Jan. 13, 1925. 1,522,671

C. CALLAHAN ET AL

COMBINED PROPELLING AND STEERING MECHANISM FOR VESSELS

Filed June 1, 1921

Fig. 1.

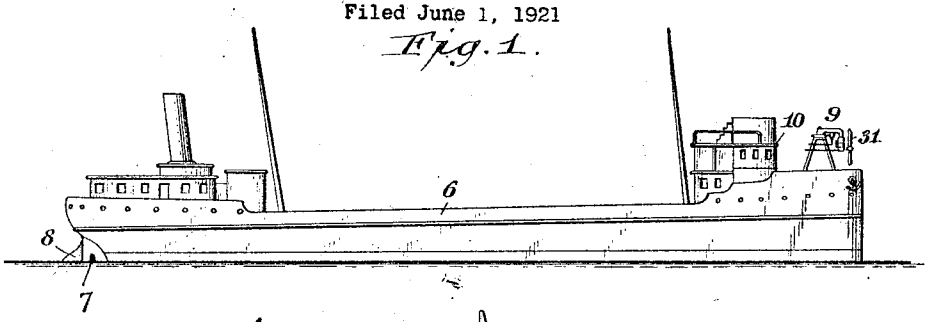


Fig. 2.

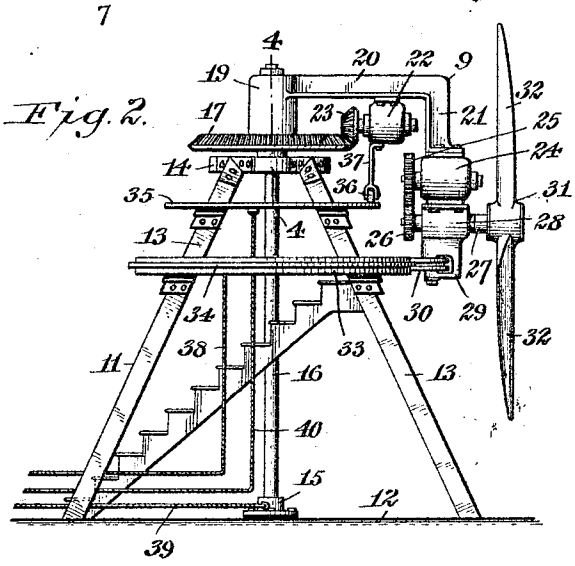


Fig. 4.

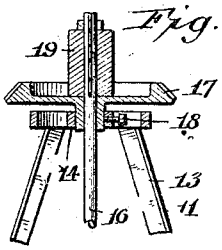


Fig. 5.

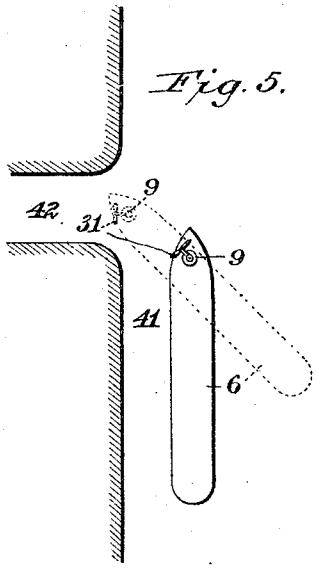
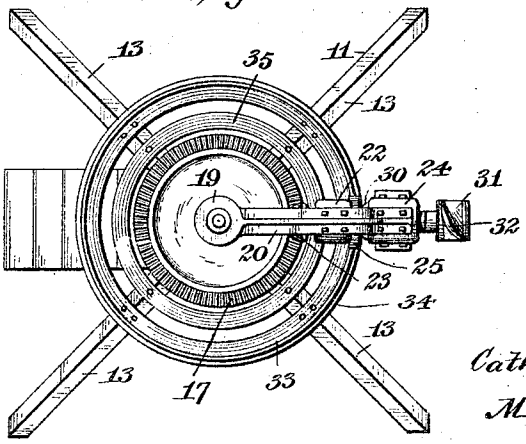


Fig. 3.



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Patented Jan. 13, 1925. 1,522,671

UNITED STATES PATENT OFFICE.

CATHERINE CALLAHAN AND MARY MANNS, OF BUFFALO, NEW YORK.

COMBINED PROPELLING AND STEERING MECHANISM FOR VESSELS.

Application filed June 1, 1921. Serial No. 474,186.

To all whom it may concern:

Be it known that we, CATHERINE CALLAHAN and MARY MANNS, citizens of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Combined Propelling and Steering Mechanism for Vessels, of which the following is a specification.

Our invention relates to improvements in apparatus for propelling and steering boats, and more particularly for propelling and steering large cargo-carrying vessels.

In large cargo-carrying vessels, the power propellers are invariably submerged and located at the rear end of the vessel, and consequently it is an extremely difficult matter to control the front of the vessel in harbors, slips, etc., without the use of tugs arranged to guide both the front and the rear ends of the vessel.

The primary object of our invention is to provide an apparatus whereby a vessel of this type can be steered in small places and directed into slips or narrow branches without the use of tugs to direct the same.

Another object of our invention is the provision of an apparatus of this kind, which is located at the front end of the vessel, and which may serve to assist in propelling the vessel in a straight-ahead course or in turning, and when in co-action with the submerged propeller and the rudder at the rear end of the vessel will make it possible to turn the vessel in a circle of smaller diameter than would be otherwise possible.

A further object is to provide an apparatus of this kind, which can be arranged to assist in moving the vessel rearwardly.

A still further object is to provide an apparatus which, while primarily designed for steering or controlling the front end of a vessel, will co-act with the submerged propeller at the rear end of the vessel and increase the speed of the vessel.

A still further object of our invention is the provision of an apparatus of this kind having an air-propeller rotatable to any angle within a complete circle, and which may be controlled from any desired point within the vessel.

A still further object of our invention is to provide an elevated air-propeller having its shaft swiveled about a fixed center so as to position the propeller parallel with or at any angle to the longitudinal center of the vessel, to provide means for positioning the propeller, and for rotating the propeller at any desired speed, said means being controllable from a point distant from the propeller.

With the above and other objects in view, the invention consists in a propeller adjustable in an arc of a circle or around a circle and which is located at the front end of the vessel to assist in propelling the vessel, or to assist in steering or controlling the front end thereof.

It further consists in a rotatable air-propeller elevated to a plane above the deck of the vessel and adjustable to any angle within a circle so as to assist in propelling the vessel forwardly or rearwardly, or steering the same in any direction.

It further consists in the use of a rotatable air-propeller adjustably mounted to swing to any angle, means controlled from a distant point for adjusting the propeller, and means for rotating the propeller, also controlled from a distant point.

It further consists in the novel features of construction and in the arrangement and combination of parts to be hereinafter described and more particularly pointed out in the subjoined claims.

In the drawings:—

Fig. 1 is a side elevation of a freight vessel showing our invention applied to the front end thereof.

Fig. 2 is a side elevation of our invention as applied to the deck of a vessel.

Fig. 3 is a plan view.

Fig. 4 is a transverse section taken on line 4—4, Fig. 2, the annular contact member being omitted.

Fig. 5 is a diagrammatic view showing a vessel in position within a harbor and about to be steered into a slip, as indicated by dotted lines.

Referring to the various parts of the drawings by numerals of references, 6 designates a vessel; that shown being of the freight-carrying type. Vessels of this type are low and narrow and comparatively long and they are usually of considerable draft to insure a large carrying capacity. Such vessels are in general use on large inland lakes, and at various points along such lakes must be directed through narrow harbors and into small slips or branches, and as oftentimes mixed cargo is carried, shifts from one dock or elevator to another, or from a

dock to an elevator or elevators, or reversely, must be made to deliver the several separate shipments. When directing a vessel from one place to another through crowded harbors or into narrow slips or passages, tugs must be employed at the front end of the vessel, and as the front end is two, three, or four hundred feet distant from the submerged propeller at the rear end thereof, said front end will not respond to the rudder as quickly as necessary under such conditions.

In Fig. 1 of the drawing, 7 designates the usual submerged or partly submerged propeller at the rear end of the vessel, and 8 the rudder, commonly employed. 9 designates our improved apparatus which may be stationed at any suitable point at the front end of the vessel, as shown preferably in advance of the pilot or wheel house 10 of the vessel so that the pilot or wheelsman may control the apparatus and have the same in full view.

In its preferred form, our combined propelling and steering apparatus comprises a suitable structure 11, which rises a considerable distance above the deck, indicated at 12, said structure being positioned directly over the longitudinal center of the vessel and formed of structural iron or other suitable material. In the form shown it has upwardly converging supporting members 13 secured at their lower ends to the deck in any suitable manner and connected together at their upper ends, either by means of a casting, or structural connector pieces, as may be desired, said casting or connector pieces forming a head 14.

Fastened to the deck 12 is a step bearing 15 into which the lower end of a vertically-disposed rotatable supporting rod 16 is entered. Said rod extends up through the head 14 and has a bevel gear wheel 17 secured thereto, said bevel gear wheel having a hub which is preferably secured within the head 14. In the drawing shown, the means employed for securing said hub within said head is a set screw 18. It is to be understood that said bevel gear, being fastened within the head of the structure 11, is non-rotatable and therefore serves as an annular rack, in view of which it will be apparent that any annular or curved rack, not necessarily in the form of a bevel gear-wheel, may be employed.

Fastened to the rotatable rod 16 above the rack 17—the bevel gear-wheel being so termed in its broadest sense—is the hub 19 of an outwardly extending arm 20, having a depending portion 21 at its outer end. While we have shown said hub keyed to the rotatable rod 16 in Fig. 4, any other means suitable for fastening said hub to the rod may be substituted therefor.

Fastened to the under side of the arm 20 is a reversible electric motor 22, to the shaft of which a bevel gear 23 is secured which is in mesh with the rack 17. Consequently, when current is passed through said motor, the bevel gear 23 will be rotated and travel over the rack 17, thus swinging the arm 20 to any angle at one or the other side of the longitudinal center of the vessel, depending on the direction of rotation of the motor shaft. Said motor is preferably a slow rotating motor so that a slow swinging of the arm 20 will take place when current is passed through said motor, thus enabling the arm to be positioned accurately at any desired point without momentum of the arm and parts connected thereto being created, which would carry said arm beyond the desired point and require a reversal of the motor to correct the adjustment.

Fastened to the lower end of the depending portion 21 of said arm, or in other words, to the outer end of said arm, is an electric motor 24 having a gear-wheel 25 secured to its shaft, said gear-wheel being in mesh with a pinion 26 fastened to a propeller shaft 27 journaled in a suitable bearing 28 fastened to the lower end of the motor 24, said bearing 28 having an extension 29 provided with a guide wheel 30. The pinion 26 is secured to the inner or rear end of the propeller shaft 27, while an air propeller 31 is secured to the front end thereof, said propeller having two or more arms 32 and being preferably of the type usually employed in aeroplanes.

Fastened to the frame or structure 11 in the plane of the guide wheel 30 is a guide track 33, against which the guide wheel 30 rides, said guide track having preferably a projecting flange 34 and the guide wheel 30 being peripherally grooved to receive said flange. Fastened to the frame or structure 11 above the track 33 is an annular contact 35 having a contact roller 36 adapted to ride over and in contact with the same, said roller being secured to an arm 37 depending from the motor 22 and serving as a current conductor for said motor.

While the current may be supplied to the motors 22 and 24 in any approved manner, we preferably connect a current-conducting wire 38 to the guide track 33, a second current-conducting wire 39 to the step bearing 15, and a third current-conducting wire 40 to the annular contact 35. Therefore, when rotating the adjusting motor 22, as it may be termed, current is passed through the wire 40, through the annular contact 35, the roller 36 and arm 37, and the motor 22, and from the motor 22 through the arm 20 and rod 16 to the wire 39; said wires 39 and 40 necessarily leading to a source of current and having a suitable switch (not shown) to make and break the circuit formed by such parts, which switch may be within the wheel

or pilot house so that, while directing the engineer in the hold of the vessel by the usual means to assist in steering the vessel, the wheelsman or pilot may control our combined propelling and steering apparatus at the front end of the vessel. The pilot or wheelsman will, of course, control the direction of rotation of the motor shaft of motor 22 by any suitable electrical instrument for the purpose, and after adjusting the arm 20 by means of the bevel gear 23 traveling in contact with the rack 17 to bring the shaft of the propeller at the desired angle, he may close the circuit in which the motor 24 is included, said circuit including the wire 38, guide track 33, guide wheel 30, and shaft bearing 28 electrically connected to said motor in any suitable manner; and from said motor the arm 20 and rod 16 are utilized with the wire 39 so that by means of a switch or other suitable device within the pilot or wheel house, the two wires 38 and 39 may be electrically connected to pass current through the motor 24 and rotate the shaft thereof, which through the medium of the gear wheel 25 and pinion 26 will rotate the propeller 31 at the desired speed. For example, assuming the vessel to be positioned within a harbor designated by the numeral 41 in Fig. 5, and adapted to enter a slip or branch of the harbor designated by the numeral 42, the wheelsman or pilot, whoever may have control of the combined propelling and steering apparatus, will adjust the propeller to the angle shown in said figure, at the same time the engineer is given the signal to assist in steering the vessel in the usual manner by manipulating the propeller 7. The velocity of the air-propeller 31 will create action against the air and draw the forward end of the vessel to the left, as indicated by dotted lines in said figure, thus making it possible to direct the vessel into the slip indicated at 42 without resorting to the use of tugs for the purpose, which would entail considerable expense and waste of time.

It will be apparent that by positioning the air-propeller 31 with its axis directly above the longitudinal center of the vessel, the rotation thereof will assist in propelling the vessel at increased speed, with the result that a larger number of trips can be made during a season, and this will also result in a considerable saving of coal.

While an air-propeller arranged to swing in a complete circle will enable a vessel to be moved backward with greater facility, a condition requiring such movement does not often arise. Therefore, it is not essential to our invention that the air-propeller be arranged to swing in a complete circle, as ordinary conditions of use may not require a greater range of movement for said propeller than ninety degrees, and therefore a segmental rack may be employed instead of the annular rack 17, also a segmental guide track and contact instead of the annular track 33 and annular contact 35. Where a greater range of movement than ninety degrees is desired for the propeller, the segments employed in place of the rack 17, track 33 and contact 35 may be enlarged. We have, however, shown and described these parts as forming complete circles so that the full range of movement can be secured when desired.

Having thus described our invention, what we claim is:—

1. The combination with a vessel, of a frame rising from the deck thereof and having a curved gear rack at its upper end, an arm circularly adjustable, an electric motor carried by said arm, a gear wheel secured to the shaft of said motor and in mesh with said rack, an air-propeller mounted for rotary movement in said arm, a second electric motor carried by said arm and operatively connected with the shaft of said air-propeller, and electrical connections between said motors and a source of current to operate said motors.

2. The combination with a vessel, of a frame secured to the vessel having a rack at its upper end and a curved contact in a plane beneath said rack, a circularly adjustable arm having its axis coincident with the axis of said rack, an electric motor secured to said arm having a contact engaging said curved contact, a gear wheel secured to said electric motor and being in mesh with said rack, an air-propeller having its shaft journaled in said arm, a second electric motor carried by said arm, a gear wheel on the shaft of said second electric motor, a pinion on the shaft of said propeller in mesh with said last-mentioned gear wheel, and electrical connection between said curved contact and a source of electric current and also between said motors and said source of electric current, said electrical connections including means to control the current individually to said motors.

3. The combination with a vessel, of a frame secured to said vessel, an annular guide track on said frame, an annular contact on said frame above said guide track, an annular gear rack on said frame above said annular contact, a vertically-disposed rotatable rod extending upwardly through said frame and gear rack, an arm secured to said rotatable rod and extending laterally therefrom, said arm having a depending portion at its outer end, an electric motor secured to said arm and having a contact in engagement with the annular contact on said frame, a gear wheel on the shaft of said motor in mesh with said annular rack, a second electric motor secured to the depending portion of said arm, a gear wheel on the shaft

of said second electric motor, a bearing member secured to said motor having a guide wheel traveling in contact with said guide track, an air-propeller having its shaft journaled in said bearing member, a pinion on said propeller shaft in mesh with the gear wheel on the shaft of said last-mentioned electric motor, and wires connected, respectively, to said annular track, said annular contact and said rotatable rod and leading to a source of power, said wires and parts to which they are connected being arranged to conduct electric current through said electric motors.

In testimony whereof we affix our signatures.

CATHERINE CALLAHAN.
MARY MANNS.