E. J. HULBERT.

Screw-Propellers.

No. 199,549. Patented Jan. 22, 1878.

Fig. 3.

Fig. 1.

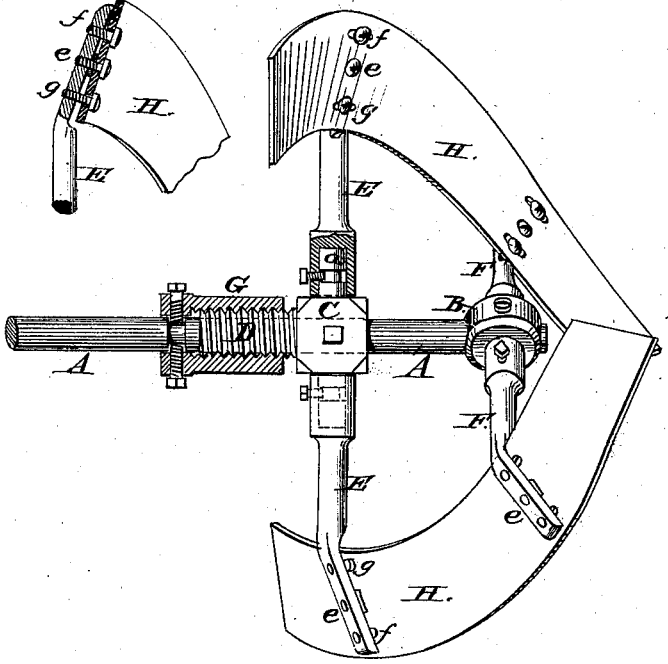


Fig. 4.

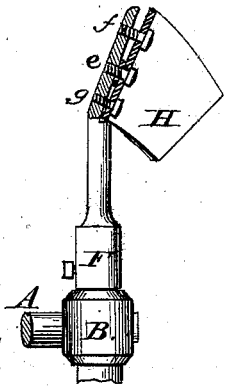


Fig. 2.

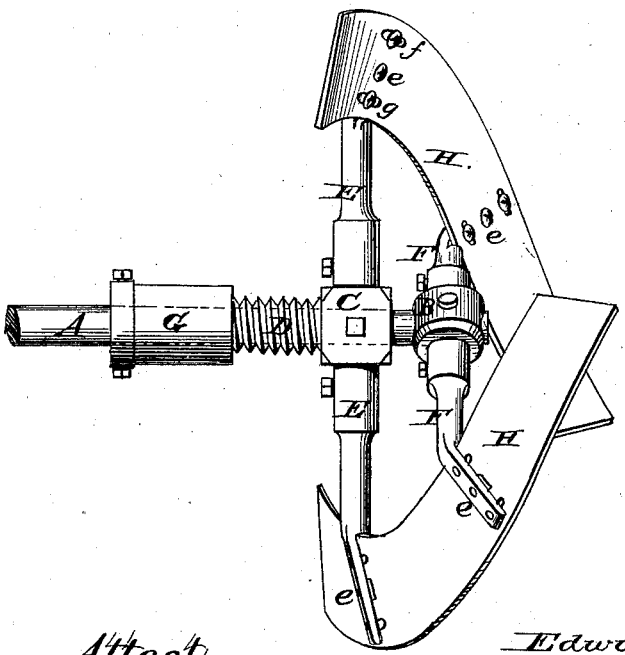
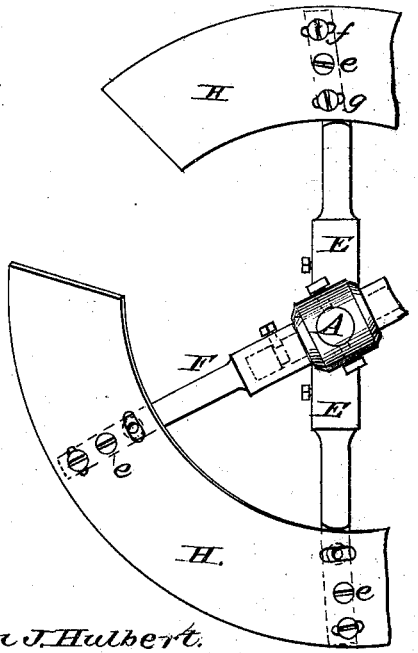


Fig. 5.



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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. **199,549**, dated January 22, 1878; application filed July 12, 1877.

To all whom it may concern:

Be it known that I, EDWIN J. HULBERT, of Middletown, Middlesex county, Connecticut, have invented an Improvement in Wheels for Propellers; 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—

Figure 1 is a side view, partly in section, of my improved propeller-wheel, showing the blades adjusted to their maximum pitch; and Fig. 2 shows said blades at their minimum pitch. Figs. 3 and 4 show the position of a blade upon its two arms; and Fig. 5 is a rear view of the wheel, showing its position on the shaft.

My present invention is an improvement upon an invention for which the United States Patent Office has allowed a patent; and it consists in a mode of adjustment for adjusting the blades of a propeller-wheel to a less or greater degree of pitch, whereby the position of the blades may be adapted to the particular degree of speed or power desired in the vessel propelled.

In the drawings, A represents the engine-shaft of a propeller, upon the outer or rear end of which the wheel is located. Upon the extreme rear end of the shaft A is securely fixed the hub B, and sliding freely upon the shaft A is the hub C, with a forward extension, D. Said hub C has a set-screw, by which it may be fixed upon the shaft A when it may become necessary. In either side of the hubs B and C are lugs *a*, upon which arms E E and F F freely revolve. Stay-screws pass through the several arms and travel through the groove around the lugs *a*, allowing the arms to freely revolve, but preventing any longitudinal motion. A screw-thread being cut upon the forward extension D of the hub C, a male screw is formed, which enters the female collar G. The collar G turns freely upon the shaft A. A lateral movement is again prevented by a stay-screw and groove in the shaft A. The arms E and F, at their outer ends, are bent backward at an angle, and upon these bent ends are adjustably fixed the blades H H. Said blades H H are of a helicoidal form, and are secured to the arms E and F in the following manner: The center of the blade H is secured to the arms E and F by a bolt, *e*, passing through the blade, thence through a washer, and finally through the arm E or F, as the case may be. Upon either side of the bolt *e* is the bolt *f* or *g*, which passes through the blade and arm without the washer; but where the bolts *f* and *g* pass through the blade H the hole is elongated longitudinally with the blade, so as to give the blade a circular movement upon the bolt *e*.

The operation of my mode of adjustment is as follows: The hub B being fixed upon the shaft A, and the hub C movable upon said shaft, and the blades H pivoted upon the ends of the rotating arms E and F, which are secured to the hubs B and C, but are permitted to make partial revolution on the lugs *a*, it is obvious that a movement of the hub C upon the shaft A will change the pitch or draft of the blades H; and, as the blades H are helicoidal in form, the whole relative position of the blades upon the arms and the arms upon the hubs will be changed when the position of the hub C is changed upon the shaft A. In Fig. 1 the maximum distance between the hubs B and C is shown. The bolts *f* and *g* having been loosened, the blade H upon the arm E will assume the position shown in Fig. 3, it having rocked upon the bolt *e*, with its outer edge resting upon the arm E and the inner edge removed from it, while the blade upon the arm F will assume the opposite position, as shown in Fig. 4, the inner edge resting upon the arm F and the outer edge removed from it. Let the female collar G be now rotated—the threaded extension D will be expelled, and the hub C will approach the hub B, as in Fig. 2, where the minimum distance between the hubs B and C is shown.

In this motion the arms E and F have made part of a revolution upon the lugs *a*, and the blades H have rocked and revolved upon the bolts *e*, so that they assume the opposite from that shown in Fig. 1—namely, the blade upon the arm E will take the position shown in Fig. 4, and the blade upon the arm F will assume the position shown in Fig. 3. The mean distance between the hubs B and C will, of course, show the blades parallel with the end of the arms in every case.

The bolts *f* and *g* are to be loosened prior

to adjustment, to admit of the rocking motion on *e;* after adjustment, to be set to aid in retaining the adjustment and to effect more complete rigidity of the wheel.

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

1. The blades of a propeller-wheel pivoted upon the backwardly-inclined ends of self-adjusting arms upon adjustable hubs, substantially as described.

2. Helicoidally-shaped blades of a propeller-wheel, pivoted upon the backwardly-inclined ends of self-adjusting arms by means of the center pivot-bolt *e* and guide-bolts *f* and *g*, operating in slots, substantially as described.

3. The helicoidally-shaped blades of a propeller-wheel, pivoted to backwardly-inclined arms, as described, and provided with a washer upon the pivot-bolt between the blade and arm, so as to allow a rocking motion of the blade upon its arm, substantially as described.

4. The hub C, movable upon its shaft, and provided with self-adjusting arms, bent backward at their outer ends, and pivot and stay bolts and washers, for adjustably securing the blades to the bent ends of said arms, in combination with the fixed hub B, provided with similar mechanism, and the blades H H, substantially as described.

The above specification of my said invention signed and witnessed, at Middletown, Connecticut, this 2d day of July, A. D. 1877.

EDWIN JAMES HULBERT.

Witnesses:

FRANK F. STARR,

H. W. B. STARR.