(No Model.) 2 Sheets—Sheet 1.

J. CARDY.

SCREW PROPELLER.

No. 496,812. Patented May 2, 1893.

Fig. 1.

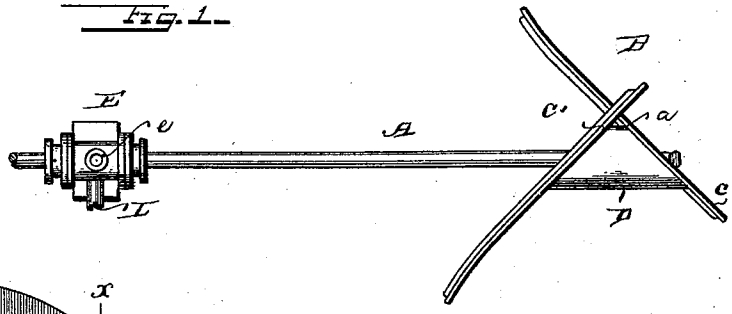


Fig. 2.

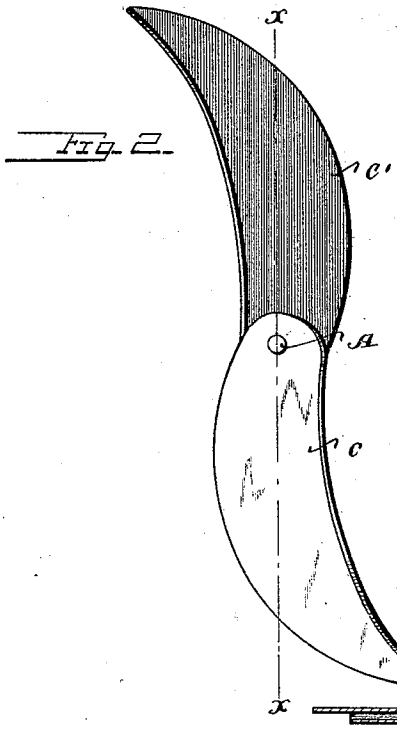


Fig. 3.

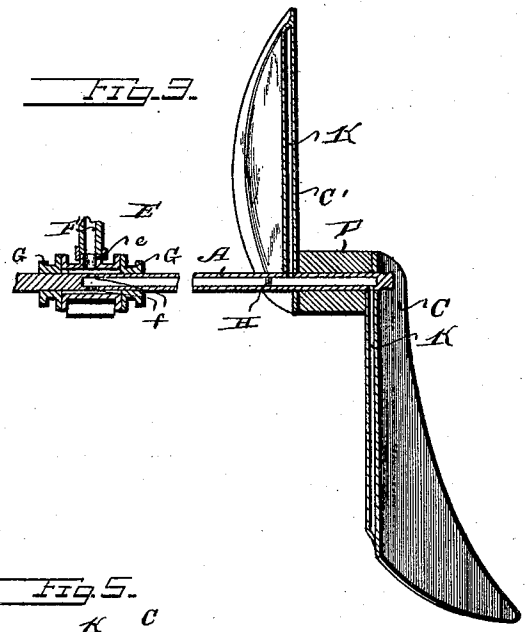


Fig. 5.

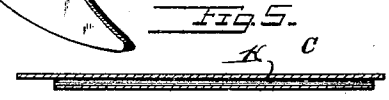


Fig. 6.

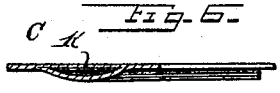
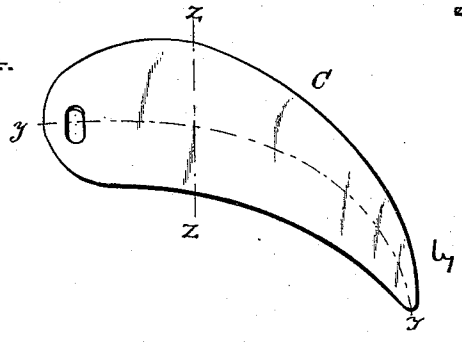


Fig. 4.



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George H. Parmelee
his Atty.

(No Model.) 2 Sheets—Sheet 2.

J. CARDY.

SCREW PROPELLER.

No. 496,812. Patented May 2, 1893.

Fig. 7.

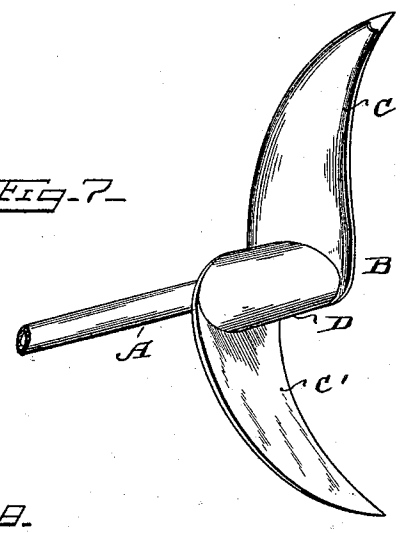
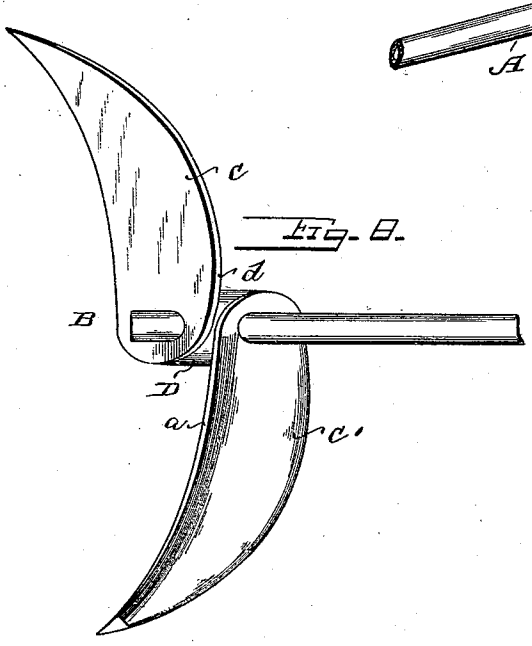


Fig. 8.



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UNITED STATES PATENT OFFICE.

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SCREW-PROPELLER.

SPECIFICATION forming part of Letters Patent No. 496,812, dated May 2, 1893.

Application filed October 11, 1892. Serial No. 448,529. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH CARDY, a citizen of the United States, residing at Tampa, in the county of Hillsborough and State of Florida, have invented certain new and useful Improvements in Screw-Propellers; 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.

This invention has relation to certain new and useful improvements in screw propellers, the object being to provide a propeller, designed to be driven at a high rate of speed, the ratio of whose propulsive force to a given expenditure of power shall show a large increase as compared with that of similar devices heretofore known and used; and further, to provide means in combination with the propeller blades whereby the centrifugal force of their high rotation may be made available to effect the discharge of the water of condensation from the condensation chambers of the ship's engines, or the bilge water from its hold. These objects I attain by the peculiar form and arrangement of the propeller blades, whereby each blade is caused to exert a maximum propulsive resistance, the greatest effective force of which is near the center of motion, each blade working in its own independent plane; and by the provision of a closed suction conduit or channel which leads from the condensation chambers of the engines, or from the hold, or both, the points of discharge of which conduit are near the extremities of said blades, whereby the rapid rotation of the latter causes a suction through said conduit or channel sufficient to draw the water to the points of discharge, where it is thrown off by the centrifugal force of rotation, all as fully hereinafter described and pointed out in the appended claims, reference being had to the accompanying drawings in which—

Figure 1 is a plan view of the propeller and its shaft. Fig. 2 is a face view of the same. Fig. 3 is a section on the line *x—x*, of Fig. 2. Fig. 4 is a plan view of a detached blade, and Figs. 5 and 6 are sectional views on the lines *y—y*, and *z—z* respectively of Fig. 4. Fig. 7 is a perspective view of the propeller and Fig. 8 is a plan view as seen from the opposite side to that shown in Fig. 7.

Referring to the said drawings, the letter A designates the propeller shaft, and B my improved propeller. Said propeller comprises the two blades C, C′, carried by a hub D, with which they are formed integral, said hub being keyed or otherwise suitably secured to the end portion of said shaft. Each of said blades has the form, approximately, of a section of a lune or crescent cut transversely at its broadest portion, the base of each section joining the hub D obliquely to the axis thereof and to the shaft. The two blades are separated from each other on the hub one hundred and eighty degrees from center to center, and are situated at right angles to each other, the angle of obliquity of each to the shaft being forty-five degrees, and the reverse of the other. The hub D is of cylindric form, the blades leaving it one at each end with the inner portions of the blades forming the ends of the hub, which are therefore inclined at right angles to each other. The length of the hub is such that the rear edge *a* of the fore-blade C′, and the leading edge *b* of the after-blade C lie nearly, at their inner ends, within the same vertical plane taken through the center of the hub at right angles to its axis, the leading edge of each blade being the outer curve of the semi-lune. By this form and arrangement of the blades I attain several important results:

In the first place, it will be apparent that the greatest effective propulsive resistance of each blade is near the center of motion, instead of at the periphery, whereby not only may the propeller be driven with a less expenditure of power, but its effective force is greater.

In the second place, the plane of one blade being behind that of the other and independent thereof, each of said blades is caused to act in its own solid abutment of water, instead of in the churned up wake of the preceding blade.

In the third place, the entire propelling surface of each blade is rendered effective, from the center of motion to the extremity, instead

of those portions of the blades near the center of motion acting merely as a churn without effective resistance, as in ordinary propellers. And finally, I enable the propeller, by the centrifugal force of its rotation to perform the office of a pump in the manner now to be described.

E designates a drain chamber through which the shaft A passes, said chamber being located within the ship or boat on the after length of the shaft, abaft the first coupling from the screw. Said chamber has a projecting nozzle *e* with which is connected a pipe F leading to the condensation chamber or chambers of the ship's engines. Where the shaft enters and passes from this chamber, stuffing boxes G are provided; and within said chamber, said shaft has two small holes or passages *f*, communicating with the hollow interior of said shaft and with the chamber. In the nozzle *e*, or at any other suitable point is placed a check valve H, which should open outwardly. The interior of the hub D forms a second chamber, communicating by small openings with the hollow interior of the shaft; and, running outwardly through the blades from said chamber, are conduits or channels K, which extend to within a very short distance of the extremities of the blades, and open to the non-propelling surface thereof.

The high speed of rotation of the semi-lunar blades causes a suction or vacuum within the shafting, the pipe F, and the drain chambers, which draws the water from the condensation chambers of the engines out through the conduits or channels in the blades, which discharge it by centrifugal force at a tangent to the plane of revolution. This action is very effective, owing to the high speed of the blades, and the fact that the direction of the conduits or channels in the blades conforms to the curve of their movement, the points of discharge being at their extremities where there is the least resistance. The said conduits or channels K are formed by swelling the non-propelling faces of the blades from edge to edge with a gentle convexity which contains the conduit, so that the blades are not caused to offer any increased resistance to their movement either forward or backward. This swelling or thickening also serves to strengthen and reinforce the blades. The check valve will prevent any reverse action in backing. A second pipe L may also connect with the drain chamber E, said pipe leading to the hold and causing the propeller to also serve the purpose of a bilge pump. By this action of the blades whereby the propeller is made to serve the office of a pump, the special pumps for the condensation chambers are obviated, and the engines simplified.

The outer portions of the blades may be turned at a slightly greater angle to the shaft than are the inner portions for the purpose of equalizing the resistance throughout their length.

The word "lune" hereinbefore employed in connection with the description of the propeller blades, is used in its geometrical sense as signifying a crescent shaped figure bounded by two intersecting arcs; and the words "semi-lune" and "semi-lunar" are herein applied to a blade having the form, approximately, of a section of a lune, the section being formed by cutting the lune transversely at its broadest central portion.

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

1. A screw propeller, comprising a pair of semi-lunar blades inclined in planes at an angle to each other, and obliquely to the shaft, substantially as specified.

2. A screw propeller having two opposite blades of semi-lunar form, inclined in planes at right angles to each other and obliquely to the shaft, substantially as specified.

3. A screw propeller having two opposite blades, each of which approximates in form the section of a lune cut transversely at its broadest portion, the outward curves or the semi-lunes forming the leading edges of the blades, said blades being inclined at right angles to each other and at angles of forty-five degrees to the shaft, substantially as specified.

4. A screw propeller having two opposite semi-lunar blades inclined at right angles to each other, and working in independent planes of rotation, substantially as specified.

5. A screw propeller comprising a cylindric hub, having at each end an oppositely directed blade of semi-lunar form, the two blades being inclined in planes at right angles to each other and at opposite angles of forty-five degrees to the axis of said hub, substantially as specified.

6. A screw propeller, comprising a hub of cylindrical form, a blade projecting from each end of said hub in opposite directions, said blades being of semi-lunar form, and having the inner portions of their propelling faces forming the ends of said hub, said blades working in independent planes of rotation, substantially as specified.

7. A screw propeller comprising two blades, each of semi-lunar form, substantially as specified.

8. The combination with the propeller, having the semi-lunar blades oblique to the axis of revolution, and inclined to each other, the channels or conduits within said blades and discharging near the extremities thereof, and the chambered hub, of the hollow shaft section having passages communicating with the chamber in said hub, the drain chamber through which said shaft passes and with which its hollow interior communicates, and a pipe connection between said drain chamber and the condensation chamber or chambers of the ship's engines, substantially as specified.

9. The combination with the propeller having the semi-lunar blades oblique to the axis of revolution and inclined to each other at

right angles, said blades having therein curved conduits or channels discharging near the extremities at the non-propelling face of said blades, of the chambered hub carrying said blades and into whose chamber the said conduits or channels extend, the hollow shaft having passages from its interior into said chamber, the drain chamber through which said shaft passes and with which its hollow interior communicates, the stuffing boxes, the check valve, and the suction pipe, substantially as specified.

10. A high speed screw propeller having its propelling blades formed with interior conduits or channels discharging near the extremities of said blades, and an inclosed passage or conduit leading to said conduits or channels and from a point within the ship from which water is to be removed, whereby the rapid rotation of said blades creates a suction within said conduits and passage and causes water to be drawn therethrough and thrown by centrifugal force from said discharges, substantially as specified.

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

JOSEPH CARDY.

Witnesses:
M. DORIAN,
JESSE HELLER.