[Second Edition.]

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A.D. 1879, 8th JANUARY. N° 78.

Propelling and Steering Steam Vessels &c.

LETTERS PATENT to George Robert Dunell, of Inglewood, Erith, in the County of Kent, Gentleman, for the Invention of "AN IMPROVED METHOD OF PROPELLING AND STEERING STEAM VESSELS AND APPARATUS THEREFOR AND CONNECTED THEREWITH." A communication from abroad by John Brown Herreshoff and James Brown Herreshoff, both of the Town and County of Bristol, State of Rhode Island, United States of America.

Sealed the 21st March 1879, and dated the 8th January 1879.

PROVISIONAL SPECIFICATION left by the said George Robert Dunell at the Office of the Commissioners of Patents on the 8th January 1879.

GEORGE ROBERT DUNELL, of Inglewood, Erith, in the County of Kent, Gentleman. "AN IMPROVED METHOD OF PROPELLING AND STEERING STEAM VESSELS AND APPARATUS THEREFOR AND CONNECTED THEREWITH." A communication from abroad by John Brown Herreshoff and James Brown Herreshoff, both of the Town and County of Bristol, State of Rhode Island, United States of America.

It is a well known fact among sailors and others that much difficulty is at times experienced in steering, turning, stopping, or reversing the motion of a steamer or other vessel or boat, especially the steering when the engines are reversed and the boat is going rapidly astern.

The object of our Invention is to remove some or all of those difficulties which we do in the following manner:—Instead of placing the engine which drives the boat amidships, we prefer to place ours further forward, while the shaft we prefer to incline at such an angle as to pass through the bottom or keel of the boat. Such shaft being carried down into the water to a depth sufficient to enable the propeller when attached thereto to revolve beneath the keel or bottom of said boat. This shaft we encase in a tube; the whole may be then supported by bars or brace irons, but we prefer to use for this purpose a metallic chamber, preferably of a V shaped section and varying in its depth from the shallow end surrounding the shaft where it passes through the bottom or keel of the boat to the deeper end where it surrounds the shaft close to the screw or propeller. At the top of this chamber is a flange on either side so as to permit of its being bolted or otherwise securely attached to the bottom or keel of the boat. Said chamber we use as a condenser into which the exhaust steam from the engine is conveyed while the induction pipe leading to the air pump is attached to lowest convenient point of said chamber. At times this

chamber may be partially filled with lead or other heavy substances to act as ballast and give greater stability to the boat.

It is a fact that much propelling power is lost if the axis of the screw or propeller be not parallel with the line of motion of the boat. In order therefore to secure the best results when the shaft is pitched at an angle as herein-before described we spring or curve it sufficiently to bring the axis of the propeller into or near the desired position. While for the purpose of steering the boat and to permit of its course being rapidly and easily changed or reversed we place a rudder at each end thereof supported in any convenient manner so as to hang clear of the bottom keel or sides, which arrangements we make in order to permit of their turning or making a complete revolution upon their axes or rudder heads. We may use but one rudder, hung as described, such rudder being placed either in the extreme bows or at the stern of the boat, but when we desire to turn the boat in an exceedingly small space we prefer to use two rudders, as set forth.

Some of the advantages of carrying the shaft through the bottom or keel and placing the screw or propeller approximately beneath the centre of the boat may be enumerated as follows:—The propeller always being in solid water the engine never "races," and there is consequently no loss in the effective driving power. Again, the V shaped chamber or condenser surrounding the shaft acts also as a "skeg" centre board or false keel, and being centrally located forms a species of pivot, enabling the boat to be more readily and rapidly turned, as the rudder or rudders are situated at a distance from said pivot and give thereby great steering or directing leverage or power.

SPECIFICATION in pursuance of the conditions of the Letters Patent filed by the said George Robert Dunell in the Great Seal Patent Office on the 3rd July 1879.

GEORGE ROBERT DUNELL, of Inglewood, Erith, in the County of Kent, Gentleman "AN IMPROVED METHOD OF PROPELLING AND STEERING STEAM VESSELS AND APPARATUS THEREFOR AND CONNECTED THEREWITH." A communication from abroad by John Brown Herreshoff and James Brown Herreshoff, both of the Town and County of Bristol, State of Rhode Island, United States of America.

It is a well known fact among sailors and others that much difficulty is at times experienced in steering, turning, stopping, or reversing the motion of a steamer or other vessel or boat, especially the steering when the engines are reversed and the boat is going rapidly astern. The object of our Invention is to remove some or all of these difficulties, which we do in the following manner, reference being had to the accompanying Drawing, which forms part of this Specification, and in which Fig. I. shows a sectional elevation of a torpedo boat, while Fig. II. is a sectional elevation on the line *x*, *x*.

Instead of placing the engine which drives the boat amid-ships we prefer to place ours further forward, as shown, while the shaft "A" we prefer to incline at such an angle as to pass through the bottom or keel of the boat; such shaft, which *may* be straight or curved (as hereafter more fully set forth), being carried down into the water to a depth sufficient to enable the propeller when attached thereto to revolve beneath the keel or bottom of said boat. This shaft we encase in a tube, the whole may then be supported by bars or brace irons, but we prefer to use for this purpose a metallic chamber approximately of a V shaped section and varying in its depth from the shallow end surrounding the shaft where it passes through the keel or bottom of the boat to the deeper end where it surrounds the shaft close to the screw or propeller. At the top of this chamber is a flange on either side so as to permit of its being bolted or otherwise securely attached to the bottom or keel of the boat. When employing condensing engines we use said chamber as a condenser into which the exhaust steam from the engines is conveyed by means of pipe B, while the induction pipe leading to the air pump is attached to the lowest convenient point of said chamber. At times this chamber may be partially filled with lead or other heavy substances to act as ballast and give greater stability to the boat.

When not using condensing engines the shaft is encased in a tube, as before described, while the place of the condenser is taken by a skeg or false keel formed of metal or wood which gives the same support to the shaft.

It is a fact that much propelling power is lost if the axis of the screw or propeller be not parallel with the line of motion of the boat. In order therefore to secure the best results when the shaft is pitched at an angle, as herein before described, we spring or curve it sufficient to bring the axis of the propeller into or near the desired position.

The proper spring for a shaft of 3 inches diameter and twenty two feet long I have found to be about equal to the curve obtained by placing a twenty pound weight at the centre of said shaft when only supported at its ends, while for the purpose of steering the boat and to permit of its course being rapidly and easily changed or reversed we place a rudder at each end thereof, supported in any convenient manner so as to hang clear of the bottom keel or sides. This arrangement we make in order to permit of their turning or making a complete revolution upon their axis or rudder heads. We may use but one rudder C, as shown and hung as described, such rudder being placed either in the extreme bows or at the stern of the boat; but when we desire to turn the boat in an exceedingly small space we prefer to use two rudders, as set forth. Some of the advantages of carrying the shaft through the bottom or keel and placing the screw or propeller approximately at the centre of the boat may be enumerated as follows:—The propeller alway

being in undisturbed solid water the engine never races and there is consequently no loss in the effective driving power. Again, the V shaped chamber or condenser surrounding the shaft acts as a "skeg" centre board or false keel, and being centrally located forms a species of pivot enabling the boat to be more readily and rapidly turned as the rudder or rudders are situated at a distance from said pivot, and give thereby great steering or directing leverage or power.

Having thus described the nature of my Invention as communicated to me by my foreign correspondents, what I claim and desire to secure by Letters Patent is,—

1st. The rudder or rudders so hung or placed that they may turn or perform a complete revolution upon their axis.

2nd. The screw in the position described, in combination with the condenser, as described.

3rd. The screw in the position described, in combination with the rudder or rudders, as described.

4th. The sprung or curved shaft, as and for the purposes specified.

5th. The sprung or a straight shaft in combination with the rudder or rudders, as described.

6th. The spring or a straight shaft, in combination with the condensers, as described.

7th. The condenser in the position described, as and for the purposes specified.

In witness whereof, I, the said George Robert Dunell, have hereunto set my hand and seal, this Third day of July, in the year of our Lord 1879.

GEO. R. DUNELL. (L.S.)

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DUNELL'S SPECIFICATION.
(2nd Edition)

(1 SHEET)

FIG.2.

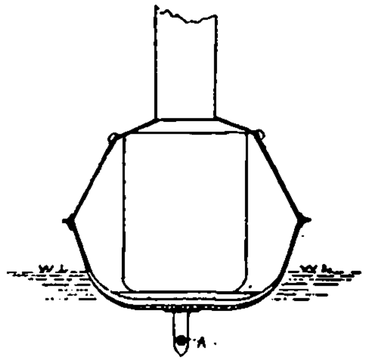

FIG.1.

Mail by E Sons, Photo-Litho.

Patents Sealed.

LIST of LETTERS PATENT which passed the Great Seal on the

21*st March*, 1879.

78. GEORGE ROBERT DUNELL, of Inglewood, Erith, in the county of Kent, Gentleman, for an invention of "An improved method of propelling and steering steam vessels and apparatus therefor and connected therewith."—A communication to him from abroad by John Brown Herreshoff and James Brown Herreshoff, both of the town and county of Bristol, state of Rhode Island, United States of America.—Dated 8th January, 1879.