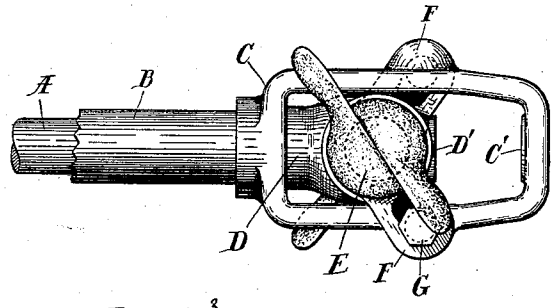
(No Model.)

R. B. HAIN.

REVERSIBLE PROPELLER.

No. 593,934. Patented Nov. 16. 1897.

Fig. 1.



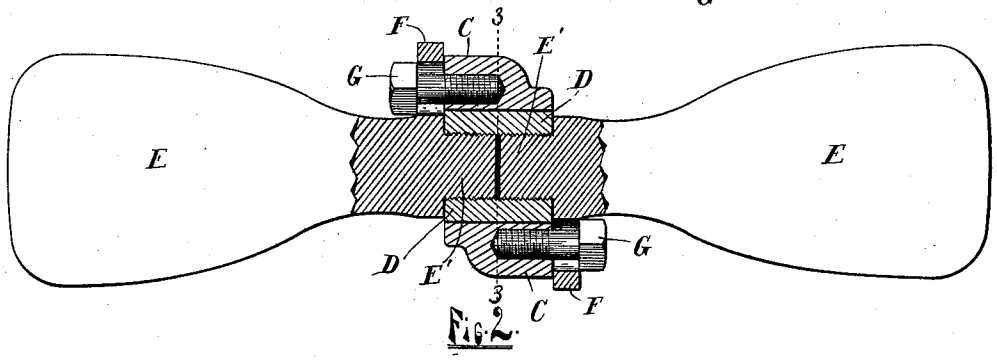
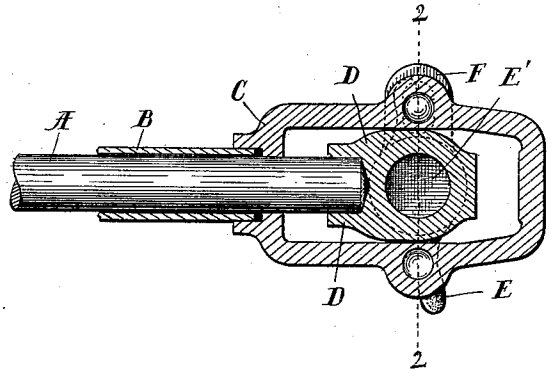


Fig. 2.

Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

RALPH B. HAIN, OF GRAND RAPIDS, MICHIGAN.

REVERSIBLE PROPELLER.

SPECIFICATION forming part of Letters Patent No. 593,934, dated November 16, 1897.

Application filed February 6, 1897. Serial No. 622,289. (No model.)

To all whom it may concern:

Be it known that I, RALPH B. HAIN, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Reversible Propeller-Wheels; and I do hereby 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.

My invention relates to improvements in reversible propeller-wheels; and its object is to so construct the same that the blades may be made thin and of suitable form to properly act on the water in that part adjacent to the hub, and to provide the same with certain other new and useful features, all being hereinafter more fully described, and particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a device embodying my invention; Fig. 2, a rear elevation of the same with the middle portion in vertical transverse section on the line 2 2 of Fig. 3, and Fig. 3 a longitudinal vertical section on the line 3 3 of Fig. 2.

Like letters refer to like parts in all of the figures.

A represents the shaft, rotated by any suitable means, and B a sleeve longitudinally movable on said shaft and shifted by any suitable means. The shaft A may be held from moving longitudinally, and the sleeve B shifted on the shaft; or the sleeve may be so held and the shaft shifted within the sleeve.

C is a yoke attached to the outer end of the sleeve B and embracing a hub D, attached to the end of the shaft A and engaging and sliding against the opposite inner sides of said yoke. Transversely through said hub and at right angles to the axis thereof is a large round opening, in which are oppositely inserted the round shanks E′ of the propeller-blades E, which shanks are loosely fitted to freely rotate in said opening and secured therein by screw-threads on said shanks engaging corresponding threads in the hub. Each propeller-blade E has a longitudinally-slotted arm F close to the hub. Said arms project across and engage the respective sides of the yoke C and at opposite sides thereof, and through the slot in each of said arms is inserted a stud G, which stud is firmly attached to the yoke C and moves therewith.

D′ is a boss on the rear end of the hub D, which boss engages a corresponding boss C′ on the yoke when the sleeve and yoke are moved forward to the limit of their movement, and when in like manner they are moved backward the inner end of the hub engages the forward end of the yoke.

The operation of the described device is as follows: By moving the sleeve relative to the shaft the hub traverses the opening in the yoke. The studs thus traverse forward and backward alongside the hub, and by means of the slotted arms with which they engage turn the shanks of the blades in the opening in the hub and thus adjust the blades in the water to cut forward or backward, as required. By connecting the blades to the hubs as described said blades can be made thin and of any suitable shape to properly act on the water close to the hub, and thus the wheel is made more compact and effective. By engaging the flattened sides of the hub with the flat inner surfaces of the yoke and engaging the hub with the ends of the yoke, at the limits of the shifting movement, and engaging the slotted arms with the sides of the yoke, the strains are taken off the other parts and a very strong and durable structure secured.

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

1. In a reversible propeller-wheel, a hub having a large transverse screw-threaded opening, blades having screw-threaded shanks rotative in said openings, slotted arms on said blades, a yoke embracing and engaging the sides of said hub, and longitudinally movable thereon, and studs in said yoke engaging the slots in said arms, substantially as described.

2. In a reversible propeller-wheel, a hub attached to the shaft, and having flattened sides and ends, a yoke attached to a sleeve movable on said shaft and having flattened inner surfaces engaging the sides and ends of said hub, blades pivotally attached to said hub, and turning on radial axes, slotted arms on said blades, and studs in said yoke engaging the slots in said arms, substantially as described.

3. The combination of a shaft, a hub on the end of the shaft, and having a transverse screw-threaded opening and a boss at the rear, blades having screw-threaded shanks loosely fitted in said opening, slotted arms on said blades, a sleeve on said shaft, a yoke engaging the sides of said hub and attached to said sleeve, and having a boss at its rear end, and studs on said yoke engaging the slots in said arms substantially as described.

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

RALPH B. HAIN.

Witnesses:

LEWIS E. FLANDERS,

LUTHER V. MOULTON.