

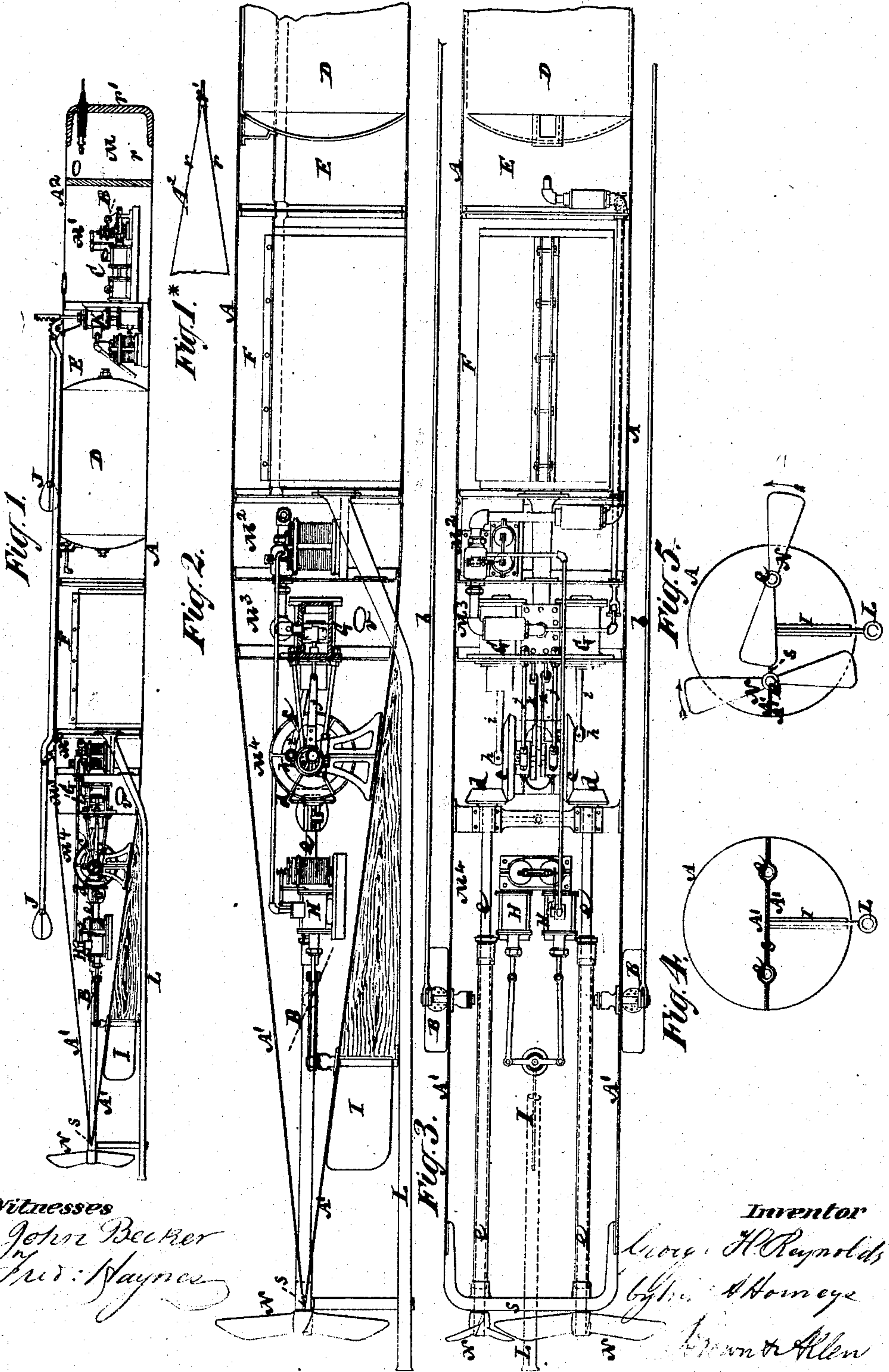
(No Model.)

G. H. REYNOLDS.

TORPEDO BOAT.

No. 246,415.

Patented Aug. 30, 1881.



Witnesses
John Becker
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UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO CORNELIUS H. DELAMATER AND GEORGE H. ROBINSON, BOTH OF SAME PLACE.

TORPEDO-BOAT.

SPECIFICATION forming part of Letters Patent No. 246,415, dated August 30, 1881.

Application filed August 2, 1878.

To all whom it may concern:

Be it known that I, GEORGE H. REYNOLDS, of the city, county, and State of New York, have invented certain new and useful Improvements in Torpedo-Vessels, also applicable to other submarine vessels; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

A torpedo-vessel or other submarine vessel of cylindrical or approximately cylindrical form having a screw-propeller applied in the usual way is very liable to roll on its axis in the water, owing to the action of the screw-propeller, and when rudders inclined in an upward and downward direction are employed on such a vessel for directing its course up or down in the water such rolling or turning of the vessel, by producing a lateral inclination of such rudders, makes them liable to divert the vessel from its proper course; to which end the invention consists in the combination, in a torpedo-vessel or other submarine vessel of side rudders for directing the vessel up and down in the water and two screw-propellers of opposite pitches, arranged side by side, rotating in opposite directions, and intermeshing, the axis of said rudders and screw-propellers being all in the same transverse plane.

In order to better provide for the application of two screw-propellers, as above mentioned, and to further counteract any liability of the vessel to turn, another part of the invention consists in a torpedo or other submarine vessel having a hull constructed of a cylindric body, terminating at one end in a vertical-sided and vertical-ended wedge-shaped or ax-shaped bow and at the other end in a horizontal-faced and horizontal-ended wedge-shaped stern.

The invention also consists in the combination, with a torpedo-vessel or other submarine vessel, of side rudders, mechanism, substantially like that hereinafter described, for operating the same, and an electric cable, through which said mechanism is controlled.

The invention also consists in a novel combination of mechanism for operating the side rudders.

The invention also relates, in part, to torpedo or other submarine vessels in which compressed air or other gas which expands at a low temperature is used to drive the propeller-engine.

In order to keep the cylinders, the valve-chests, and pipes above a freezing temperature, the entire engine, including not only the cylinders, chests, and pipes, but the cranks, rods, and connections, have in such vessels been placed in a compartment within which they are all immersed in a circulating body of water; but while it is desirable to so immerse the cylinders, valve-chest, and pipes, it is very undesirable to so immerse the cranks, rods, and connections, as when so immersed the latter meet with the resistance of the water in working, and are also liable to rust, and are not easily oiled and otherwise taken care of.

With a view to obtain the advantages, and at the same time to obviate the disadvantages, just above mentioned, the invention consists in placing the cylinders, valve-chests, and pipes in one compartment of the vessel through which water circulates, and placing the cranks, rods, and other motion-transmitting connections which do not contain the air or gas used for motive power in a separate compartment of the vessel from which water is excluded.

In the accompanying drawings, Figure 1 represents a longitudinal section of a torpedo-vessel constructed in accordance with the invention; Fig. 1*, a plan of the bow of the vessel; Fig. 2, a vertical longitudinal section of the rear half or part of said vessel upon a large scale, and Fig. 3 a plan of such portion. Figs. 4 and 5 are rear end views of the vessel in illustration of the arrangement of the propeller-shafts and their blades relatively to each other.

A is the body portion of the hull of the vessel, of cylindrical or approximately cylindrical form, and provided with side rudders, B B, inclined in an upward and downward direction, for directing the course of the vessel up or down. These rudders, which should be in duplicate near both ends of the vessel, and be connected by rods *b b*, may be operated by means of a gas-engine, C, of any suitable construction, and deriving its supply from a gas flask or reservoir, D, within a chamber, E, of the vessel.

The same flask D, which is charged with compressed air or other gas which expands at a low temperature, likewise serves to supply with the necessary power a propeller-engine, G, and engine H for operating a rudder, I, to steer the vessel laterally, and an engine, K, for raising or lowering sight-rods or targets J, which, when raised, serve to indicate the position of the submerged vessel. These elements or devices are all fully shown and described in another specification for patent filed by me in the United States Patent Office, June 11, 1878, and the several engines may be operated, as therein described, by electricity through a cable, which serves the double purpose of holding the vessel in check and of operating as a conductor to stop or start each of all the several engines and to explode the charge by means of suitable magnets, said cable being received in the form of a coil within a separate chamber, F, of the vessel, and passing out from the center of the coil in an afterward direction through a pipe or tube, L.

The vessel is divided transversely by bulkheads into separate compartments or chambers, including a forward chamber M, containing the explosive or charge, a chamber M containing the engine which operates the side rudders, a chamber, E, containing the gas-reservoir, a chamber, F, containing the cable, the rear chambers M M M, containing the engines and mechanism for propelling the vessel and for steering it laterally by the rudder I. Certain of these chambers have the water freely admitted to and allowed to circulate through them, alike for the purpose of ballasting the vessel and of keeping up a non-freezing temperature of the working parts, or certain of them, as hereinbefore referred to; but as only one part of the invention specially refers to torpedo or other submerged vessels using compressed air or other gas which expands at a low temperature, and which renders a regulation of the temperature of the working parts desirable, I shall now proceed to describe in detail other features of the invention.

To prevent the submarine vessel of cylindrical or approximately cylindrical form from rolling or turning on its axis by the action of its propeller, and to prevent the vessel when provided with side rudders, B B, as described, from being diverted from its proper forward course by the rolling or turning of the vessel, and which a lateral inclination of said rudders could not fail to produce, I combine with said rudders in such a vessel two screw-propellers, N N, having opposite pitches, and arranged side by side, and rotating in opposite directions—as, for instance, by bevel-gears *c c d d* and parallel propeller-shafts *e e*, deriving their motion from the engine G. These propellers N N have their respective blades arranged intermediately of one another, as clearly shown in Fig. 4, and are so geared that the extremities of the blades of each propeller work nearly close to the shaft or hub of the other

propeller, whereby propellers of a large size may be used on a vessel of comparatively small diameter. The axis of the side rudders and propellers are in the same transverse plane. 70

To still further protect the vessel from rolling or turning over, and to provide for the application of duplicate screw-propellers, as above described, I construct the stern A' of the vessel, having a cylindrical or approximately cylindrical hull, of a wedge-shaped or ax-shaped form, having its edges or extremities in a horizontal direction, also further combine with said stern a wedge-shaped or ax-shaped bow, A², having vertical sides *r* and end *r'*. Such construction of the stern and bow offers a large resistance to any tendency of the vessel to turn on its axis, and the propellers N N, arranged side by side and occupying a position in rear of the horizontal wedge-shaped stern, with both of their axes in a plane coincident with the horizontal edge *s* of the stern A', always work in a compact body of water, inasmuch as the water displaced by the hull in its forward movement passes easily over and under the stern into the spaces surrounding the propellers, thus contributing to the efficiency of the propellers. 80 85 90 95

The arrangement of the different parts of the engine is shown in Figs. 1, 2, and 3, the cylinder G, with its valve-chests and pipes, being arranged within one compartment, M³, of the vessel, in which water from outside the vessel is allowed to circulate freely through the openings *v*, and the cranks *k*, connecting-rods *i*, valve-rods *j k*, and other motion-transmitting connections being arranged in a separate compartment, M⁴, from which water is excluded. By this arrangement the motion-transmitting connections are relieved from resistance offered to their motion by water, and they are better protected against rust, and also are more accessible for the purpose of oiling, repairing, or adjustment. 100 105

What I claim as my invention, and desire to secure by Letters Patent, is— 110

1. The combination, in a torpedo or other submarine vessel, of side rudders for directing the vessel up and down in the water, and two screw-propellers of opposite pitches, arranged side by side, rotating in opposite directions, and intermeshing, the axes of said rudders and screw-propellers being all in the same transverse plane, substantially as specified. 115

2. A torpedo-vessel or other submarine vessel having a hull constructed of a cylindrical body, terminating at one end in a vertical-sided and vertical-ended wedge-shaped or ax-shaped bow and at the other end in a horizontal-faced and horizontal-ended wedge-shaped stern, substantially as specified. 120 125

3. The combination, with a torpedo-vessel or other submarine vessel, of side rudders, mechanism, substantially such as described, for operating the same, and an electric cable through which said mechanism is controlled, substantially as specified. 130

4. The combination, with a torpedo vessel or

other submarine vessel, of side rudders and a shaft upon which they are fixed, a toothed sector upon said shaft, a piston provided with a rack-bar, and a cylinder in which said piston
5 moves, substantially as specified.

5. A submarine vessel provided with an engine for its propulsion, and divided into two or more compartments, one of which compartments contains the cylinder, valve-chest, pipes,
10 and other parts of said engine, which receive within them the air or gaseous fluid used for

motive power, and has provision for the circulation of water through it, and the other of which compartments contains the cranks, rods, and other motion-transmitting parts of said
15 engine, and has the water excluded from it, substantially as specified.

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Witnesses:

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