

No. 624,353.

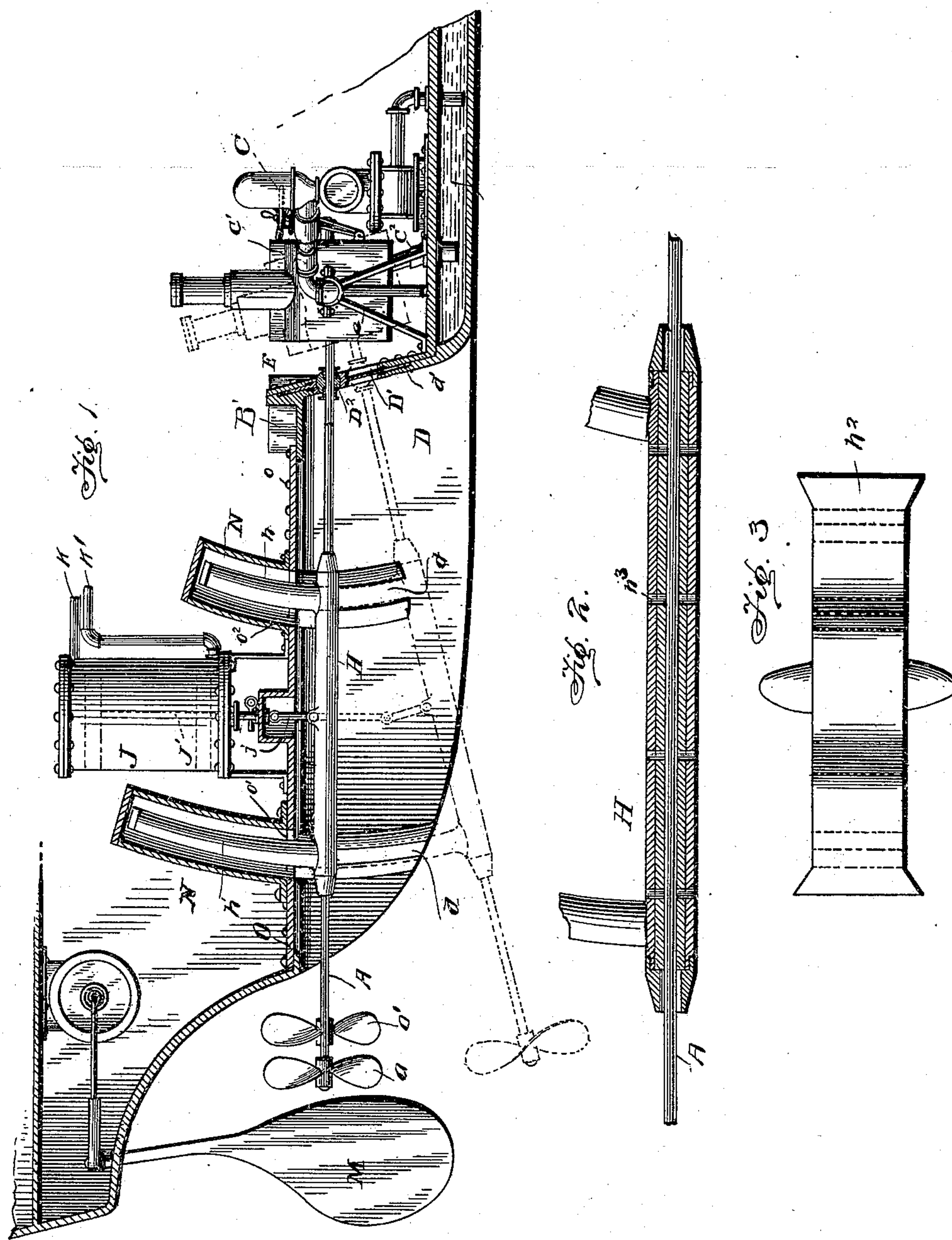
Patented May 2, 1899.

A. H. LIDTHALL.
MARINE PROPULSION.

(Application filed Jan. 14, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
Fenton S. Belt,
Harry M. Test.

Inventor
Almerin H. Lighthall
By David H. Mearns
Attorney

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Fig. 4

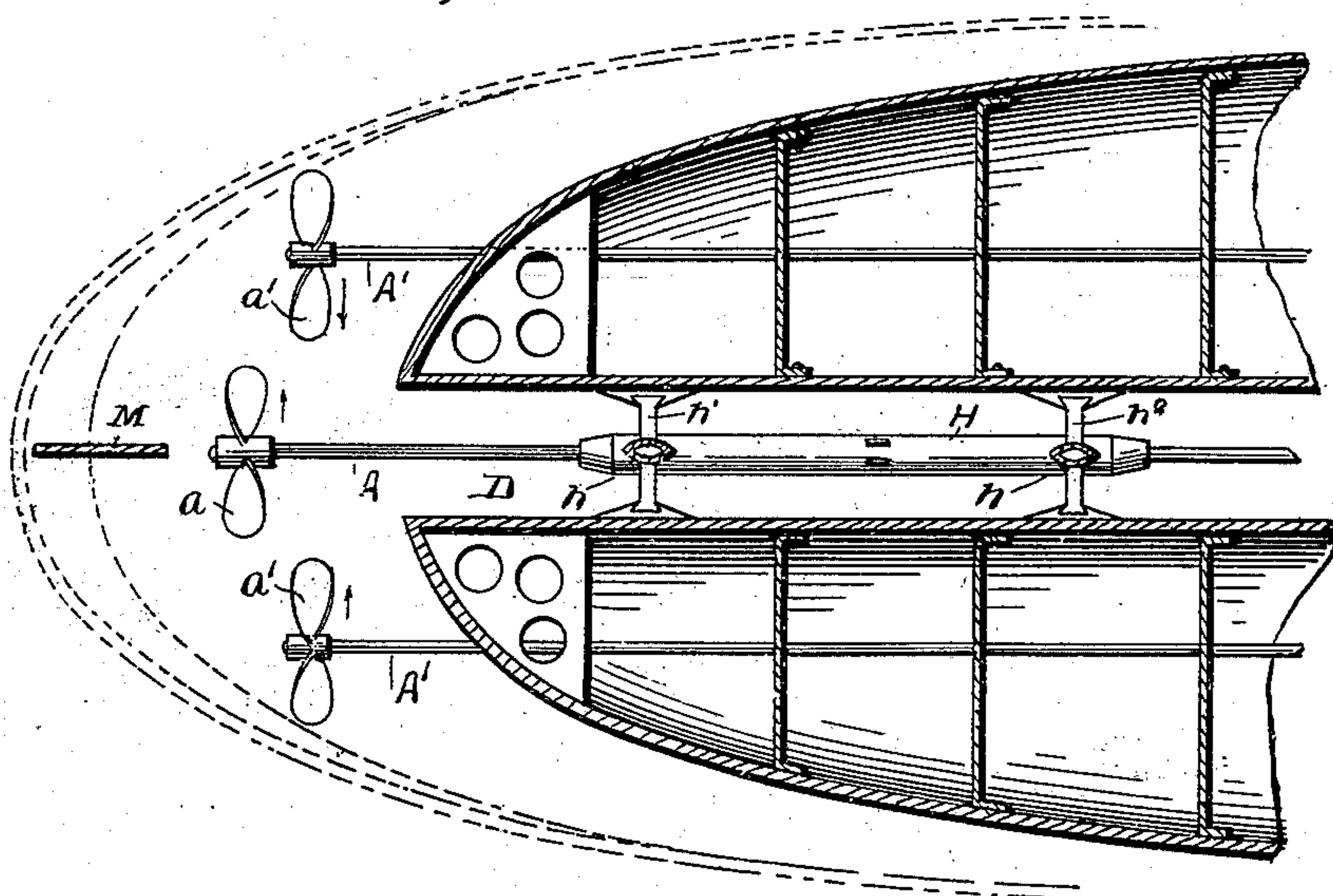
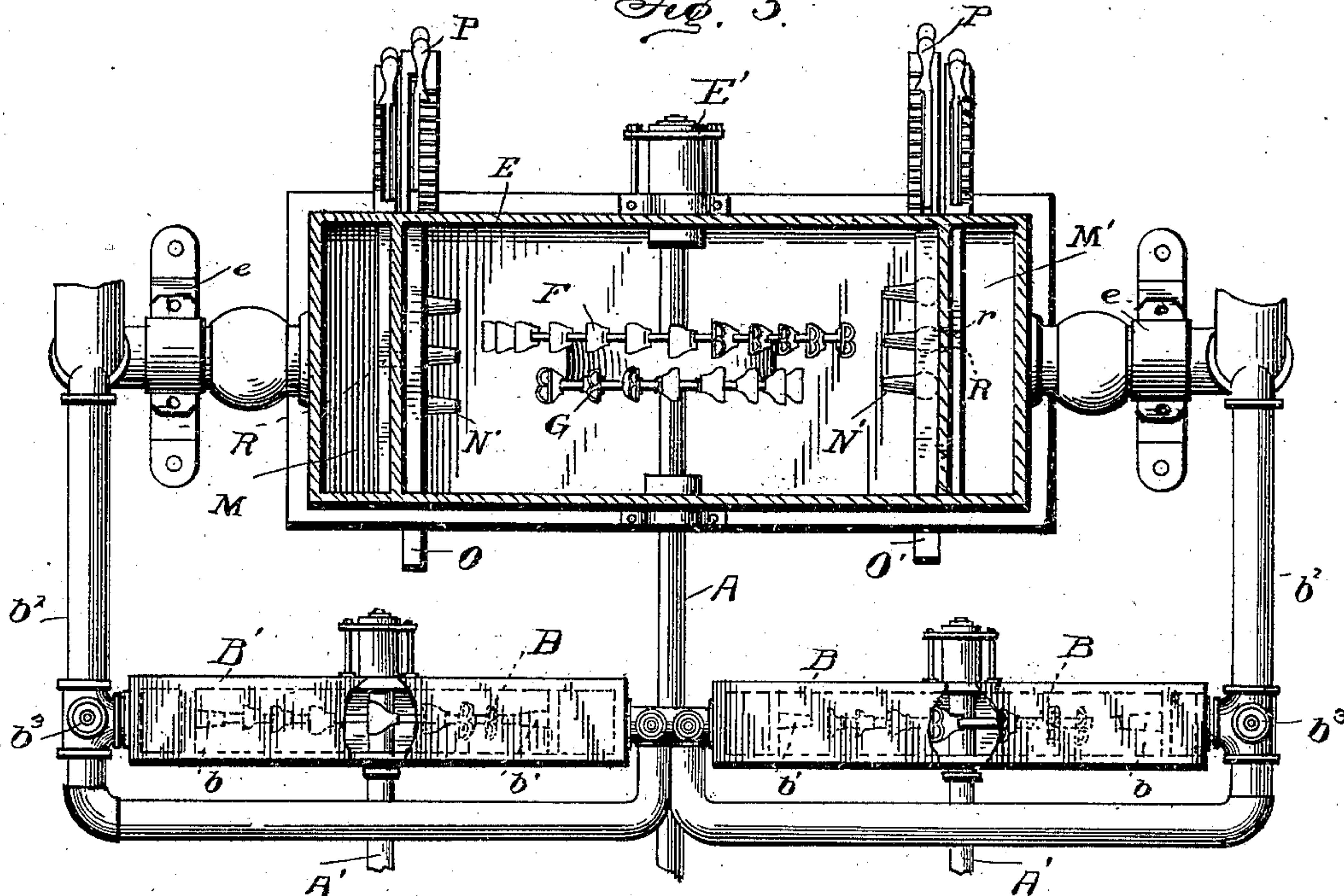


Fig. 5



Witnesses:
Tonton & Belt,
Harry M. Test

Inventor
Almer H. Lighthall
By *Samuel*
Attorney

UNITED STATES PATENT OFFICE.

ALMERIN H. LIDTHALL, OF NEW YORK, N. Y., ASSIGNOR TO HENRY A. MAURER, OF SAME PLACE.

MARINE PROPULSION.

SPECIFICATION forming part of Letters Patent No. 624,353, dated May 2, 1899.

Application filed January 14, 1899. Serial No. 702,169. (No model.)

To all whom it may concern:

Be it known that I, ALMERIN H. LIDTHALL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Marine Propulsion; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

15 This invention relates to marine propulsion.

The primary object of the invention is to provide a marine engine of such construction as to allow the propeller to be raised or lowered at will to permit of its being submerged in water to a depth to give greatest efficiency and to correspond to change of draft of a vessel by reason of lightening of the same by consumption of fuel or discharge of cargo.

25 Further, the object of the invention is to provide a construction permitting the movement referred to and which will insure a solid body of water around the propeller for the latter to act upon in propelling the vessel.

30 Further, the object of the invention is to provide a marine engine of such construction as to allow a propeller and shaft to be raised entirely out of water to permit cleaning and repairing without removing the propeller from the shaft.

35 With these objects in view the invention consists, essentially, of a vessel having in the stern thereof an open-bottomed well and a propeller-shaft extending through the well and capable of being raised or lowered.

40 The invention consists in various novel constructions and details whereby the objects of the invention are accomplished.

In the accompanying drawings, in which like letters of reference indicate like parts in all the views, Figure 1 is a side elevation of a portion of the stern of a vessel constructed in accordance with my invention, one side of the vessel being broken away and showing by dotted lines the positions of the parts when the main propeller is depressed. Fig. 2 is a central longitudinal section of the main bear-

ing for the propeller-shaft. Fig. 3 is a plan view of one of the guides for the bearing of the shaft. Fig. 4 is a plan view showing the arrangement of the main and side shafts and the well in the vessel for the reception of the shaft; and Fig. 5 is a plan view showing the arrangement of the motor-wheels by which the propeller-shafts are driven.

In the present embodiment of the invention I have shown a vessel provided with three propeller-shafts, each having a motor-wheel thereon for receiving the impact of water under pressure for imparting movement to it. The central shaft A is provided with a propeller *a*, and each side shaft A' is provided with a propeller *a'*.

In order that an up-and-down movement may be given the central propeller-shaft without impairing the effectiveness of the motor by which the shaft is rotated, I prefer to use the hydraulic motor shown. The latter is not claimed herein and is only shown and described as being particularly applicable to the construction claimed.

The means for driving the shafts is shown in Fig. 5 of the drawings. Each shaft has arranged on it a water-wheel, having on its periphery buckets or vanes, against which water under pressure is directed through suitable nozzles arranged on opposite sides of the respective wheels to revolve the different wheels in either direction, according to the desired direction of movement of the vessel.

The wheels B B of the side shafts are mounted in casings B' B', as shown. They are given motion by water under pressure from a pump C, conveyed to suitable nozzles *b b* and *b' b'* through pipes *b² b²*. A three-way cock *b³* is arranged in each pipe *b²*, by which the water is directed through the nozzles *b b* or the nozzles *b' b'*, as desired, to rotate the water-wheels B B, and consequently the propellers *a' a'*, in either direction.

In order that during the revolution of the propellers *a' a'* to move the vessel in a forward direction they may throw water against which they act inward, the inclines of the blades of the respective propellers are oppositely arranged, and during forward movement they rotate in the direction indicated by the arrows. The result of this is that dur-

ing the forward movement of the vessel the volume of water displaced by the side propellers is thrown inward and is acted upon by the central propeller.

5 The side propeller-shafts are fixed and are so arranged as to be only slightly submerged in order to avoid danger to them when the vessel is in shallow water.

10 The central propeller-shaft A has arranged on its forward end the water-wheels F and G, each provided with buckets or vanes, and these wheels are inclosed within a casing E, which has trunnions mounted in uprights e, permitting the rotation of the casing. Water
15 under pressure to be projected against the wheels F and G is conducted to the interior of the casing through telescoping pipes C', leading from the pumps C. The water after being projected against the wheels is conducted
20 from the casing E by the telescoping pipes C².

The well D, through which the shaft A extends, has no bottom throughout its length, and thus it offers no obstruction to the depression of the shaft A to any desired depth.
25 The well being open, as shown, no impediment to the even and constant flow of a current of water through the well and over or against the propeller *a* in the forward movement of the vessel is offered, and therefore a solid body of water is at all times presented
30 for the action of the propeller and for the action of the rudder M. In ordinary construction of a vessel the propeller acts upon water
35 which is thrown into eddies and currents by passage of the stern through the water.

The forward face of the casing E has on it a thrust-bearing E', receiving the forward end of the shaft. The thrust-bearing, which is
40 preferably of a construction similar to that shown in application Serial No. 706,728, allows a limited longitudinal movement to the shaft to adapt it to different pressures on the propeller.

45 H represents the main bearing for the propeller-shaft, which is arranged in the well D of the vessel. The bearing and the shaft A are supported and guided in their up-and-down movement by the arms *h*, having at the upper
50 ends the cross-pieces *h'* and *h*², provided with dovetailed ends, which are received by correspondingly-shaped guideways *d* in the sides of the well D and in the housings N N. The bearing H is preferably lined with lig-
55 num-vitæ and has openings *h*³ in its sides for permitting the inlet of water, whereby the necessary lubrication is supplied to the shaft.

The upper casing of the well D is formed by the removable plate O, attached to the
60 deck of the vessel by bolts *o*. The plate has in it openings *o'* *o*² for the passage of the arms *h*, and housings N N, having guideways in their inner faces to receive the cross-pieces *h*², are attached to the plate O by bolts.

65 The raising and lowering of the shaft to give the desired submersion to the propeller may be accomplished in any desired or con-

venient manner. One means of effecting the raising and lowering is shown in Fig. 1 of the drawings. This consists of the cylinder J, 70 attached to the plate O, having its piston-rod J' connected to the bearing H by the link *j*. The piston is moved up or down in the cylinder to change the position of the shaft A, and consequently of the propeller, by water 75 under pressure supplied through pipes K K', connected, respectively, with the upper and lower ends of the cylinder. The pipes are capable of acting either as inlet or exhaust conduits, and thus by admitting water under 80 pressure at one end of the cylinder and exhausting it at the other the shaft may rapidly be raised or lowered to any desired position.

The forward wall of the well D has arranged in it a plate D', capable of moving up or down 85 in a way *d'*, the space between the two being packed to prevent entrance of water from the well to the hold of the ship. A globe-bearing D² is arranged in the plate D', and through this passes the shaft A. 90

In order that a greater or less quantity of water may be projected against the wheels F and G, as required in driving the propeller *a* in its different positions, I arrange in the water-chests M', on each side of the casing E, in 95 which water under pressure is received from a pump, a series of nozzles N' of different areas. These nozzles are arranged on sliding plates O', which plates are capable of being moved to bring either of the nozzles on either 100 side of the casing into line with either wheel F or G. The plates have openings through them for the passage of water from the chests to the nozzles. Levers P are connected to the plates, and by these levers the nozzles 105 may be moved at will to any desired position and rigidly retained in place. The nozzles are spherical on their inner ends and are capable of being moved to project water at any desired angle. As a further means of regu- 110 lating the quantity of water projected through the nozzles, plates R are arranged adjacent to the inner ends of the nozzles. These plates have openings *r*, corresponding in size to the opening in the largest nozzle, and are connected 115 to levers P, by which they may be moved longitudinally to bring the whole or a portion of the area of any of their openings to register with the opening in the nozzle.

In addition to the described means of regu- 120 lating the speed of movement of the propeller *a* I provide the shaft A with the two water-wheels F and G, of different diameter. The nozzles N' on each side of the casing E are all capable of being brought in line with either 125 of the wheels, and therefore the speed of the revolution of the shaft in either direction can quickly be changed by bringing water under pressure from either nozzle against either of the wheels, the difference in diameter of the 130 wheels being sufficient to effect a material change of speed without manipulation of the other means herein described as provided for the purpose.

The construction herein described accomplishes what is impossible by the constructions heretofore employed. By it the depression of the main propeller to any desirable depth to allow its blades to act on water of great density is permitted, and a solid body of water for the action of the propeller and of the rudder is permitted to be formed in rear of the vessel. In rough water the propeller can be depressed to such a position that it will not be lifted from the water in the pitching of a vessel and therefore a constant impelling power maintained under all conditions.

By removing the plate forming the top of the well the shaft extending through the well and its propeller can be raised entirely out of the water, and thus parts can be cleaned or repaired without removing the propeller from the shaft.

While I have herein particularly shown and described a preferred form of motor for rotating the shaft, no claim is made therefor, as it forms the subject-matter of application, Serial No. 691,416, filed September 20, 1898.

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

1. A vessel having the open-bottomed well extending from the stern of the vessel forward, the propeller-shaft extending through the well, the bearing for the shaft, supports for the bearing, the guides on the sides of the

well, and the cross-pieces attached to the supports and entering the guideways, substantially as described.

2. A vessel having the well provided with guideways on its sides, the propeller-shaft extending through the well, the bearing having the supports, the cross-pieces attached to the supports and entering the guideways, and the cylinder having its piston attached to the bearing and having inlet and exhaust pipes, substantially as described.

3. A vessel having the open-bottomed well, the side propellers having their blades oppositely arranged, and the central propeller-shaft arranged in the well, substantially as described.

4. A vessel having the well open at its bottom and provided with the removable covering-plates, and the pivotally-arranged propeller-shaft extending through the well, substantially as described.

5. A vessel having the open-bottomed well, in combination with the propeller-shaft extending through the well, a motor-wheel on the shaft, and the pivoted casing containing the motor-wheel, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALMERIN H. LIGHTHALL.

Witnesses:

DAVID H. MEAD,
THOMAS BRADLEY.