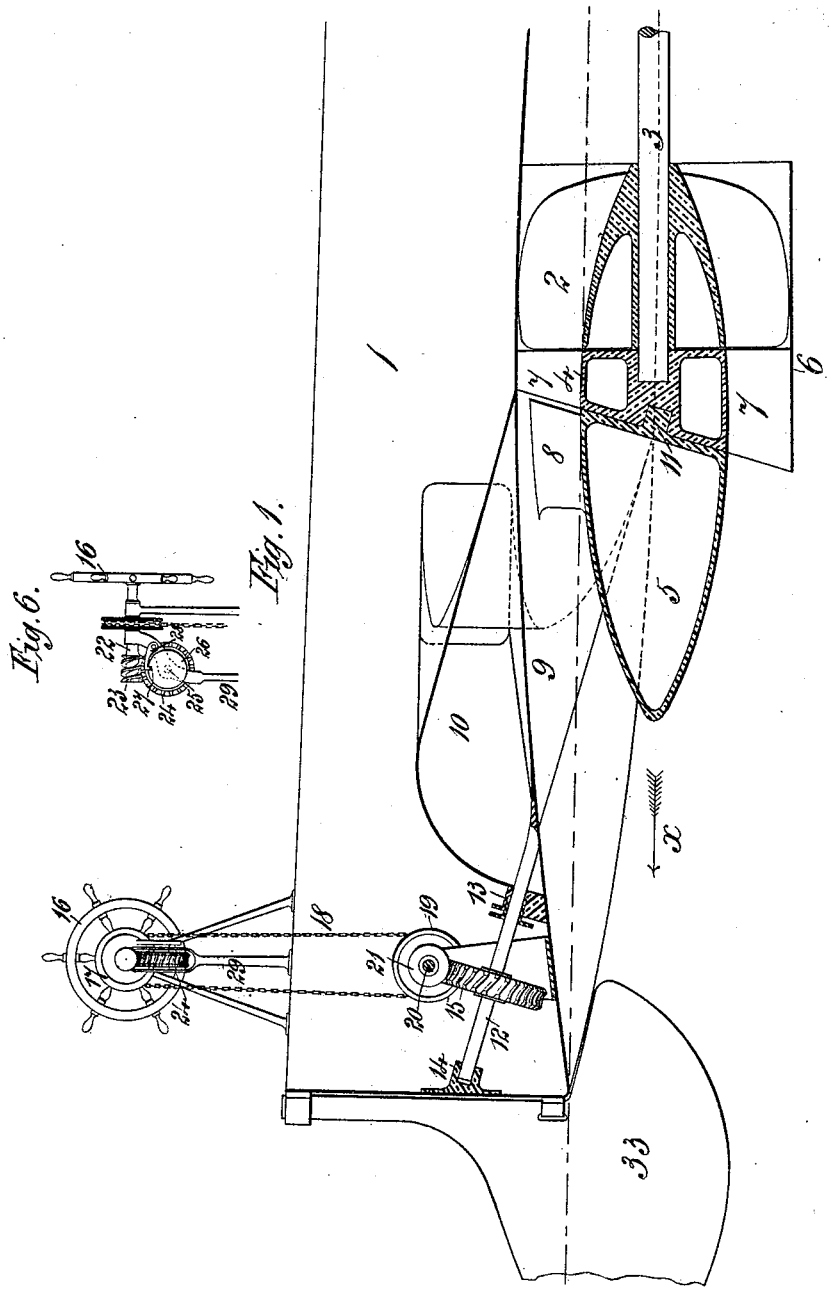
(No Model.) 4 Sheets—Sheet 1.

J. I. THORNYCROFT.

PROPELLING AND STEERING APPARATUS FOR SHIPS, &c.

No. 386,041. Patented July 10, 1888.



Witnesses:
Chas. J. Maguire.
William A. Briggs.

Inventor:
John Isaac Thornycroft
By his Attorneys
Curtis & Crocker.

4 Sheets—Sheet 2.

(No Model.)

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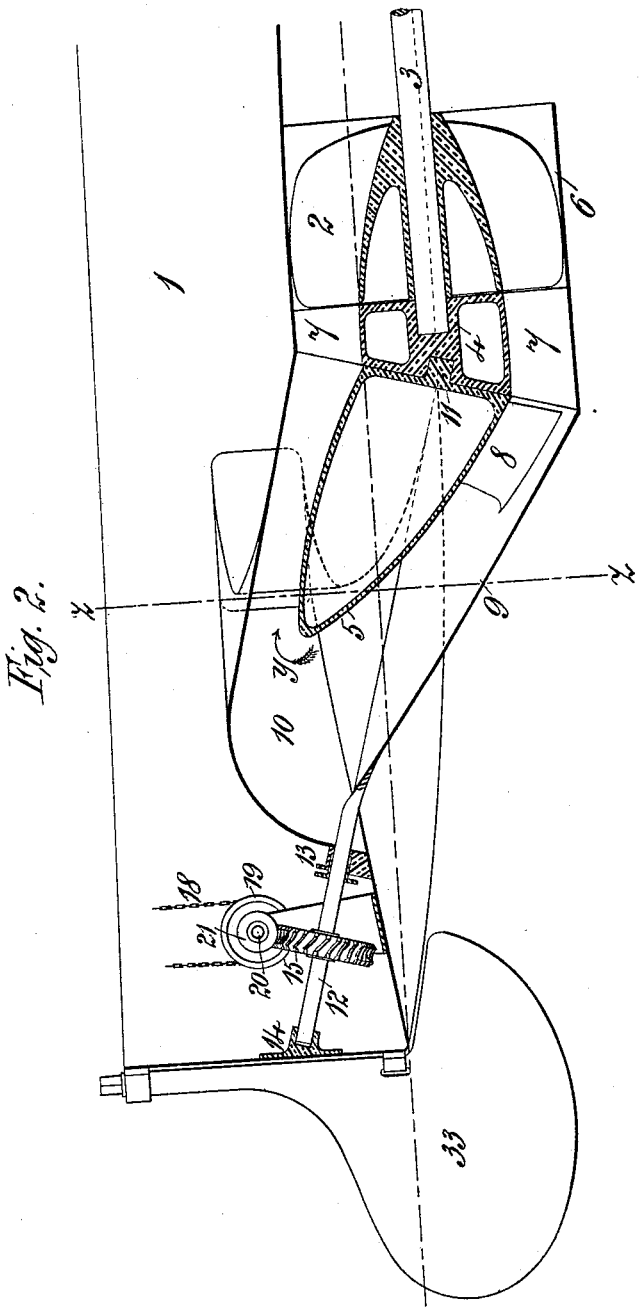

Fig. 2.

Witnesses:
Chas. J. Maguire.
William E. Dwyer Jr.

Inventor:
John Isaac Thornycroft
By his Attorneys
Curtis & Crocker.

(No Model.) 4 Sheets—Sheet 3.

J. I. THORNYCROFT.

PROPELLING AND STEERING APPARATUS FOR SHIPS, &c.

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Fig. 5.

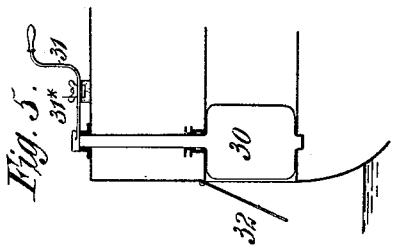
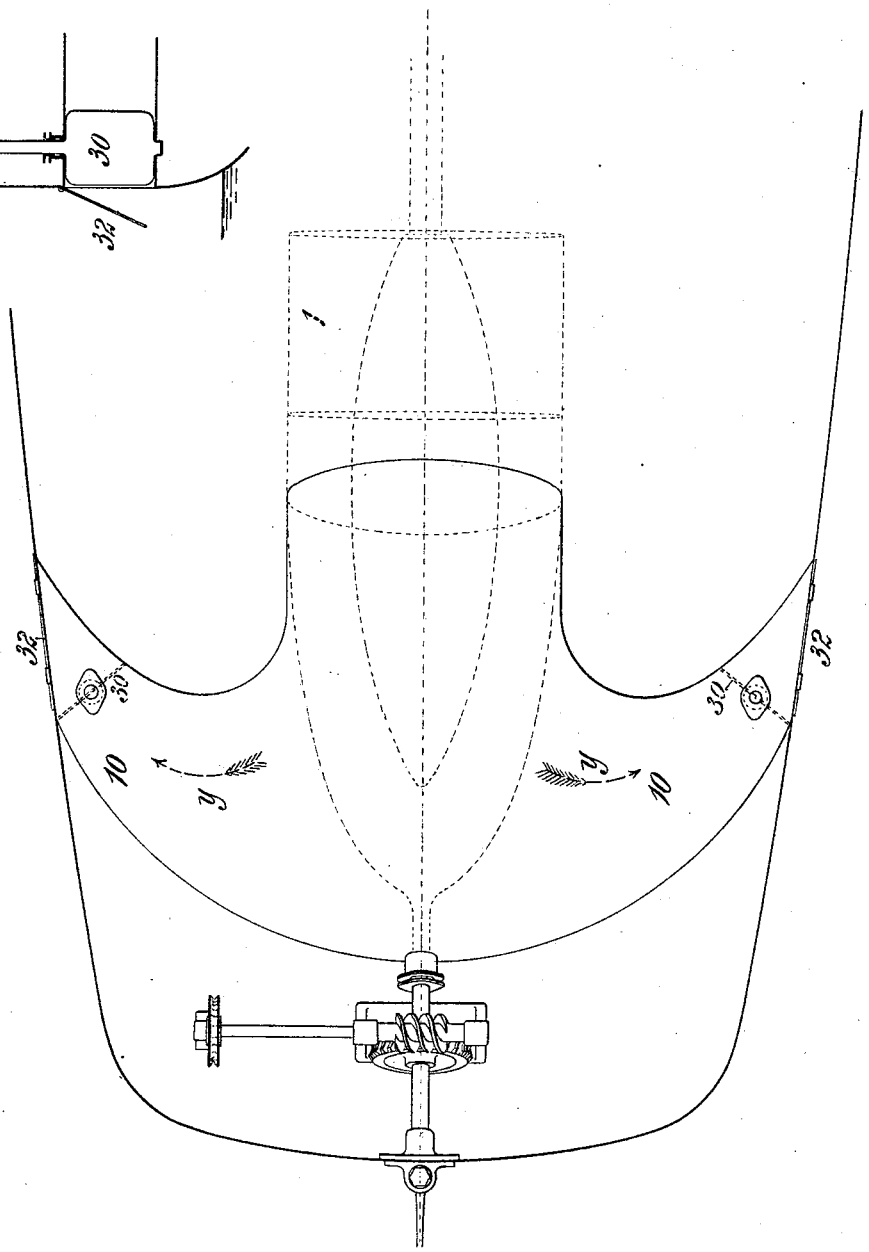


Fig. 3.



Witnesses:
Chas. J. Maguire.
William A. Dreyer.

Inventor:
John Isaac Thornycroft
By his Attorneys
Curtis & Crocker.

(No Model.) 4 Sheets—Sheet 4.

J. I. THORNYCROFT.

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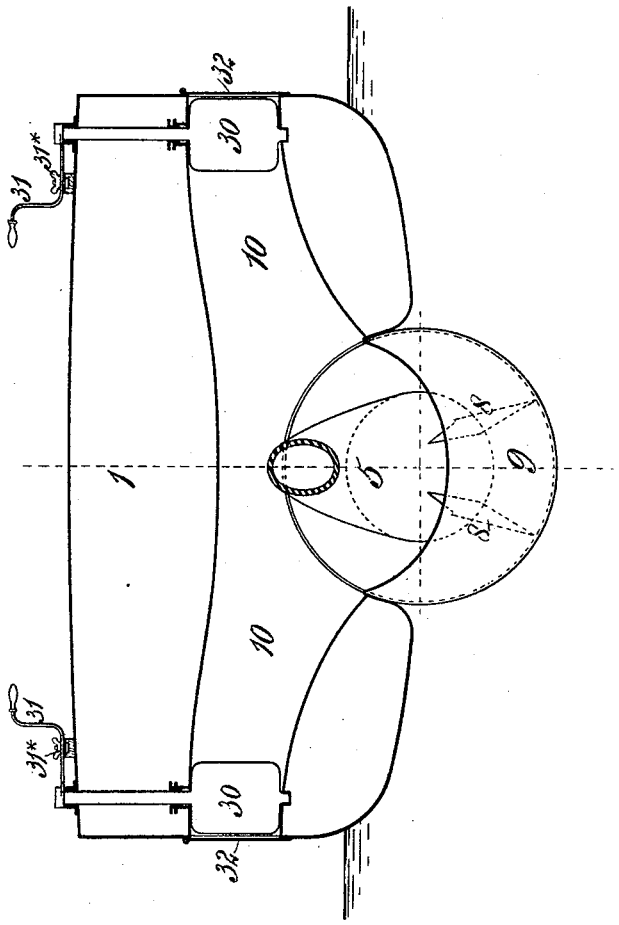
Fig. 4.



Witnesses:
Chas. J. Maguire.
William E. Dwyer.

Inventor:
John Isaac Thornycroft
By his Attorneys
Curtis & Crocker

UNITED STATES PATENT OFFICE.

JOHN ISAAC THORNYCROFT, OF CHURCH WHARF, CHISWICK, COUNTY OF MIDDLESEX, ENGLAND.

PROPELLING AND STEERING APPARATUS FOR SHIPS, &c.

SPECIFICATION forming part of Letters Patent No. 386,041, dated July 10, 1888.

Application filed May 27, 1886. Serial No. 203,396. (No model.) Patented in England January 13, 1886, No. 578.

To all whom it may concern:

Be it known that I, JOHN ISAAC THORNYCROFT, a subject of the Queen of Great Britain and Ireland, residing at Church Wharf, Chiswick, in the county of Middlesex, Kingdom of Great Britain and Ireland, have invented new and useful Improvements in Propelling and Steering Apparatus for Ships or Vessels, (for which I have obtained a patent in Great Britain, dated January 13, 1886, No. 578,) of which the following is a specification.

This invention relates to improvements in apparatus for propelling and steering ships or vessels wherein there is used a propeller having behind it and arranged in line with its boss a body having a gradually-increasing diameter or width for a short distance and afterward a gradually-diminishing diameter or width to its rearward end. This body, which I will call the "rearward" body is made in one, two, or more lengths, and is furnished with guide plates or blades for gradually deflecting and directing the water projected from the propeller in a direction approximately parallel with the body-axis. Around the propeller and the body behind it is a pipe, tube, case, or hollow guide.

Now my present invention has for its object to enable vessels fitted with propellers of this kind to go astern and give them maneuvering qualities independent of endwise motion, the propelling-engines not being reversed, but only varied in speed.

The arrangement I adopt for this purpose is such that for going ahead the stream of water from the propeller is caused to pass rearward through the pipe, tube, case, or hollow guide; but to go astern the stream of water is caused to pass through the vessel by means of curved passages, and is projected forward at a more or less acute angle with the keel. The water in this case may be delivered above water-mark, or at or near the plane of flotation, and by suitable valves at or near the points of discharge the amount at either side of the hull may be regulated, and the direction may be varied, so as to give great control, whether one, two, or more propellers be used.

Referring to the accompanying four Sheets of drawings, Figure 1 is a longitudinal sectional elevation of the stern portion of a vessel provided with propelling and steering apparatus according to this invention arranged for going ahead. Fig. 2 is a similar view to Fig. 1, with the apparatus set for going astern. Fig. 3 is a plan or top view of the vessel with curved water-passages, the deck being omitted. Fig. 4 is a transverse section on the line *z z*, Fig. 2. Figs. 5 and 6 are detail views hereinafter referred to.

1 is the body of the vessel. 2 is a screw-propeller, the boss of which is secured to a driving-shaft, 3. Behind the propeller 2 is a rearward body formed in two parts, 4 and 5, whereof 4 is of a gradually-increasing diameter or width toward the stern of the vessel, and 5 is of a gradually-diminishing diameter or width to its rearward end. 6 is a pipe, tube, case, or hollow guide, hereinafter called the "tube," encircling the propeller 2 and the part 4 of the rearward body. The part 4 is connected by guide plates or blades 7 to the tube 6, the office of such guides or blades being to gradually deflect and direct the water projected from the propeller in a direction approximately parallel to the axis of the fixed part of the rearward body. The part 4, the guide plates or blades 7, and the tube 6 are rigidly connected together, and are attached to the vessel 1 in any convenient manner.

The part 5 of the rearward body is rigidly connected by plates or blades 8 8 to a curved plate or cover, 9, hereinafter called a "cover," which, when in the position shown in Fig. 1, forms a continuation of the lower concave surface of the hull of the vessel and closes the inlet-orifice of the connected curved passages 10 10, which extend through the vessel to its sides, as clearly shown in Fig. 3. The part 5 is provided with a pivot, 11, having a bearing in the part 4, as shown. The cover 9 has secured to it a shaft, 12, working in a watertight bearing at 13, and in any suitable bearing at 14, the arrangement being such that the connected cover 9 and part 5 may be rotated on an axis, which, in the example shown, makes a small angle with the driving shaft 3.

A convenient arrangement of apparatus for

effecting the desired rotation of the connected cover 9 and part 5 of the rearward body is as follows:

15 is a worm-wheel secured to the shaft 12, and arranged to receive motion from a hand-wheel, 16, through the intermediary of a chain-wheel, 17, endless chain 18, chain-wheel 19, shaft 20, and worm 21, which gears with the worm-wheel 15, as shown. When the propeller is in operation to cause the vessel to go ahead, the several parts of my apparatus will be in the relative positions represented in Fig. 1. The stream of water from the propeller 2 will then be caused to pass rearward through the tube 6 and away in the direction of the arrow *x*, Fig. 1. If it be desired that the vessel should go astern, the connected cover 9 and part 5 of the rearward body are rotated on their common axis through half a revolution by turning the hand-wheel 16, so that they shall assume the position shown in Fig. 2, when an opening in the under part of the vessel's hull, communicating with the curved passages 10 10, is uncovered. The stream of water from the propeller, which continues to rotate in the same direction as before, will now pass rearward through the tube 6, as in the previous case; but it will then be deflected and guided by the cover 9 and part 5 in the direction of the arrows *y y*, Figs. 2 and 3, so as to pass through the curved passages 10 in a forward direction at a more or less acute angle with the keel of the vessel, and by its reaction causing the vessel to move astern, as will be readily understood.

To enable the connected cover 9 and part 5 of the rearward body to be rotated to the required extent with accuracy, and afterward to be held in such position until it is desired to alter it, the shaft 22, Fig. 6, of the hand-wheel 16 is provided with a worm, 23, which gears into a worm-wheel, 24. The shaft 25 of the worm-wheel 24 carries a disk, 26, provided with a notch, 27, into which a catch or pawl, 28, engages when the connected cover 9 and part 5 are in either of the positions shown in Figs. 1 and 2. The pawl 28 is pivoted to a standard, 29, which supports the shaft carrying the worm-wheel 24 and disk 26. 30 30, Figs. 3 and 5, are valves situate in the curved passages 10, near their outer ends. They are provided with handles 31, Fig. 5, in order that the quantity of water discharged at either side of the hull may be regulated and its direction varied, so as to give great control over the maneuvering powers of the vessel, whether one or two propellers be used.

At 31*, Fig. 5, are a screw and nut for holding the valve-handle 31 in position.

32 32 are doors or valves so arranged at the outer ends of the curved passages 10 as to be opened by a flow of water therethrough, and to close automatically when such flow ceases and prevent the entry of air into said passages.

33 is the vessel's rudder, which may be of ordinary construction, as shown, for use in conjunction with the propelling and steering apparatus hereinbefore described. When two propellers are used, the rearward body, 4 5, tube 6, cover 9, and means for rotating it, should be in duplicate.

The stream of water from each propeller in this case may, when the vessel is to go astern, be passed into one or other of the curved passages 10, and the valves 30 30, employed when the vessel is fitted with one propeller only, may be dispensed with, the quantity of water discharged through the passages 10 being regulated according to requirements by varying the speed of the respective propeller-engines.

What I claim is—

1. Apparatus for propelling and steering a vessel, comprising a screw-propeller with a rearward body having a movable part, 5, and in combination therewith a curved plate or cover, 9, these being so arranged that they may be rotated about a common axis to open or close, as required, communication with passages (or a passage with lateral branch) formed in or through the vessel to its respective sides, substantially as herein described, for the purposes specified.

2. Apparatus for propelling and steering a vessel, comprising a screw-propeller with tube 6, a rearward body having a fixed part, 4, and a movable part, 5, with pivot 11, a curved plate or cover, 9, and shaft 12, means for rotating said part 5 and curved plate or cover 9, and passages 10, (or a passage with lateral branches,) formed in or through said vessel to its respective sides, substantially as herein described, for the purposes specified.

3. The combination, for propelling and steering a vessel, of a screw-propeller with tube 6, a rearward body having a fixed part, 4, and a movable part, 5, with pivot 11, a curved plate or cover, 9, with shaft 12, means for rotating said part 5 and curved plate or cover 9, passages (or a passage with lateral branches) formed in or through said vessel to its respective sides, and valves 30, all substantially as herein described, for the purposes specified.

4. In apparatus for propelling and steering a vessel, the combination, with the propeller, of a tube, 6, surrounding it, a rearward body having a fixed part, 4, and a movable part, 5, which, with a curved plate or cover, 9, is mounted to revolve upon the shaft 12, a hand-wheel, 16, mechanically connected with said shaft, an opening or space in the lower part of the hull of the vessel, adapted to be opened and closed by the said plate 9, and passages connecting with said space and formed in or through said vessel to its respective sides, substantially as described.

5. In apparatus for propelling and steering a vessel, the combination, with a propeller, of a tube surrounding it, a rearward body having a fixed portion, 4, and a movable part, 5, which, with a curved plate, 9, is mounted to revolve upon the shaft 12, a hand-wheel, 16, mechanically connected with said shaft to re-

volve the same, an opening or space in the lower part of the hull, adapted to be opened and closed by the said plate, passages connecting with said space and formed in or through the vessel to its respective sides, and valves 30, arranged in said passages to open and close the same, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN ISAAC THORNYCROFT.

Witnesses:

EDWD. N. HOBBS,

Pope's Head Alley, Cornhill, London, Gentn.

F. J. BROUGHAM,

Lincoln's Inn Fields, London.