No. 690,821.

Patented Jan. 7, 1902.

J. J. ASTOR.

MARINE PROPULSION.

(Application filed Sept. 3, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

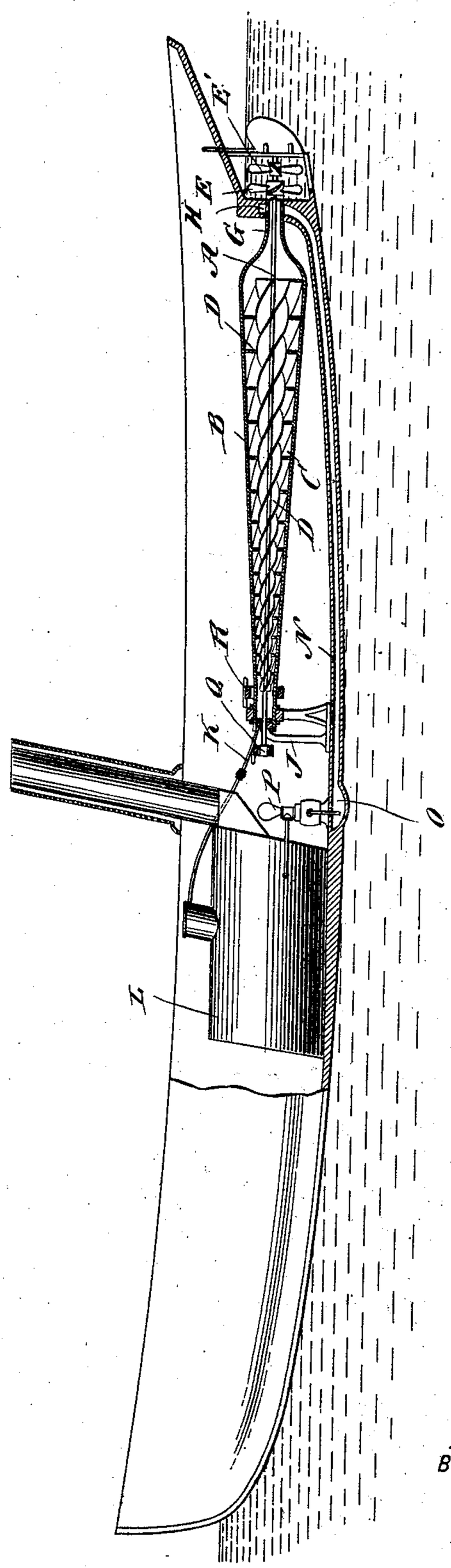

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Fig. 2.

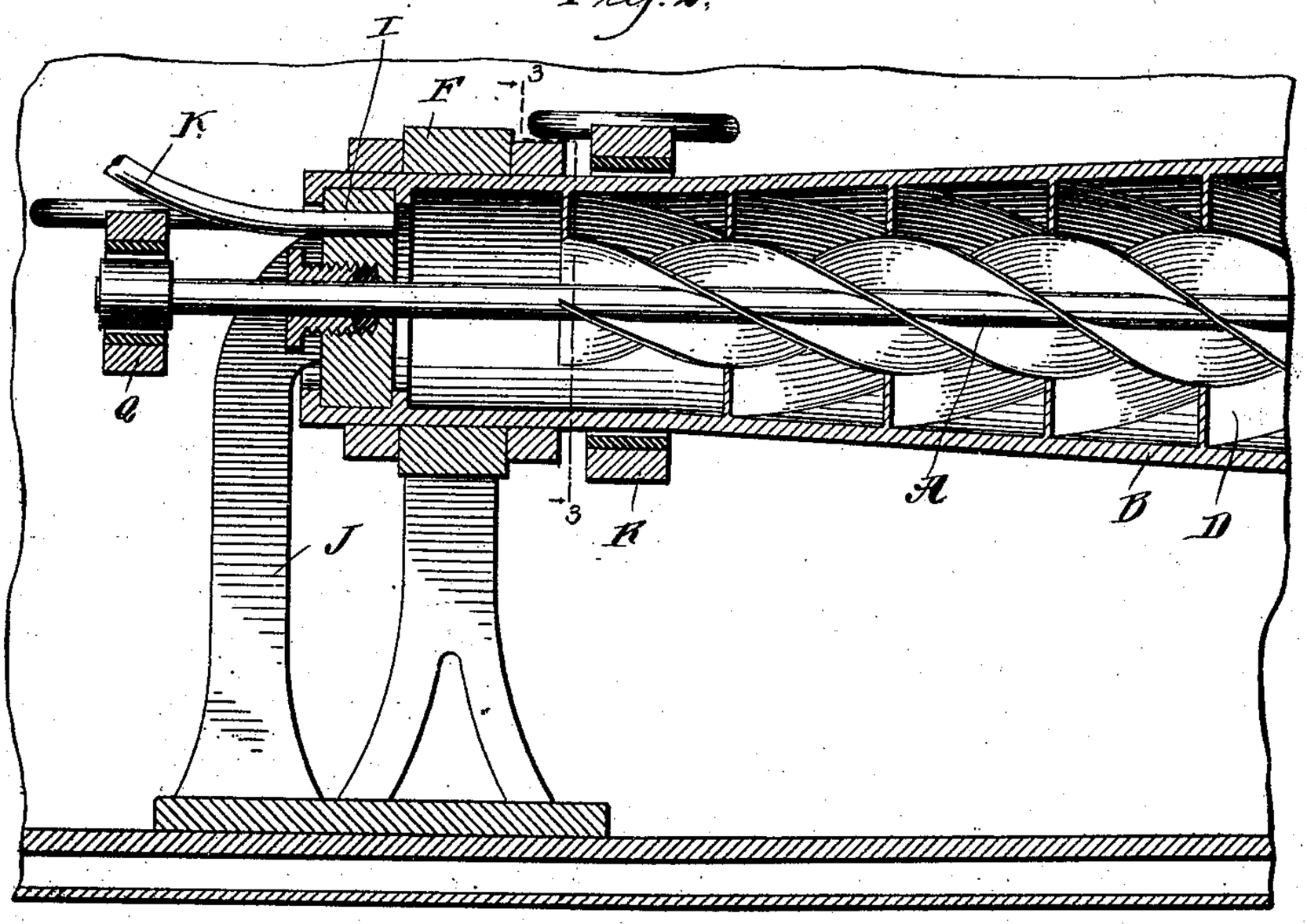
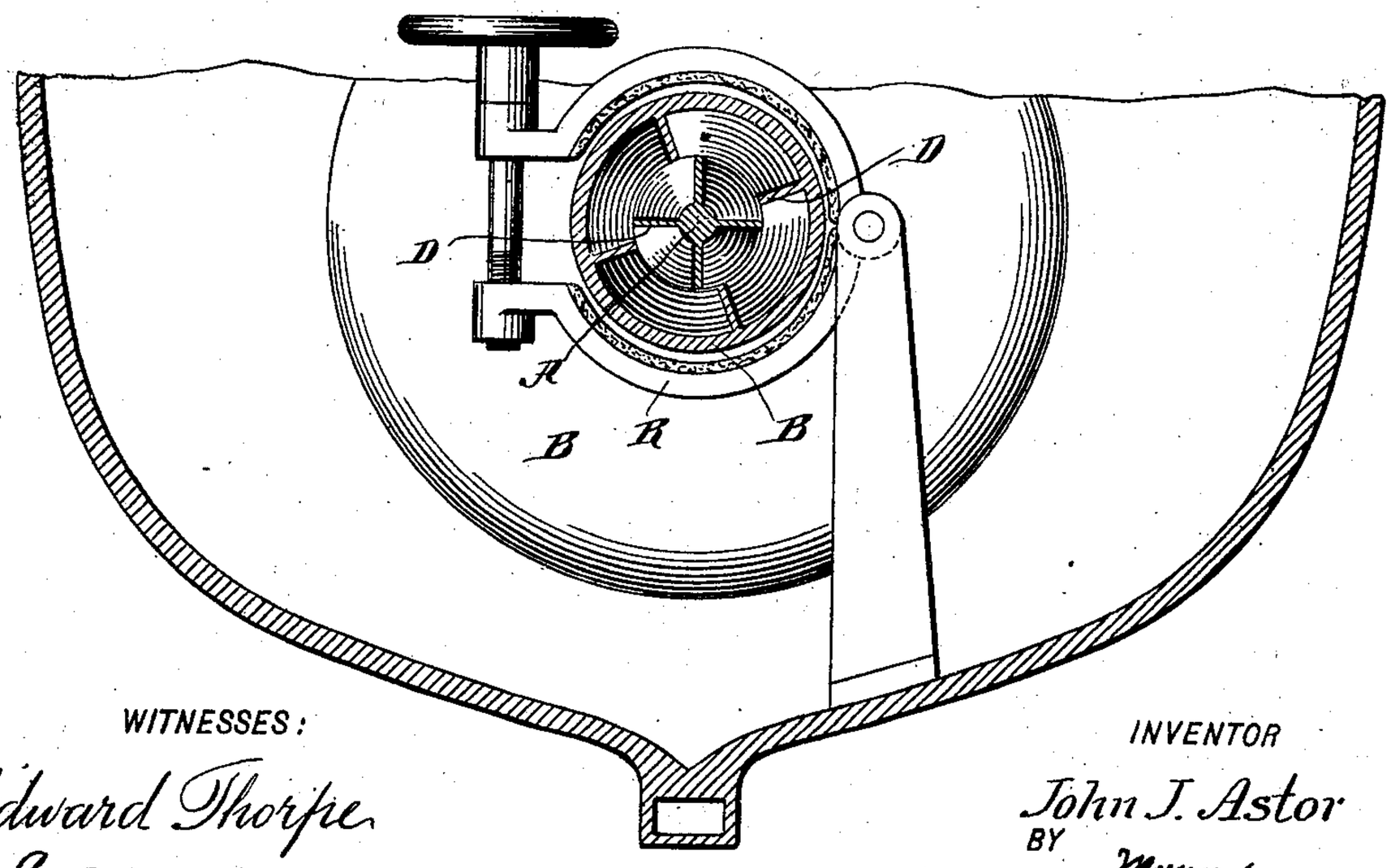


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN JACOB ASTOR, OF NEW YORK, N. Y.

MARINE PROPULSION.

SPECIFICATION forming part of Letters Patent No. 690,821, dated January 7, 1902.

Application filed September 3, 1901. Serial No. 74,093. (No model.)

To all whom it may concern:

Be it known that I, JOHN JACOB ASTOR, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented certain new and useful Improvements in Marine Propulsion, of which the following is a full, clear, and exact description.

This invention relates to a new apparatus for marine propulsion.

In the well-known turbine the steam acts between a stationary exterior shell or casing and a rotative interior part. In order to attain a great efficiency in these engines, it is necessary to drive the mobile part at an excessive speed. I propose in my invention to reduce this speed without reducing the efficiency of the engine and at the same time to increase the power of the engine. This end I attain by rotatively mounting the exterior part or casing as well as the interior part and by fitting each with spiraform surfaces, against which the steam or other motive fluid may act. These spiraform surfaces are set oppositely, and as the motive fluid acts between them it turns the two parts of the engine oppositely. The result is that the motive force is divided between the two mobile parts of the engine, thus reducing its speed, but increasing its power and usefulness. The power of the engine may be easily controlled not only by the steam-supply, but by applying a brake to either of the rotative elements. The propellers are arranged one ahead of the other in the longitudinal center of the ship. They are right and left hand screws, and being turned in opposite directions afford all the advantages of the usual twin-screw arrangement without the attendant disadvantages. In its practical form the engine comprises a central rotative shaft, along which runs a spiral blade or blades, and this central shaft is incased in an exterior shell or tubular shaft rotative independently of the central shaft and having an internal spiral blade or blades set oppositely to the blades of the central shaft. The exterior shell or tubular shaft may be made to flare toward the exhaust end of the apparatus, thus allowing for the expansion of the steam or other gas as it passes through the engine. This apparatus is set fore and aft on or directly above the keel of the vessel, the after ends of the two shafts running through the stern-posts of the vessel in the same manner as the shaft of a single-screw ship. Each shaft carries a propeller, the axes of which are therefore coincident, and both propellers are located immediately aft of and in line with the stern-post of the vessel. The advantage of this is obvious, since the weight and strain of the engine and propeller-gear are carried directly on the keel, which is the strongest part of the frame of the vessel. No additional timbering in the vessel is necessary, such as is the case in the ordinary twin-screw ship. The rotation of the first or forward propeller gives the water at the stern a rotary or whirling motion and forces it aft to the second or after propeller, which in turning oppositely to the first propeller acts against the current therefrom, and thus the propelling efficiency of the two screws is increased. This novel arrangement of the propeller presents the further advantage of enabling the vessel to be easily steered and handled.

This specification is a specific description of one form of the invention, while the claims are definitions of the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal sectional elevation of a marine vessel supplied with my improvement. Fig. 2 is an enlarged longitudinal sectional elevation of part of the propelling-turbine, and Fig. 3 is a cross-section of the same on the line 3 3 in Fig. 2.

The engine consists, essentially, of a central rotary shaft A, extending centrally through a hollow shaft or shell B, both of which parts A and B are independent relatively and form between them an annular working chamber C. As shown in the drawings, particularly Fig. 1, the shell B is flared toward the discharge end, thus accommodating the expanding volume of steam as it passes through the engine. Into this chamber extend spiral blades or wings B, secured to the parts A and B, respectively, and standing in opposite directions, the outer edges of the wings

on the shaft A being close to the inner edges of the wings on the shell B.

In fitting the motor to a marine vessel the parts A and B extend fore and aft directly above the keel, and the rear ends of the parts A and B project through the stern-post of the vessel and carry, respectively, propellers E and E', of any approved construction and located one behind the other, as shown in Fig. 1. The shell B is journaled at its forward end in a bearing F, and the after end of the shell is contracted to form a hollow neck G, suitably journaled in the stern-post of the vessel. The shaft A extends through the neck G and is mounted at its after end in the rudder-post of the vessel or in any other suitable part. The forward end of the shaft A is mounted in a bearing I, which is supported by a pedestal J and which fits into the forward end of the shell B to close the same. This neck G is perforated (see Fig. 1) to admit the escape of the exhaust-steam, which passes from the shell B into a chamber H in the vessel, from which it escapes into the condenser, to be hereinafter described. A supply-pipe K extends through the forward bearing I (see Figs. 1 and 2) to discharge the motive fluid into the chamber C, said supply-pipe K being connected with a boiler or other apparatus L in which the motive fluid is generated or restored. When the supply-pipe K is opened, the motive fluid passes into the forward end of the working chamber C and simultaneously acts on both sets of wings or blades D to rotate the parts A and B and the propellers E and E' in opposite directions. This drives the vessel, as hereinbefore explained. It should be understood that the motive fluid in its travel through the working chamber C acts continuously on the wings D of both parts A and B, so that the force of the motive fluid is utilized to the fullest advantage. Preferably steam is employed to work the engine.

The exhaust-steam may be condensed in any manner desired—for example, by the devices described below. The exhaust-steam passes from the chamber H into a condensing-duct N, formed either in the keel of the vessel or produced by a pipe arranged on the keel. I have here shown the duct in the keel itself. The duct N extends forward toward the middle of the vessel and dips slightly to cause the water of condensation to run by its own gravity into a pit or well O, from which the water is returned by a pump, injector, or other means P back to the boiler L. Thus the live steam travels rearward through the chamber C and the exhaust-steam travels forward in the duct N and is condensed therein. The water of condensation accumulating in the well O is returned to the boiler L by the pump P. By the arrangement described the sea-water at the keel forms a cooling medium for the exhaust-steam to insure a rapid condensation without the use of special condensers or a cooling medium pumped through the condensers.

In order to permit of revolving either of the shafts while the other is held stationary, suitable brake or locking mechanism Q and R are provided for the parts A and B, so that the engineer can hold either part against rotation while the other is turning. Reversal of the propellers E can be had by passing the motive fluid into the rear end of the working chamber C and exhausting at the front end thereof, it being understood that for this purpose suitable connections and valves are provided.

The construction above described may be greatly varied without deviating from the spirit of my invention, it being expressly understood that I do not limit myself to the detail construction shown and described.

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

1. In an apparatus for marine propulsion, the combination of a central rotative shaft, an exterior shell inclosing the shaft and mounted to rotate independently thereof, oppositely-disposed spiral blades fastened respectively to the shaft and to the interior wall of the shell, the blade of the shell running across the blade of the shaft and said blades having their adjacent edges abutting against each other, and oppositely-set screw-propellers connected respectively with the central shaft and with the said shell.

2. In an apparatus for marine propulsion, the combination of a central rotative shaft, an exterior shell inclosing the shaft and mounted to rotate independently thereof, oppositely-set spiral blades fastened respectively to the central shaft and the interior wall of the shell and running continuously throughout the working length of the shaft and shell and oppositely-set screw-propellers connected respectively with the central shaft and with the said shell.

3. The combination with a marine vessel, of an exterior shell located fore and aft therein, a bearing revolubly carrying the forward end of the shell, the rear end of the shell being contracted to form a neck projected through and revolubly mounted in the stern-post of the vessel, a centrally-disposed rotative shaft located in the shell and running rearward through the neck thereof, bearings for the said shaft, spiral blades attached to the shaft and shell and disposed oppositely for the purpose specified, and oppositely-disposed propellers fastened to the neck of the shell and to the central shaft.

4. In an apparatus for marine propulsion, the combination of an exterior shell, a centrally-disposed shaft running through it, oppositely-disposed spiral blades attached to the shell and shaft, for the purpose specified, oppositely-disposed propellers connected respectively with the shell and shaft, a bearing

for revolubly mounting the front end of the shell, a bearing-head fitted revolubly in the front end of the shell, means for rigidly supporting said bearing-head, the said bearing-head revolubly carrying the centrally-disposed shaft, and brakes respectively for the shaft and shell.

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

JOHN JACOB ASTOR.

Witnesses:
PHILIP C. BROWNE,
E. D. COULTER.