E. J. HULBERT.
Screw-Propellers.

No. 199,550. Patented Jan. 22, 1878.

Fig. 1.

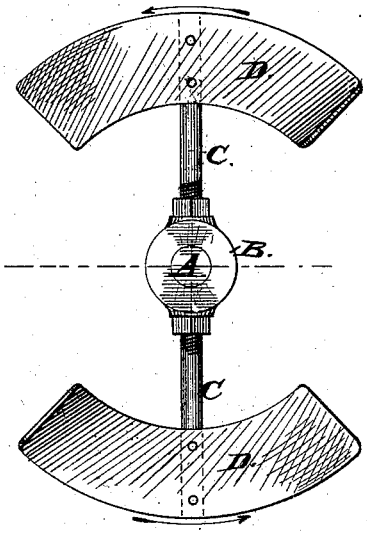


Fig. 2.

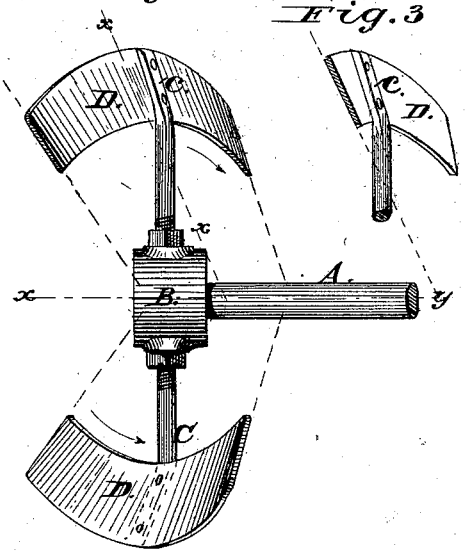


Fig. 3

Fig. 4.

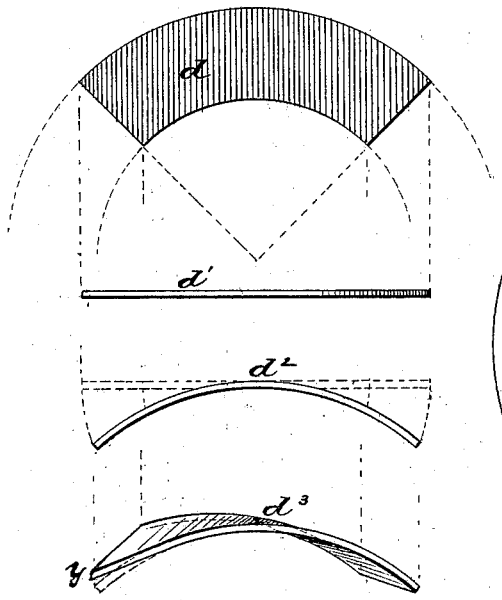
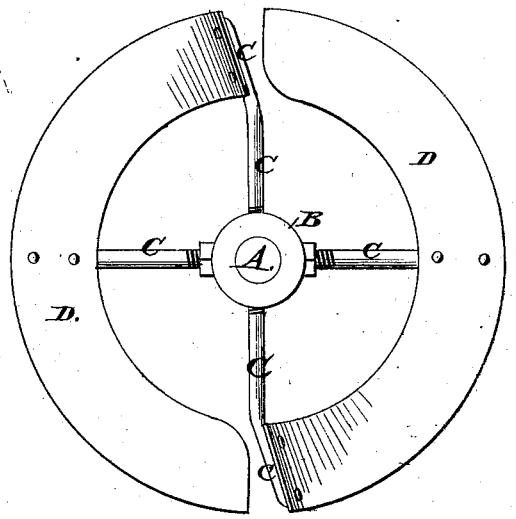


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWIN J. HULBERT, OF MIDDLETOWN, CONNECTICUT.

IMPROVEMENT IN SCREW-PROPELLERS.

Specification forming part of Letters Patent No. **199,550**, dated January 22, 1878; application filed March 14, 1877.

To all whom it may concern:

Be it known that I, EDWIN JAMES HULBERT, of Middletown, Connecticut, have invented Improvements in Screws for Propelling Vessels; and I do hereby declare the following to be a full and correct description of the same, reference being had to the accompanying drawings, in which the same letters refer to corresponding parts.

Figure 1 is a rear view of my propeller-screw. Fig. 2 is a side view; Fig. 3, a section of the blade, illustrating its position on the arm; Fig. 4, a detailed view, showing the process of construction of the blades; and Fig. 5, a rear view, showing the bracing for the extension of the blades.

My invention relates to the construction and relative position of the blades of a propeller-screw, by which not only increased progressive power is obtained, but said power is augmented relatively as the revolution is increased.

My invention consists, first, in constructing the blades of my propeller-wheel of a helicoidal form, as will be described; secondly, inclining the operating-surface of the blades backward toward the outer end of the shaft—that is, in such position that a section of this helicoidal surface made by a plane passing through the axis of rotation shall be inclined backward at a constant angle with the axis; and, thirdly, my invention consists in securing said helicoidal-shaped blades to the outer ends of radial arms extending from the revolving shaft, said outer ends of the arms inclining backward at a similar angle to preserve the aforesaid position of the blades.

In the drawings, A represents the revolving shaft of a propeller-engine, and B the boss or hub of the propeller-wheel. Extending outward radially from the hub B are the arms C C, attached to the hub B in any of the well-known ways. These arms C are preferably perpendicular to the shaft A, except at the outer ends, where the part *c*, for a distance the width of the blades of the wheel, are inclined backward, or toward the outer end of the shaft, thus making the rear side of the wheel concave—that is, if a line parallel to the part *c* of the arm C be produced until it meets the axis of rotation of the shaft A, it will meet it at an acute angle. (See Figs. 2 and 3.) D in the drawings are the blades of the wheel, secured to the part *c* of the arm C. The blades D are of a helicoidal form, and are cut in blanks, as *d*, from the sheet, forming the segment of an annular ring the size of the wheel to be formed. Said segment *d*, after being cut, is straight transversely, as seen at d^1; then it is bent in a curve, as seen at d^2; and then the alternate corners are bent in opposite directions, forming the helicoidal shape, as seen at d^3, with one corner straightened, as at *y*. This blade D is then properly secured to the part *c* of the arm C, with the helicoidal surface inclining backward, so that a section of this surface made by a plane passing through the axis of rotation shall be inclined backward at a constant angle with the axis, as seen in Figs. 2 and 3, wherein the dotted lines are drawn in planes passing through the axis of rotation *x y*, and show the inclination backward of the blades D. The length of the blades D is arbitrary; but if blades much extended should be desired, an elongated or double hub would be necessary, with two or more sets of arms, as seen in Fig. 5; but this is no part of my present application for a patent.

The operation of my device is as follows: The wheel, as constructed, having been properly secured to the revolving shaft of the engine of a propeller, and rotated at a desired velocity, the blades D, being inclined backward, will tend to throw the water inward in a conical shape, while at the same time, the arms C giving but little resistance to the core of water passing centrally through the wheel between the blades, the water of the core and the water from the blades, meeting, combine and assist to relieve the wheel from dead-water, and consequently tend to prevent that "churning" of the water which is experienced in the ordinary wheels, especially at high velocities.

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

1. The helicoidal blade of a propeller-wheel, constructed as from a segment of a flat annular ring, first bent in a curve transversely, and then its alternate corners bent in opposite directions, with one corner straightened, substantially as described.

2. The blades of a screw-propeller, the heli-

coidal surface of which is of the form described, so that a section of its surface made by a plane passing through the axis of rotation shall be inclined backward at a constant angle with the axis, substantially as set forth.

3. The revolving shaft of a screw-propeller, carrying one or more radial arms, said arms having their outer ends bent backward from a perpendicular, as and for the purpose set forth.

4. The blades of a propeller-wheel of the helicoidal shape described, secured upon the outer ends of radial arms bent backward so as to retain the blades in their angular position, as described.

5. The blades of a screw-propeller supported on the ends of radial arms and inclined backward, so that a section of its surface made by a plane passing through the axis of rotation shall form an angle less than a right angle with said axis, substantially as described.

The above specification of my said invention signed and witnessed, at Middletown, Connecticut, this 12th day of February, A. D. 1877.

EDWIN JAMES HULBERT.

Witnesses:

HENRY D. A. WARD,

ELIHU W. N. STARR.