W. W. SHOE.
Screw-Propeller.

No. 198,052. Patented Dec. 11, 1877.

Fig. 1.

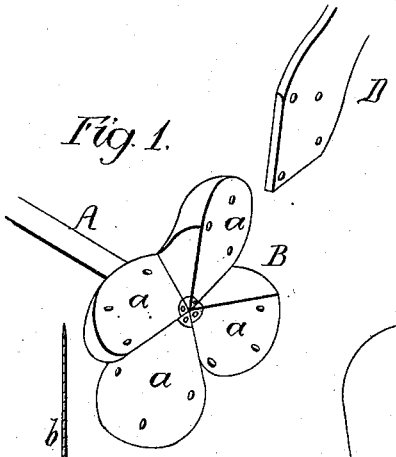


Fig. 5.

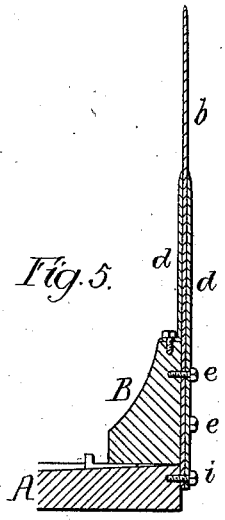


Fig. 4.

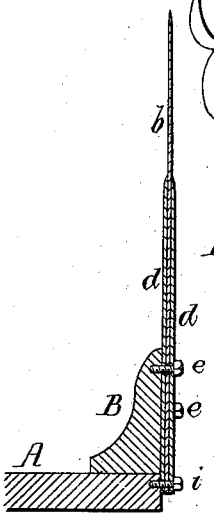


Fig. 3.

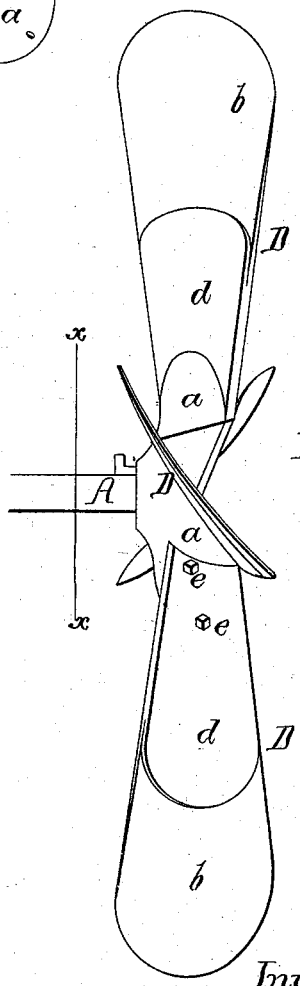
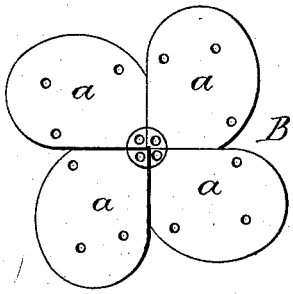


Fig. 2.



Witnesses
Henry Howson Jr
Harry Smith

Inventor
William W. Shoe
by his Attorneys
Howson and Sons

UNITED STATES PATENT OFFICE.

WILLIAM W. SHOE, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN SCREW-PROPELLERS.

Specification forming part of Letters Patent No. **198,052**, dated December 11, 1877; application filed November 19, 1877.

To all whom it may concern:

Be it known that I, WILLIAM W. SHOE, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Propellers, of which the following is a specification:

The main object of my invention is to construct a cheap and strong propeller, a further object being to increase the effective working-surface of the blade; and these objects I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 is a perspective view of the hub of the propeller; Fig. 2, a face view of the same; Fig. 3, a side view of the complete propeller; Fig. 4, a sectional view of part of the same, and Fig. 5 a sectional view of a modification.

A is the propeller-shaft, and B a hub secured to the end of the same and provided, in the present instance, with four projecting arms, *a*, the rear faces of which are inclined in respect to a vertical plane, *x*, passing through the shaft A, as shown in Fig. 3.

The propeller-shaft extends entirely through the hub, and its rear end is recessed, so as to form continuations of the inclined faces of the projecting arms of the hub. (See Fig. 1.)

Each blade D consists of a central plate, *b*, re-enforced throughout about two-thirds of its length by supplementary plates *d*, the plates *b* and *d* being riveted or otherwise firmly secured together.

The blades are so formed at the inner ends as to correspond with the form of the rear faces of the arms *a* of the hub, to which they are secured by bolts *e*, the extreme inner end of the blade overlapping a portion of the end of the shaft A, and being secured directly to the same by a bolt, *i*.

By making the hub of my improved propeller of cast metal and the blades of wrought metal firmly bolted to the hub and to the propeller-shaft, great strength will be secured, and yet the propeller will be much lighter and can be made at less expense than an ordinary cast-iron propeller. Moreover, as the pitch of the blade extends down to the very center of the propeller-shaft, the effective working-surface of the propeller is carried much nearer the center than in the usual propeller with a solid hub. The latter feature may also be applied with advantage to propellers the blades of which are cast with the hub.

The use of strengthening-plates *d* on both sides of the central plate *b* of each blade D is not essential to my invention, as the said plates *d* might be applied to one side only of the main plate, or in some cases said plate *b* might be so formed that the strengthening-plates *d* could be dispensed with altogether. Their use, however, is preferred.

In the modification, Fig. 5, the outer end of the arm *a* of the hub is made abrupt, so as to form a shoulder, to which the bent end of the inner re-enforcing-plate *d* may be bolted, in order to secure additional strength.

I claim as my invention—

1. The combination, in a propeller, of detachable blades D with a hub, B, having arms *a*, whose rear faces are inclined in respect to a vertical plane passing through the propeller-shaft.

2. The combination, in a propeller, of a hub through which the propeller-shaft passes, with detachable blades secured to the hub and to the shaft, as set forth.

3. A propeller-hub having arms *a* with inclined rear faces, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WM. W. SHOE.

Witnesses:
RICHARD L. GARDINER,
HARRY SMITH.