E. WILDE.

PNEUMATIC PROPULSION OF VESSELS.

APPLICATION FILED JUNE 8, 1906. RENEWED JULY 22, 1908.

915,004. Patented Mar. 9, 1909.

2 SHEETS—SHEET 1.

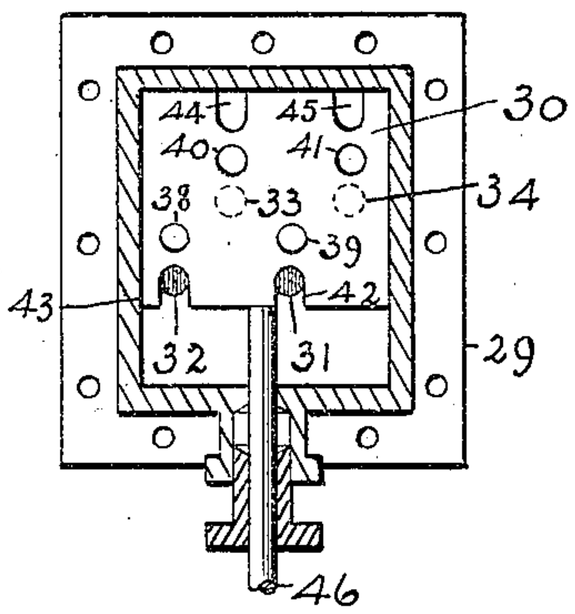

Fig. 6

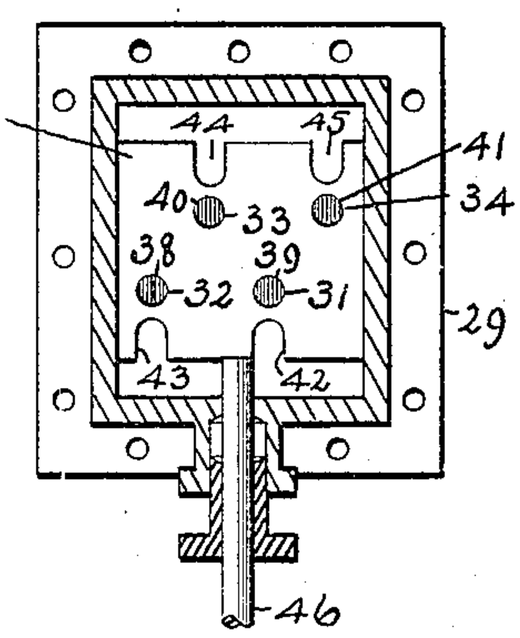

Fig. 5

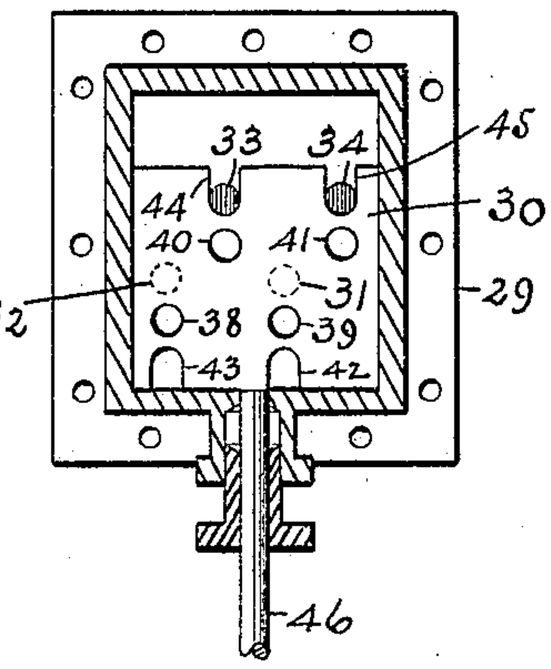

Fig. 7

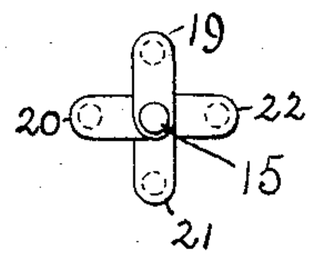

Fig. 4

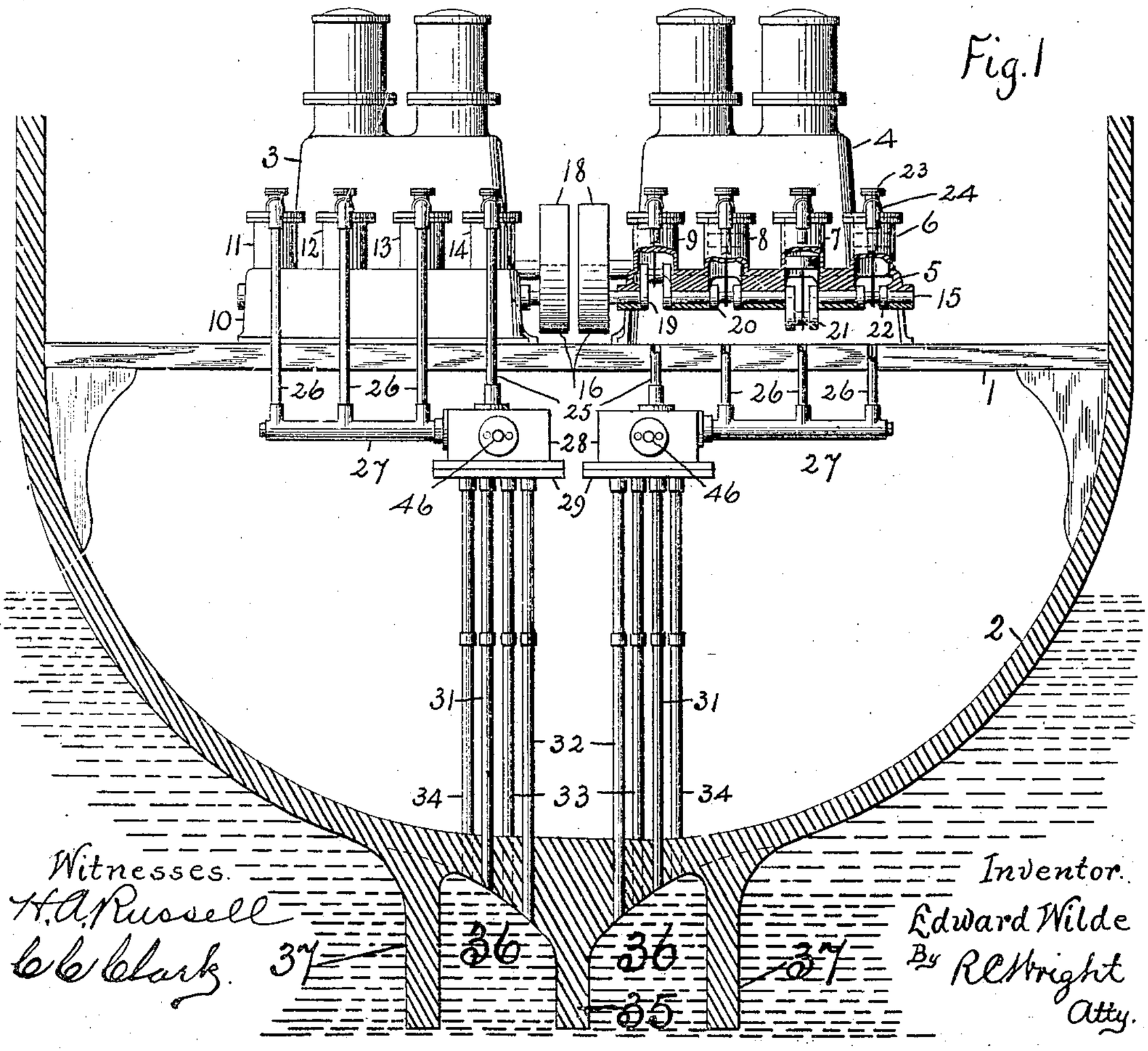

Fig. 1

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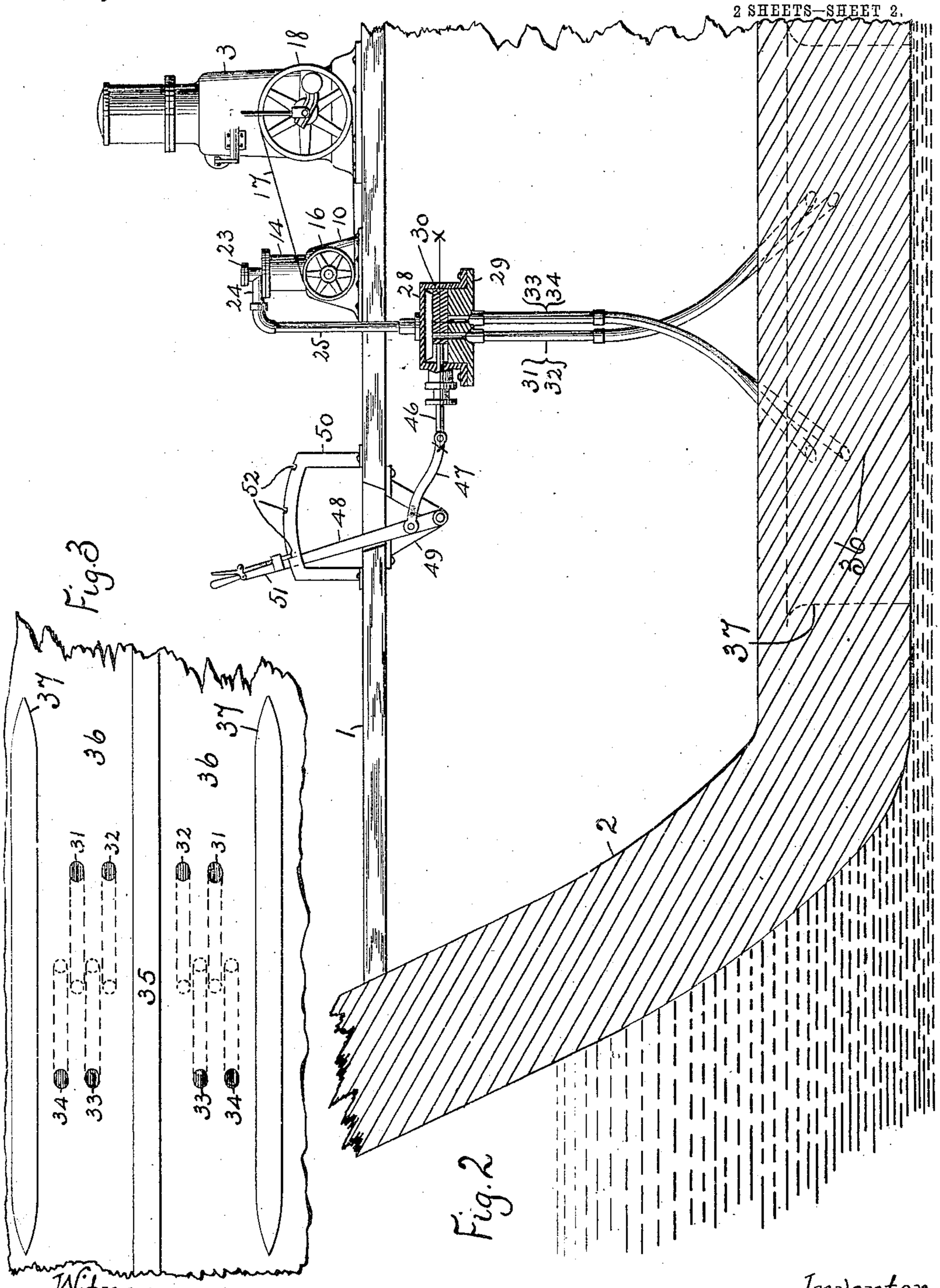

Fig. 2

Fig. 3

Witnesses.
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UNITED STATES PATENT OFFICE.

EDWARD WILDE, OF PHILADELPHIA, PENNSYLVANIA.

PNEUMATIC PROPULSION OF VESSELS.

No. 915,004. Specification of Letters Patent. Patented March 9, 1909.

Application filed June 8, 1906, Serial No. 320,712. Renewed July 22, 1908. Serial No. 444,304.

To all whom it may concern:

Be it known that I, EDWARD WILDE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Pneumatic Propulsion of Vessels, of which the following is a specification.

This invention relates to the employment of pneumatic pressure for the propulsion of vessels; the employment of compressors for the creation of the pressure, and therefrom passages to either side of the vessel's keel which discharge the pressure toward the stern or bow, under the vessel's bottom, between the keel and a guard of less length than the keel at each side of the keel, so that the escaping air cannot follow up the sides of the vessel, but must be ejected either fore or aft against a solid body of water, and so force the vessel to move. The air discharge is under the vessel near its bow, where the buoyancy of the discharge tends to lift the vessel and keep it up at the head. The guides act to steady the vessel from rolling. As there is no mechanism to project beyond the hull there is nothing to retard its progress, as this system of propulsion creates no friction on the hull the full force of the discharging pressure is exerted in moving the vessel. It is intended to run the compressors continuously, and when it is desired to stop the vessel the pneumatic force is directed both fore and aft at each side of the keel, the force being then divided is equalized, and the vessel does not move. To turn the vessel the force can be applied aft at the starboard side of the keel, and forward at the port side of the keel, or vice versa. The full force can be applied full ahead, or full aft by simple means which will be more explicitly set forth in the specification and illustrated in the accompanying drawings wherein like parts are designated by similar characters of reference, and wherein is set forth the best method I have up to the present time developed to accomplish the desired purpose. But I do not by reason of the absence of other specific examples of the physical embodiment of my improvements intend to forego other examples and other similar modes of the application of the principle.

Figure 1 is a cross section of the hull of a vessel, with an engine and a compressor at each side of the center of the vessel, the pipes leading from the compressors to the valve chambers, and therefrom through the hull, and the guards beside the keel. Fig. 2 is a longitudinal section through the center of the vessel, showing an engine, a compressor, a valve chamber, a valve and its operative mechanism, and the pipes leading into and out of the valve chamber. Fig. 3 is a portion of the bottom of the vessel showing the relation of the keel and the short guards and the pipe openings between them. Fig. 4 is an end view of the compressor cranks. Fig. 5 is a section of the valve chamber on line *x x* Fig. 2 showing the valve in central or neutral position, and set to deliver pressure fore and aft, as when the vessel is stopped, while the compressor is still running. Fig. 6 is the same section of Fig. 5, with the valve in position to deliver pressure aft, to force the vessel ahead. Fig. 7 is the same section as Figs. 5, 6, with the valve in position to deliver pressure ahead, to force the vessel astern.

Upon the deck 1 of the hull 2 there are secured two, two cylinder engines 3, 4 which are of the internal explosion type, but any preferred type may be used to operate the compressors 5 with pumps 6, 7, 8, 9 and 10 with pumps 11, 12, 13, 14. The compressor's pumps are operated by the four throw crank 15 having a pulley 16 with a belt 17 on the driving pulley of the engine. The object in having compressors with multiple cylinders, or four cycle, is to have continuous pressure. Crank shafts 15 have cranks 19 for pumps 9, 14; 20 for pumps 8, 13; 21 for pumps 7, 12; 22 for pumps 6, 11 so that continuous pressure is assured. Each compression pump has an air inlet valve 23 and an air outlet valve 24 from which lead pipes 25, 26, 27 to valve chambers having an upper part 28 and a lower part 29 projecting into part 28 and carrying a slide valve 30. Attached to parts 29 are two pipes 31, 32 leading astern, and two pipes 33, 34 leading ahead, at each side of the keel 35, into open ended pockets 36 formed by the keel and the adjacent short guards 37 below the hull. The guards prevent the air escaping without pressure, either fore or aft, against the water. Valves 30 have apertures 38, 39, 40, 41 leading to pipes 31, 32, 33, 34 when the valves are in the neutral position shown in Fig. 5, at which time air pressure will pass both fore and aft into pockets 36.

In Fig. 6 the valve is shown in the go ahead position, delivering air pressure

through notches 42, 43 to pipes 31, 32 toward the stern, to force the vessel ahead, and pipes 33, 34 are closed. In Fig. 7 the valve is shown in the backing or astern position, delivering air pressure through notches 44, 45 to pipes 33, 34 toward the bow, to force the vessel astern, and pipes 31, 32 are closed. It will be seen that valves 30 when in neutral or central position admit air pressure to all pipes 31, 32, 33, 34 and can be shifted to admit air pressure to the pipes to drive the vessel ahead, or astern, or if one valve is moved to go ahead and the other valve is moved to go astern, the vessel's prow will be turned either to starboard or port, according to which way the valves are shifted. The valves are independent of each other, each having a stem 46 to which is attached a rod 47 reaching and attached to a lever 48 fulcrumed on a stand 49, the lever is moved ahead when the valve is in its forward or goahead position, and back when the valve is in its back or astern position. The lever has a guard 50 with a latch 51 engaging notches 52.

I claim—

1. In a means for the propulsion of vessels by pneumatic pressure, the combination of a vessel having a keel, of a guard at each side of the keel, and for a portion of its length, and below the hull; spaces formed between the guards and the keel which are open to the circulation of water at the bottom and at each end, and compressors having means to deliver pneumatic pressure to said spaces, toward the bow and toward the stern of the vessel.

2. In a means for the propulsion of vessels by pneumatic pressure; a vessel, a keel for the vessel, a guard adjacent each side of the keel for a portion of the keel's length; multiple pressure compressors with independent means for the driving of each compressor; a plurality of pressure delivery pipes from each compressor through the vessel's bottom, one portion of said pipes at each side of the keel being deflected to deliver the pressure toward the stern, and the other portion of said pipes at each side of the keel being deflected to deliver the pressure toward the bow, and independent means to control said delivery of pressure wholly toward the stern, or wholly toward the bow, or toward the bow and stern simultaneously.

3. In a system of vessel propulsion by pneumatic pressure; a vessel, a keel therefor, open ended pockets formed adjacent each side of a portion of the keel's length, and below the hull; independent pneumatic compressors with independent driving means; a series of pipes from one compressor to and through the vessel's bottom at the starboard side of the vessel's keel, a portion of said pipes being deflected toward the stern, and another portion being deflected toward the bow of the vessel; a series of pipes from the other compressor to and through the vessel's bottom at the port side of the vessel's keel, a portion of said pipes being deflected toward the stern, and another portion being deflected toward the bow of the vessel; and independent means to control the passage of pressure to each series of pipes as aforesaid.

4. In a system of vessel propulsion by pneumatic pressure; independent pneumatic compressors, and means for their driving; a series of pipes or passages from each compressor to and through the bottom of the vessel, one series of passages delivering pressure at one side of the keel and the other series of passages delivering pressure at the opposite side of the keel, a portion of all of said pipes or passages delivering pressure toward the stern, and the other portion delivering pressure toward the bow of the vessel, independent means to control the delivery of pressure through the pipes or passages wholly toward the stern, or wholly toward the bow, or to opposite sides of the keel, in opposite directions, simultaneously, and guides adjacent a portion of the keel to form pockets open at each end and below the hull, where the pneumatic pressure is delivered.

5. In a system of marine propulsion by pneumatic pressure; compressors; means for their driving; passages from the compressors to and through the vessel's bottom, at each side of the keel, toward the stern and toward the bow of the vessel, and means located intermediate the compressors and the outlet of the passages aforesaid to control the outlets so that the delivery of pressure shall be equalized as to delivery ahead and astern, or wholly astern, wholly ahead, or partially astern and partially ahead.

6. The combination with a vessel, of compressors, and means for their operation, valve chambers having passages thereto from the compressors and therefrom to and through the bottom of the vessel, at each side of its keel; the said passages in about equal proportions and numbers tending to deliver air pressure toward the stern of the vessel and toward its bow, and valves in the chambers having means to deliver pressure to the passages toward the stern, or toward the bow, at the will of the operator, and to the passages in both directions to neutralize the propulsive force, and means whereby the operator controls the valves for the purposes set forth.

7. The combination with a vessel of air compressors having multiple pumps, means for the operation of the compressors, valve chambers having passages thereto from the compressors and therefrom to and through the bottom of the vessel, toward its stern and toward its bow, in about equal proportions, valves in the chamber, and means for the operation of the valves, each independent of

the other, so that the full pressure may be delivered toward the stern, or toward the bow, or equally toward the stern and bow, or partially on the starboard side of the vessel and partially on the port side, or vice versa.

8. The combination with a vessel of multiple air compressors, each compressor having four pumps, driven by four throw cranks set 90° apart, means for the operations of the compressors; valve chambers having passage thereto from the compressors, and therefrom through the vessel's bottom, the termination of the passages, at the vessel's bottom being in direction toward the vessel's stern and bow, one half each way on the port side and one half each way on the starboard side; valves in the chambers, and means for the operation of the valves and whereby the air pressure is delivered from the passages for the movement of the vessel ahead, astern, to the starboard or port, or equal pressure ahead and astern for no movement.

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

EDWARD WILDE.

Witnesses:
LEWIS H. REDNER,
R. C. WRIGHT.