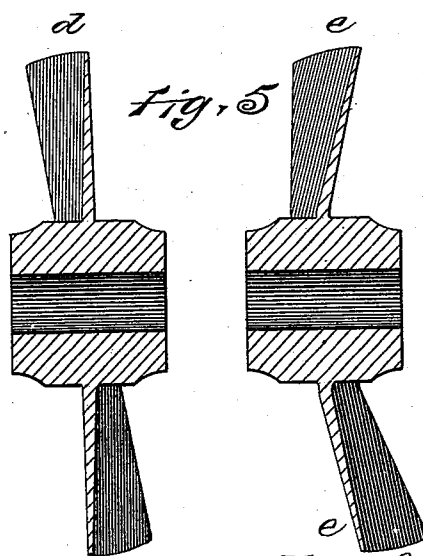
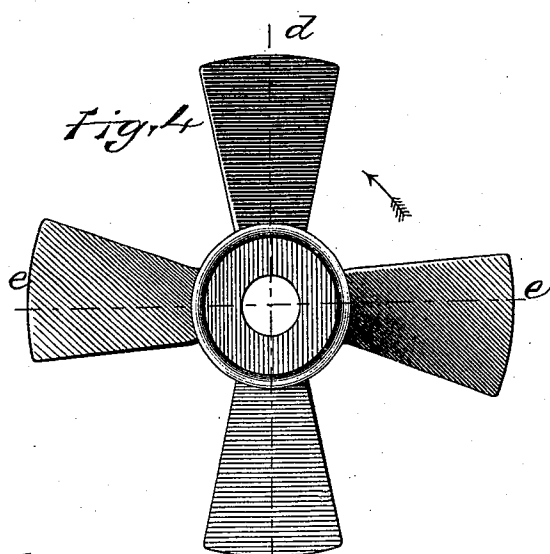
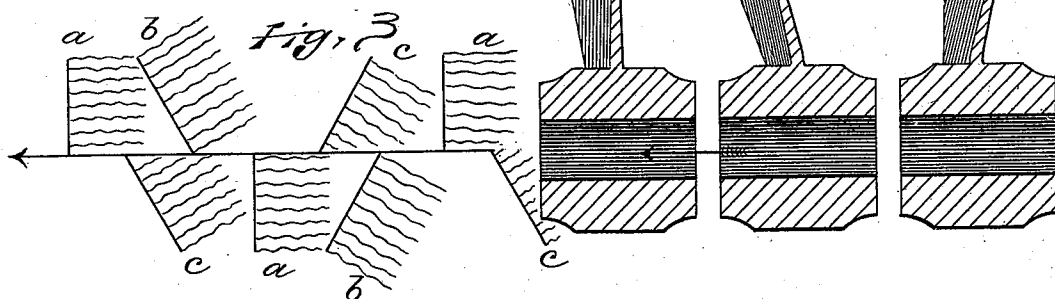
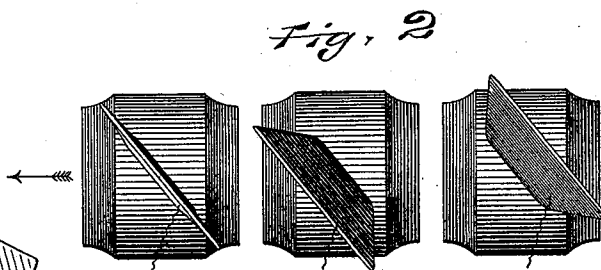
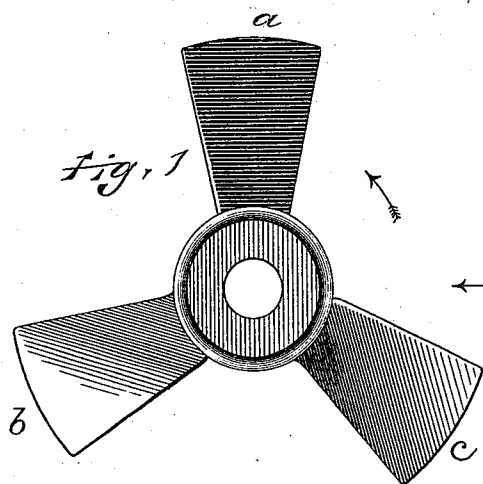


(No Model.)

A. W. CASE.
SCREW PROPELLER.

No. 517,025.

Patented Mar. 27, 1894.



Witnesses: *d*
C. Buckland,
P. A. Phelps.

Inventor:
Alfred Wells Case
by
Harry R. Williams
att'y.

UNITED STATES PATENT OFFICE.

ALFRED WELLS CASE, OF HIGHLAND PARK, CONNECTICUT.

SCREW-PROPELLER.

SPECIFICATION forming part of Letters Patent No. 517,025, dated March 27, 1894.

Application filed July 5, 1893. Serial No. 479,557. (No model.)

To all whom it may concern:

Be it known that I, ALFRED WELLS CASE, a citizen of the United States, residing at Highland Park, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Propellers, of which the following is a specification.

The invention relates to the class of screw propellers that are adapted to be attached to the exterior of a boat, and the object is to provide a simple propeller so formed that when in motion the blades will act upon the water in such manner as to utilize the utmost resistance that can be afforded by the water to the blades, and thus obtain the greatest effect of the screw.

To this end the invention resides in a propeller having blades set upon substantially the same pitch of the screw, but projecting outwardly at varying angles, so as to thrust against the water in different lines, as more particularly hereinafter described and pointed out in the claims.

Referring to the accompanying drawings:—
Figure 1 is a plan of a propeller embodying the improvements. Fig. 2 represents a top edge view of each of the blades of this propeller, and also vertical sections of the same, in order to illustrate the angle at which the blades project from the hub. Fig. 3 is a diagrammatic view illustrating the manner in which these blades thrust against the water when in motion. Fig. 4 is a plan of a propeller with four blades, embodying the invention; and Fig. 5 are sections of the blades of this latter propeller to show the angles at which they project from their hub.

The propeller shown in Fig. 1 has three blades, *a*, *b*, and *c*, which blades are set upon the hub on the pitch of the desired screw. These blades, which may be made flat, as shown, or may be curved on the true pitch of the screw, are made to project from the hub at different angles, that is, the blade *a*, as is shown in plan and section in Fig. 2, projects outwardly straight or at right angles to the axis of the screw; while the blade *b* is shown as inclining forwardly with relation to the axis of the screw; and the blade *c* inclines from the hub rearwardly. When the propeller is formed in this way the action of the thrusts of the blades on the water may be illus-

trated as in Fig. 3; the blade *a*, which projects outwardly on the pitch of the screw at right angles from the hub of the propeller, thrusts backward and sets the water which it enters moving backward parallel with or spirally with the axis of the screw; the blade *b*, which is set upon the same or substantially the same pitch but is inclined forwardly, in its spiral movement forward thrusts outwardly as well as rearwardly and tends to throw the water which it acts upon outward somewhat centrifugally or in an increasing helix with relation to the axis of the screw; and the blade *c*, having the same pitch but inclined rearwardly, in its spiral movement forward tends to thrust the water inward toward the axis of the screw or to compact the water at the center.

In a construction like this the blade *a*, that projects straight outward from the hub, thrusts against water which is backed by water directly behind it; while the blade *b* thrusts against water which is backed by water outside of the center of disturbance created by the rotation of the screw, and the blade *c* thrusts against water that is thrown in toward the center or compacted along the axis; and by combining these features a propeller is produced in which the thrust of the blades is against water that is backed by solid water, or water that has not already been given a motion in the direction of the thrust, by the passage of the preceding blade of the screw; and thus more resistance of water for the thrusts of the blades is obtained, and the entire effectiveness of the screw is secured.

The propeller shown in Fig. 4 has four blades, the two blades marked *d* being set diametrically opposite on the pitch of the screw and extending outwardly straight or at right angles to the axis of the screw, as shown in Fig. 5, so as to thrust directly backward, or spirally to the axis of the screw; while the other two blades *e*, which are set upon the same pitch, are inclined forwardly as shown in Fig. 5, so as to thrust outwardly as well as rearwardly as they advance, that is, these blades tend to throw the water in a spiral helix. By means of this construction, the blades do not have to act against water which is backed by water that is already churned up and given a motion, or set into a current in the same direction as the thrust, by the pre-

vious blade, so that the liquid medium in which the screw works is as dense as possible.

I do not limit myself to the precise number of blades that may be used, nor the number
5 that may project at the same angle of inclination; neither do I limit myself to the exact outline, pitch or angle of inclination shown, as these may be varied for different purposes without departing from the invention.

10 I claim as my invention—

1. A propeller consisting of a hub, and a plural number of blades set upon the hub on the pitch of a screw and projecting therefrom at different angles with relation to the axis of

the hub, substantially as described and for 15 the purpose specified.

2. A propeller consisting of a hub, and a plural number of blades set upon the hub on the pitch of a screw, a portion of said blades projecting out from the hub at right angles to 20 the axis, and a portion projecting from the hub obliquely to the axis of the propeller, substantially as described and for the purpose specified.

ALFRED WELLS CASE.

Witnesses:

H. R. WILLIAMS,
C. E. BUCKLAND.