



(No Model.)

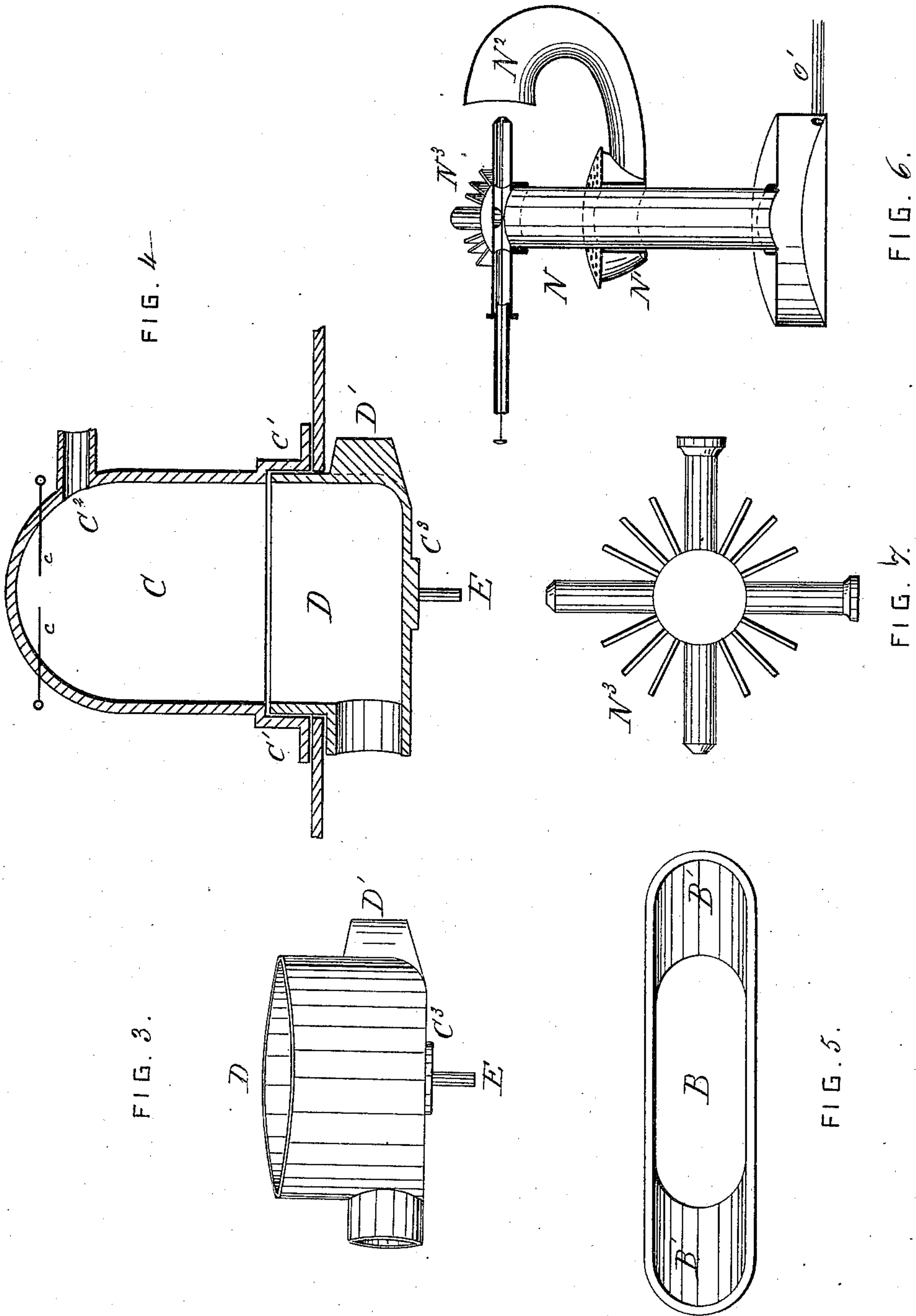
2 Sheets—Sheet 2.

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MEANS FOR PROPELLING VESSELS.

No. 368,678.

Patented Aug. 23, 1887.



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## MEANS FOR PROPELLING VESSELS.

SPECIFICATION forming part of Letters Patent No. 368,678, dated August 23, 1887.

Application filed August 5, 1886. Serial No. 210,084. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL T. McDOUGALL, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Means for Propelling Vessels and for other Purposes by the Exploding Power of Gas or Vapor and Air; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification.

The object of my invention is to produce a simple, inexpensive, and reliable means of making gas or vapor and mixing it with atmospheric air, and forcing it into an explosion-chamber and exploding it against water by automatic means, said explosion-chamber being connected to a longitudinal tube passing through a vessel below the water-line; also reversing mechanism and steering apparatus, as hereinafter described.

Figure 1 is a vertical longitudinal central section of a vessel with my invention applied, showing the longitudinal tube, reversing-tube and gearing, explosion-chamber, rudder and gearing, gas or vapor and air apparatus, battery and operating-lever, air-pump, mixing tube and chamber, lever, and oil-fountain. Fig. 2 is a longitudinal section of B at right angles to the section shown in Fig. 1, showing the enlarged center and stern end of the tube and a section of the rudder and reversing-tube. Fig. 3 is a view of the reversing-tube, also showing the bottom rest and gearing-pin and water-divider. Fig. 4 is a view in section of the explosion-chamber, reversing-tube, electric points, and inlet-valve and water-divider. Fig. 5 is a view of the stern end of the longitudinal tube when a rudder is used in the tube. Fig. 6 is a vertical section of the vapor apparatus, showing the vapor-tube to supply the burner heating the retort. Fig. 7 is a top view of the retort for vaporizing the oil or other liquids.

A, Fig. 1, is a vessel of any suitable size and construction for either ocean, river, lake, or canal navigation.

B is a longitudinal tube extending from the stem to the stern of the vessel. It is placed below the water-line and is open at both ends to the water. The outer end of the tube at the

stern is enlarged and flattened, as shown at B', Figs. 2 and 5, and described hereinafter. Near the center the tube B is enlarged to nearly twice the capacity of the main tube, and circles outward at two sides and is flat at the top and bottom, the object being described hereinafter. Directly above the enlarged circling part of the tube B is an explosion-chamber, C. This chamber is firmly bolted to the tube B and extends upward some distance, and is cylindrical, with a dome-shaped top, and nearly the same capacity or diameter inside as the pipe B. Near the bottom it has an offset and an outward flange, as shown at C'. The upper end is circling in form and has electric points *c c*, near the top, and also a gas or vapor inlet pipe, C<sup>2</sup>, as shown at Figs. 1 and 4. In the bottom of the explosion-chamber, and fitting into the offset, is a reversing-tube, D. This tube is about the same diameter as the chamber C, and forms nearly a round elbow or quarter-circle, the lower end opening into the main pipe B and the upper end into the explosion-chamber C. On the lower side of the reversing-tube D is a rest, C<sup>3</sup>. Extending down below this rest and through the enlarged part of the pipe B is a gear-pin, E. On the back of the reversing-tube D is a water separator or divider, D', sharp at the outer edge and enlarged where it joins the tube.

F and F' are gearing, F being attached to the gear-pin E, and F' to a bar, G, which passes up and near the top of the explosion-chamber, the pinions of both gear-wheels running in openings in a frame, H, as shown, below the tube B, Fig. 1.

All the parts above described are constructed of suitable metal. The explosion-chamber C can be placed at any suitable place on the tube B. Branch tubes from the main tube B may pass around the reversing-tube D and be used in place of the enlarged circling part of the tube B.

I is a rudder placed at the commencement of the enlarged outlet at the stern part of the main tube B, as shown in Figs. 1 and 2. Attached to this rudder is a post or bar passing up to a wheel on deck, as shown at J, Fig. 1.

K is an inlet-valve in the pipe K', connecting the gas and air apparatus with the explosion-chamber.

L is an air, gas, or vapor chamber on the



same pipe. The object of the chamber L is to regulate the pressure in the pipe K', and also to give additional pressure to the gas or vapor passing into the explosion-chamber through the valve K, the vapor being compressed by the action of the air-pump M.

M is an air-pump constructed in the usual manner with valves, piston head, rod, and chamber.

N is a vapor or gas apparatus composed of a retort, N<sup>3</sup>, having spindles through it, and connected to and communicating with the top of a vertical supply-pipe. Said pipe is surrounded by a burner, N', near the top, having a vapor and air supply pipe, N<sup>2</sup>, and connected at the bottom to a vessel having an air-chamber on the top, said vessel connecting with a fountain or vessel, O, by means of a pipe, O'.

P is an operating-lever supported by an upright or other support. It is connected to the support by a bolt and nut at about one-third the distance from the bottom, (more or less,) on which it works freely back and forth. A short distance below this working-joint the needle-valve rod connects with the lever P by a working-joint, and a short distance above the piston-rod of the air-pump a rod operates the inlet-valve to the explosion-chamber and connects with the lever P by working-joints, all being operated, as shown in Fig. 1, by a forward-and-back movement of the lever P.

Q is an electric battery of the usual construction, the wires connecting with the points c c. A cut-off bar is placed on the battery and connected to a lever, R, as shown. The lever R is bolted loosely through the center to a suitable support, and at or near one end of the lever R a short angle-shaped lever, R', is placed at right angles to the lever R, also loosely bolted, one end or angle being above the end of the lever R, as shown in Fig. 1. Near the lower end of the lever P is a pin or other fastening, to which a crank or eccentric lever may be attached.

S is a crank or eccentric lever operated by an eccentric wheel or crank attached to a shaft, or by any suitable power.

A small upright oscillating steam or air engine with a direct-acting crank may be used to operate the lever P after being started by hand, and vapor from the retort may be used as the fuel. The gas or vapor and air in the explosion-chamber can be exploded through an opening in the top of the chamber by a flame or other means.

I do not confine myself to the exact manner of vaporizing oils or other fluids, as shown, as they may be slightly varied and produce the same result. In large vaporizers I change the form of the retort and place it in the fire-box of the furnace or engine.

I do not confine myself to the form of battery shown, as any suitable electric apparatus may be used; neither do I confine myself to vapor and air, as gas may be generated and mixed with air and perform the same function.

To operate my invention, oil or other vaporizing fluid is poured into the elevated fountain O, (a barrel or other vessel may be used,) by allowing the air to escape from the lower vessel and rising-pipe to the retort, which can be done by opening one of the vapor-outlets by turning the spindle passing through the retort. The fluid will then flow down through the pipe O' and into the lower vessel, and up the rising-pipe to the retort. The vapor-outlet in the retort must be immediately closed when the oil appears at the vapor-outlet. Primary heat is now applied to the lower side of the retort. As soon as the retort is at a red heat the primary heat is removed and the vapor-spindle (shown in Fig. 6) is opened, the vapor will rush into the curved pipe N<sup>2</sup>, carrying a current of air with it, which is mixed with the vapor and carried into the burner N', and ignited on the top of the burner. The gas or vapor thus formed and burned will maintain a red heat in the retort and furnish sufficient vapor for the explosion-chamber, the operation of making vapor on the start requiring from three to five minutes. After starting, the operation is continuous.

To operate the explosion-chamber the crank or eccentric lever S is raised up and disconnected from the lever P. The lever P is operated by hand in starting. It is thrown forward the retort, and in the act of throwing it forward the vapor-spindle through the retort is drawn back, allowing vapor to escape into the pipe K'. The same movement operates the air-pump M, forcing air into the pipe K' and mixing the air and vapor in the proper explosive proportions and under pressure. The same movement of the lever P opens the inlet-valve K to the explosion-chamber, and the mixed vapor and air escape or are forced into the explosion-chamber C. The top of the lever P on its forward movement passes the short tipping angle-lever R'. On its backward movement it closes the inlet-valve K and draws back the piston of the air-pump M, and closes the vapor-outlet in the retort, the upper end of the lever P operating the battery by striking against the tipping angle-lever R' and forcing the upper angle down on the top and end of the battery-lever R and raising up the opposite end, breaking the circuit and discharging electricity through the wires and between the points c c in the explosion-chamber, thereby igniting and exploding the gas or vapor and air in the chamber C. After two or three movements of the lever P have been made and the vessel started the lower end of the lever P or any suitable place on the lever may be connected to a crank or eccentric lever, S, as shown at S', or other suitable power, and the motion continued any length of time required. The number and frequency of the explosions depend on the revolutions given to the crank or eccentric, and the movement of the lever P. The force of the explosions is directed against the water in the lower part of the explosion-chamber C, reversing-tube D,



and tube B, and expels it with great force from the back part of the tube B and against the body of water at the stern of the vessel, thus imparting a forward motion to the vessel, the water being replaced in the tube B from the bow of the vessel. The reversing-tube D offers but little resistance or obstruction to the flow of water through the tube, owing to the enlargement of the main tube at that point. Two tubes can be used, one on either side encircling the reversing-tube D and united again to the main tube near the outlet of the reversing-tube. To reverse the vessel, reverse the tube D by means of the bar and wheel G and proceed as previously described, the power being equal in either direction.

Two or more sets of apparatus and tubes may be used in the same vessel, if desired. Both ends of the longitudinal tubes may be the same diameter and a rudder placed between them.

Having fully described my invention, what I desire to claim and secure by Letters Patent is—

1. In an apparatus for propelling vessels and for other purposes, the reversing-tube D, constructed and operated as shown, in combination with the explosion-chamber C and longitudinal tube B, substantially as described.

2. The reversing-tube D, having a water-separator, D', on the back and rest C<sup>3</sup> and pin E at the bottom, substantially as and for the purpose described.

3. In an apparatus for propelling vessels, the longitudinal tube B, having an enlarged center, in combination with the explosion-chamber C, having a reversing-tube, D, constructed and operated as shown, and mechanism whereby the tube D is turned at the proper time, substantially as described.

4. The longitudinal tube B, in combination with the explosion-chamber C, said tube B enlarged at or near the center, directly under the explosion-chamber, to allow water to flow around the reversing-tube D, and having an enlarged end for a rudder, substantially as and for the purpose described.

5. In an apparatus for propelling vessels and for other purposes, the reversing elbow-tube D, having a water separator, D', on the back, a rest, C<sup>3</sup>, and pin E on the bottom, in combination with the pinion and wheel F, gear-wheel F', frame H, and bar and wheel G, substantially as shown and described.

6. In an apparatus for propelling vessels, the explosion-chamber C, having a recess and flange at the bottom, a reversing-tube, D, constructed and operated, as shown, in the recess, operated at the proper time by suitable mechanism,

and an inlet-pipe, C<sup>2</sup>, in combination with the points *c c* and battery Q, and mechanism to operate the battery and ignite and explode the gas or vapor and air in the explosion-chamber at the proper times, substantially as described.

7. In an apparatus for propelling vessels, the vaporizer N, air-pump M, chamber L, mixing-pipe K', and inlet-valve K, in combination with the explosion-chamber C, substantially as shown and described.

8. In an apparatus for propelling vessels and for other purposes, the fountain O, pipe O', vaporizer N, having burner N' and vapor-tube N<sup>2</sup>, vapor-spindle O<sup>2</sup>, pump and piston-rod O<sup>3</sup>, inlet-opening lever O<sup>4</sup>, tripping-lever R', battery-lever R, and battery Q, in combination with the operating and starting lever P and eccentric or crank lever S and explosion-chamber C, substantially as shown and described.

9. In an apparatus for propelling vessels and for other purposes, a vapor-retort placed outside the explosion-chamber and heated by its own vapor, or by other means, in combination with an air-pump, a mixing tube and chamber, an inlet-valve and explosion-chamber, and a longitudinal tube, and having suitable mechanism to operate the valves and force the mixed vapor or gas and air into the explosion-chamber and ignite and explode it at the proper times, substantially as specified.

10. In a means and apparatus for propelling vessels and for other purposes, a vaporizing-retort placed outside the explosion-chamber and heated either externally or internally, in combination with an explosion-chamber and a longitudinal tube, said tube either enlarged at one end or of the same diameter, substantially as described.

11. In a means and apparatus for propelling vessels and for other purposes, the combination of the following parts: the oil-fountain O and pipe O', vaporizer N, with its vapor-burner N' and tube N<sup>2</sup>, spindles O<sup>2</sup>, the air-pump M, with its plunger and piston-rod O<sup>3</sup>, the inlet opening and closing lever O<sup>4</sup>, tripping lever R', battery-lever R, starting and operating-lever P, operating-lever S, inlet-valve K, mixing-tube K', air and vapor or gas chamber L, electric points *c c* and battery Q, explosion-chamber C, reversing elbow-tube D, constructed and operated as shown, with its reversing-gearing, the rudder I, with its wheel and gearing, the longitudinal tube B, and vessel A, substantially as shown and described.

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Witnesses:

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