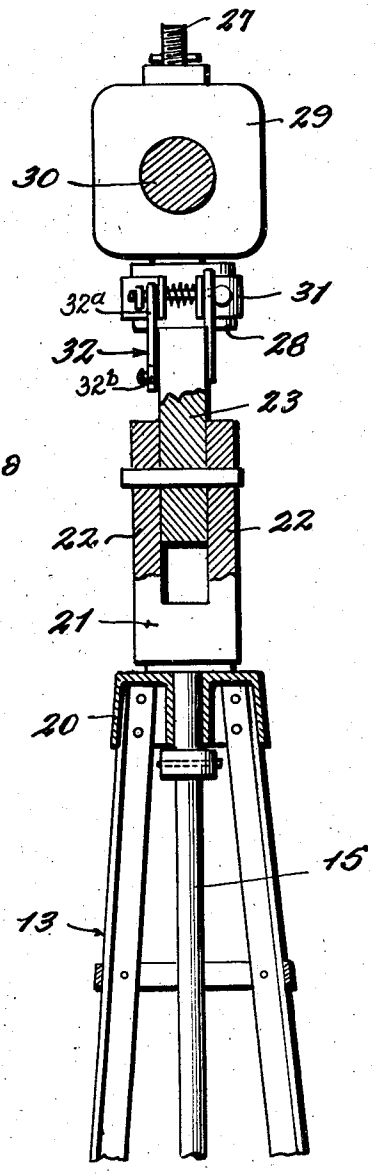
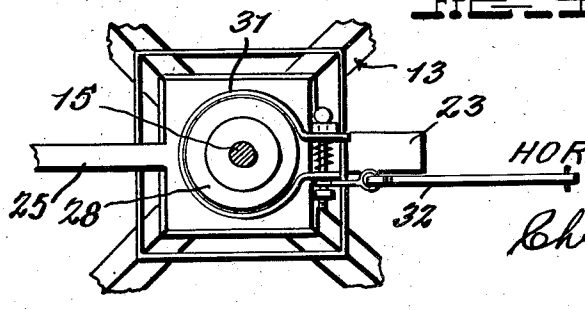


FIG. 4



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PROPULSION AND STABILIZATION OF WATERCRAFT AND THE LIKE

Horace M. Dobbins, Pasadena, Calif.

Application February 16, 1944, Serial No. 522,628

1 Claim. (Cl. 114—39)

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The invention relates to rotary aerial foils for propulsion and stabilization of water craft, ice boats and the like craft, the use of which has become of importance within a recent period, and aims to effect improvements in the mounting and controls of the rotors in such installations.

It is an important object of the invention to provide a novel mounting and operative machine by which the rotor may be turned to feathering position without disturbing the operative connections, so that a minimum cross sectional area will be presented in a horizontal direction, this being an equivalent of the "reefing" of sails. It is also an aim to enable the positioning of the foils in a vertical position, or in any intermediate position between the vertical and horizontal, as may be deemed advisable and practicable for the condition of wind and its direction in relation to the charted course of the vessel.

It is an important object also to enable the utilization of the rotor as a gyroscopic element to add to the stability of craft when required.

One of the most important purposes of the invention is to minimize the amount of gear and avoid the multiplicity of operative pieces required to control and adjust the apparatus, as well as minimize the labor effort required in the operation of the equipment, as well as to reduce hazards incident to operation of such devices and to enable the complete control of the apparatus from within a pilot house in a simple and economical as well as rugged and durable construction. Additional objects, advantages and features of invention reside in the construction, arrangement and combination of parts involved in the embodiment of the invention, as will be more readily understood from the following description and accompanying drawings, wherein

Figure 1 is an elevational view, partly in section of the forward portion of a vessel equipped with my invention.

Figure 2 is an enlarged detail of the mast and rotor mounting, brake and shifter.

Figure 3 is a view at right angles to Figure 2, partly in section.

Figure 4 is a horizontal sectional view on the line 4—4 of Figure 2.

There is illustrated in Figure 1 a portion of the hull of a vessel 10, conventionally illustrated, the vessel having a deck 11 and pilot house 12, of any usual construction.

Upon the deck there is erected a structural work mast 13, of suitable materials conventionally stayed, as at 14. A main vertical shaft 15 is revolubly mounted in this mast, upon suitable

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bearings at top and bottom, this shaft being rotated through the agency of an endless chain 16 engaged upon a suitable sprocket at the lower end of the shaft, and carried around a corresponding sprocket of a counter-shaft 17 in the pilot-house 12, this shaft having conventional drive connections from the control wheel 18, revoluble upon the horizontal axis adjacent the binnacle 19 in a position corresponding to that of the tiller wheel in conventional rudder control for ships.

The shaft 15 extends through a suitable cap bearing 20 at the top of the mast 13, and carries upon its upper end a shaft yoke 21 which is set revolubly upon the cap bearing 20. Pivoted between the upstanding ears 22 of the yoke 21, there is a rocking block 23, its portions extended substantially beyond the yoke and forming a junction for the rear and forward arms 24 and 25 of a bell crank lever device, these arms being set at an angle of 90 degrees to each other, the first named arm having a normal initial position extending approximately vertical at the rear side of the mast, at the same time that the arm 25 extends forward horizontally, as shown in solid lines in Figure 1. The block 23 carries revolubly a stud shaft 27, vertical in the initial or neutral position of the parts shown in Figure 1, and having a brake drum 28 fixed thereon immediately over the block 23, while above the brake drum a hub 29 is mounted revolubly, upon the shaft and secured conventionally. The hub is provided with oppositely extending aerofoils 30, which may conform to approved practices in the shaping and proportioning of such foils for the purposes indicated.

In accordance with one manner of operation, the hub 29 with its aerofoils 30 is free to rotate, but may be retarded by means of a band brake device 31 operative upon the drum 28. The brake device includes a bell crank lever 32 pivoted upon the rocking block 23 with conventional operative connections to the band brake as at 32—*a*, and including a long arm 32—*b* extended outwardly and horizontally when in released position, this being the position shown in solid lines in Figure 1. This direction of the long arm of the lever 32 is approximately normal to the direction of the arm 24.

The extremity of the large bell crank lever arm 24 is connected by means of a cable 32', a take-up drum 33 mounted conveniently in the wheel house, this cable being extended from the extremity of the arm 24 inwardly toward the mast 13 and around a pulley 34 on the mast, so that

when the cable 32' is drawn into the wheel house, the arm 24 is pulled downwardly toward the mast. The extremity of the arm 25 of the bell crank is likewise connected by means of a cable 35 through pulley 36 on the mast 13 to a take-up drum 37 in the wheel house, adjacent the drum 33, so that when the cable 35 is drawn into the wheel house, the arm 25 is drawn downwardly. Means is provided, not illustrated, for securing the drums 33 and 37 in adjusted positions.

For operation of the brake, a cable 38 is extended from the long arm of the bell crank 32 through a pulley 39 at the extremity of the arm 24 of the main bell crank, and thence into the wheel house to a drum 40.

In the use of my invention as thus disclosed, in case it is desired to give the axis of rotation of the foils an inclination forwardly in a vertical plane coincident with the keel axis of the ship, it is sufficient to take up the cable 35 on the drum 37, while the cable 32' is let out from drum 33, bringing the main bell crank with the rotor assembly to the position dotted in Figure 1. The slack in the brake cable 38 will be immaterial, if no brake application is required, but may be taken up at the drum 40 as required. In case it is desired to tilt the rotor to a different direction, the wheel 18 is manipulated to rotate the shaft 15, the cables being let out from the drum in the wheel house as may be required to fit this movement, as will be understood. Obviously, the degree of rotation will be limited to an extent so that the cables 32' and 35 will not become fouled in the mast 13. At any position in the rotation of the shaft 15, further inclination of the rotor in the direction before mentioned may be effected by futher take-up of the cable 35 and paying out of the cables 32' and 38. Likewise, intermediate positions may be effected or the rotor returned to its initial vertical axis of rotation, as shown in solid lines in Figure 1, by take-up on the cables 32' and 38, and paying out the cable 35 at any position in rotation of the shaft 15. If inclination of the rotor to any quarter or to any point in the compass is desired, this may be effected by rotating the shaft 15 through the agency of the wheel 18, as may be readily understood.

With the parts in the positions shown in solid lines in Figure 1, rotation of the rotor will have a gyroscopic effect, tending to steady the craft, without propulsive effect in any direction. A graduation of propulsive effect may thus be obtained in my invention with the rotor axis inclined in any direction, by varying the degree of this inclination. At the same time directional propulsive resultants may be developed as required by the rotation of the yoke 21 in conjunction with the control of the degree of tilt of the tiltable support 23.

While I have disclosed my invention with particularity, it will nevertheless be understood that this is purely exemplary, and represents the best form of the invention at this time known to me, and that various changes in the construction, arrangement and combination of parts, substitution of materials and substitution of equivalents, mechanical and otherwise, may be made without departing from the spirit of the invention, except as more particularly set forth hereinafter in the appended claim, wherein I claim:

A craft of the character described comprising a hull, an upright mast carried by the hull, a rotatable shaft supported by the mast, a forked yoke mounted on the shaft, the arms thereof being extended upwardly, a hub support pivoted between the arms of the yoke and having a stud shaft thereon having a neutral vertical position at a medial position of the pivotal movement of the hub support, an aerofoil having a hub revoluble on the stud shaft, means to rotate the rotatable shaft and associated yoke at will, consisting of a remote manual control, said hub support comprising arms disposed at an angle of 90 degrees to each other, remotely operable means associated with respective arms to tilt said hub support from said medial position to variable angles at will, and a brake means on the stud shaft remotely operable at will.

HORACE M. DOBBINS.