(Model.)

J. P. HOLLAND.

Screw Propeller.

No. 239,046. Patented March 22, 1881.

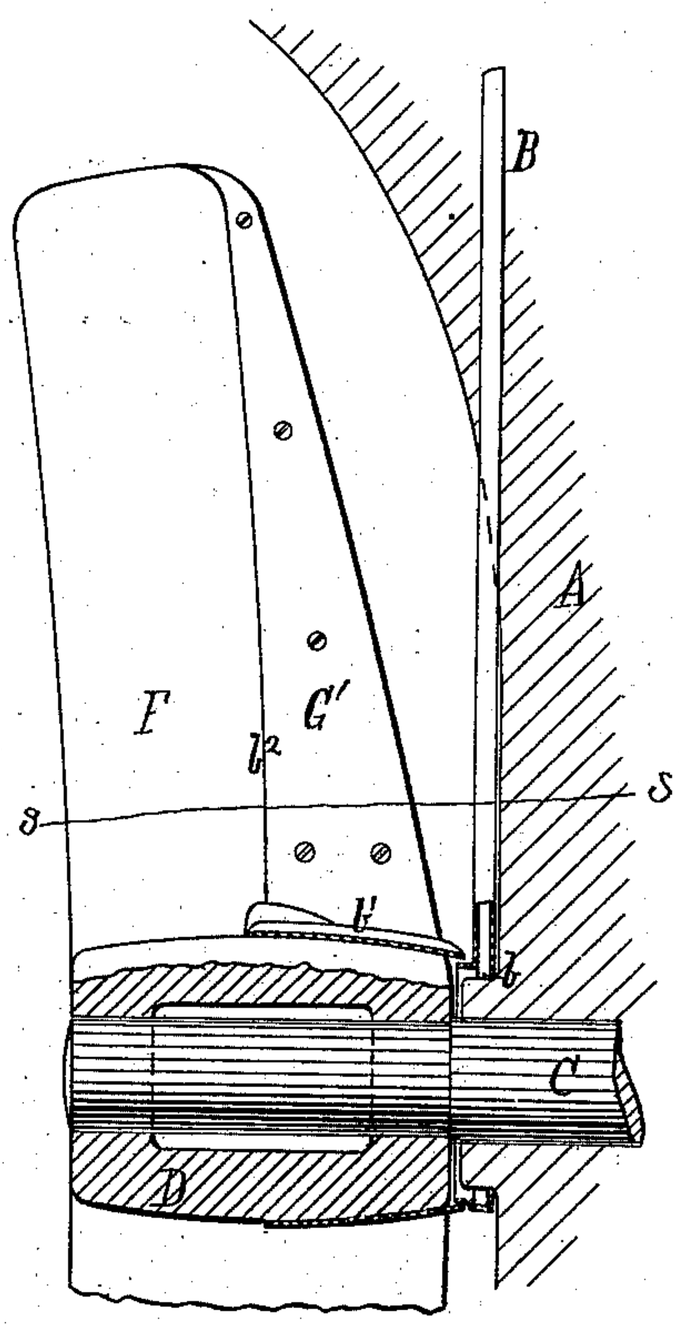

Fig. 1.

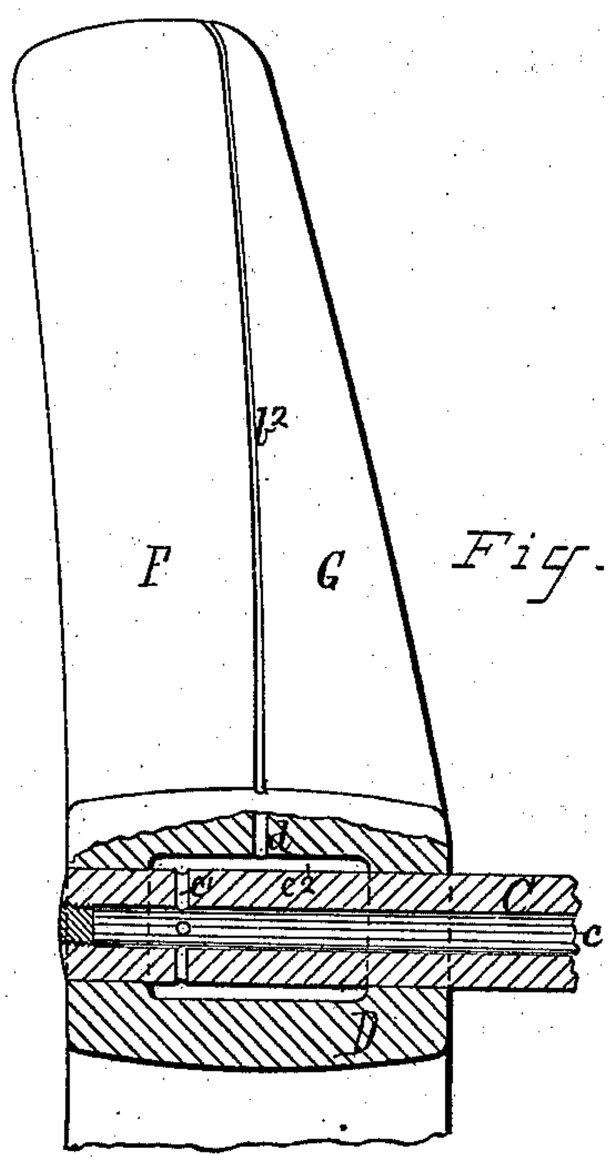

Fig. 2.

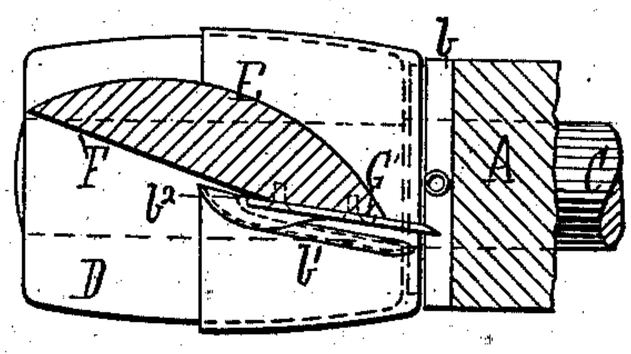

Fig. 3.

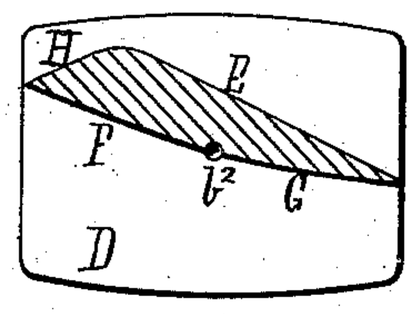

Fig. 4.

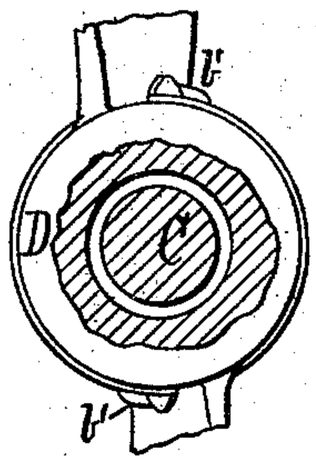

Fig. 5.

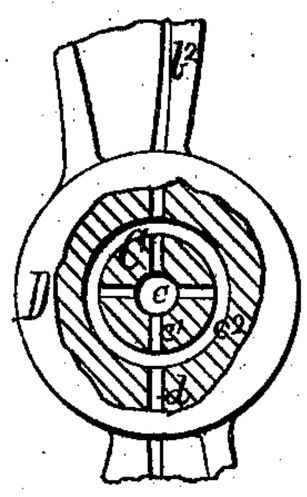

Fig. 6.

WITNESSES.

Charles C. Stetson

Wm C Dey

INVENTOR.

John P. Holland

UNITED STATES PATENT OFFICE.

JOHN P. HOLLAND, OF NEWARK, NEW JERSEY.

SCREW-PROPELLER.

SPECIFICATION forming part of Letters Patent No. 239,046, dated March 22, 1881.

Application filed April 8, 1880. (Model.)

To all whom it may concern:

Be it known that I, JOHN P. HOLLAND, a subject of Great Britain, residing in Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Screw-Propellers, of which the following is a specification.

My invention is intended to increase the efficiency of the propeller; and it consists of a peculiar shape of the blades and means of decreasing the friction of the water in passing the same.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figures 1, 3, and 5 represent a screw of the ordinary construction altered to contain my invention. Fig. 1 is an elevation, partly in section. Fig. 3 is a plan view, partly in section. The section is on the line *s s* in Fig. 1. Fig. 5 is an end view, partly in section. Figs. 2, 4, and 5 represent my propeller in what I esteem the preferable form for new work. Fig. 2 is an elevation, partly in section. Fig. 4 is a plan, partly in section; Fig. 6, an end view, partly in section.

Similar letters of reference indicate corresponding parts in all the figures wherever they occur.

A is the stern-post of the ship.

Referring to Figs. 1 and 3, B is an air-pipe leading down from the deck or the interior of the vessel. Its lower end communicates with a casing, *b*, which encircles the shaft-bearing.

Referring to Figs. 2, 4, and 6, C is the shaft, and D the hub, of the propeller, strongly secured together by keys or other ordinary means. Along the axis of the shaft C is a hole, *c*, plugged at the outer end, and provided with radial vents or branches c', communicating with an annular cavity, c^2, in the interior of the hub D. Radial holes *d* are made through the hub D. It follows that air under pressure, being supplied through the holes c', fills the annular chamber c^2 and flows out through the orifices *d*, to be made available in lubricating the surface of the screw-blades, and greatly reducing the severe friction of the water thereon. The air delivered through the orifices *d* is received in a groove, b^2, formed on the rearmost face—the working-face—of each blade of the propeller.

In Figs. 1 and 3, G is an additional plate of metal, riveted or otherwise firmly secured on the surface, of greater pitch, and having a corresponding action on the water. The after edge of the added plate G′ forms the groove b^2, or an equivalent space for the air to traverse outward by the considerable offset presented by the abrupt termination or shoulder. The front edge or leading edge of the metal may be sharpened.

In the form of the invention shown in Figs. 1, 3, and 5 an additional plate of rolled metal, b', is riveted or otherwise fixed on the hub D, inclosing a sufficient way or passage close to the root of each blade. The passage under the plate b' is presented to the space under the rearward-projecting lip of the fixed casing *b*, so that it receives a continuous current of air from the latter and conducts it to the groove b^2.

It will be understood that the air blows down through the pipe B and fills the annular case *b*, and that it flows from thence in continuous streams rearward in the revolving channels or passages under the casing b', and that it is thence discharged into the grooves b^2, whence it flows out and is distributed to reduce the friction of the water on the propelling-surface of the blade. A force-pump worked by the engine or other suitable means may force the air down through the pipe B, or the air may be induced to move solely by the centrifugal force of the propeller; or both these means may contribute to the desired end.

In altering an old propeller I confine the alteration entirely to the after propelling-face, except that my added plate G′, by projecting a little at an increased angle, gives some of the same effect in reducing the resistance of the water on the forward or idle side.

In the form shown in Figs. 2, 4, and 6 the air is admitted or forced in through the passages c' c^2 *d*, being admitted to the axial passage C at any convenient point (not represented) in the interior of the vessel.

The groove b^2 divides the rear face of each screw-blade into two distinct surfaces, which I have marked by different letters, F G. The portions are of different pitch. The mean pitch

of the two taken together may be that of a corresponding ordinary screw; but the pitch of the part G is greater and the pitch of the part F is less. Or the working-face may show, in a cross-section of the blade, on line *s s* in Fig. 2, a convex curve, tangents to which from the leading and trailing edges shall correspond with the pitch or slant of the faces F G, above described. The back or idle face of the screw-blade is modified, as indicated by the section, Fig. 4, where E is one portion, forming a small angle with the working-faces F G at the leading edge of the propeller; and H, another portion, forming a much larger angle at the trailing edge. This form of section gives the required strength and stiffness to the blades with little resistance. Or the back may show, in cross-section of the blade, on the line *s s*, a convex curve having similar relation to the component faces of the back, as described for working-face.

Modifications may be made in other points. Both means of supplying air to the groove b^2 may be employed in combination—that is to say, I can admit air through the center of the shaft C and the connected passages, and also through the pipe B at the connected passages—or I can provide a passage (not shown) leading from the annular chamber *b* diagonally inward to the annular chamber c^2, whence it may be discharged outward through the passages *d*.

The parts G, *b'*, and *b* may be ordinarily rolled iron or brass; but cast metal may be substituted with advantage in some situations.

Some parts of the invention may be used without the others.

I prefer the construction shown in Figs. 2, 4, and 6.

It will be understood that the form of section of each blade changes gradually toward the periphery, and that each blade is a flat or nearly plane surface of little thickness near its periphery. Each groove is of liberal size at the inner end, sufficient to contain all the air flowing out through *d;* but it is of less area at the points farther out, and is reduced nearly to nothing at the periphery of the blade. The air escaping through *d* into each groove b^2 flows over the whole face of the screw, which is in the rear of this groove b^2.

I claim as my invention—

1. In a screw-propeller, the surface passage or groove b^2 on the propelling-face of each blade, in combination with provisions for supplying air to the inner end thereof, so that the air will be distributed from b^2 over the working-surface, as and for the purposes herein specified.

2. In a screw-propeller, the air-passage b^2 upon the blade, formed by grooving said blade or superadding a plate, G', fixed at or near the leading edge of the blade, with an offset at its rear edge, in combination with the means, B *c c' d*, for supplying air to said passage, as set forth.

3. In a screw-propeller blade, the front surface, G, and after surface, F, of the working-face, formed in two distinct parts, having each a different pitch from the other, and having an air-channel, b^2, along a line at or near the junction of these two surfaces, as herein specified.

4. In a screw-propeller, the annular chamber c^2, radial passages *d*, and grooves b^2, formed in the propelling-face of each blade, in combination with each other, and with provisions for supplying a current of air to flow through such series and be discharged, so as to cover the working-surface with air and reduce the friction thereon, as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, New York, this 6th day of April, 1880, in the presence of two subscribing witnesses.

JOHN P. HOLLAND.

Witnesses:

CHARLES C. STETSON,

WM. C. DEY.