H. A. CROSSLEY & G. W. FRENCH.

SCREW-PROPELLERS.

No. 183,373. Patented Oct. 17, 1876.

Fig. 1.

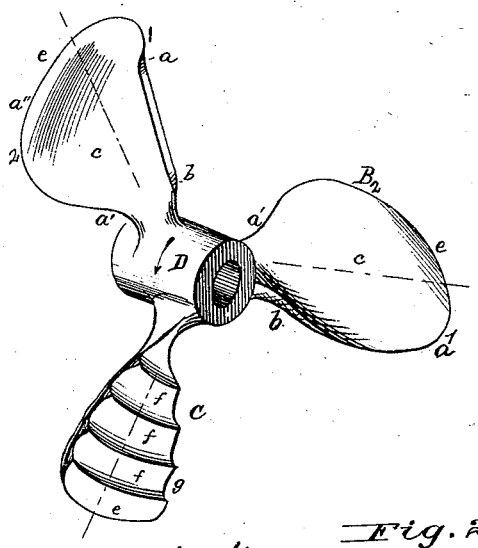


Fig. 5.

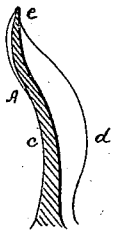


Fig. 6.

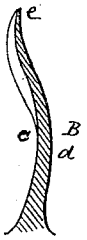


Fig. 3.

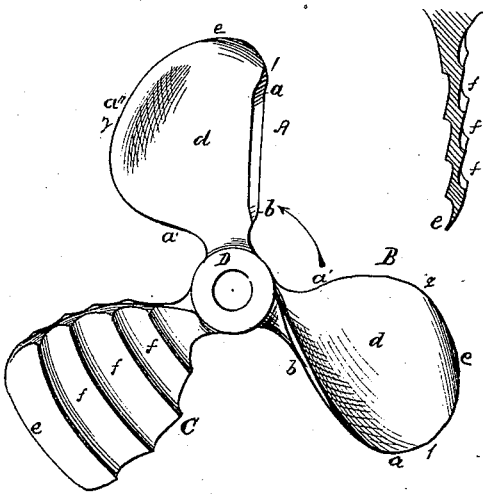


Fig. 4.

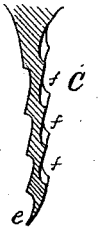
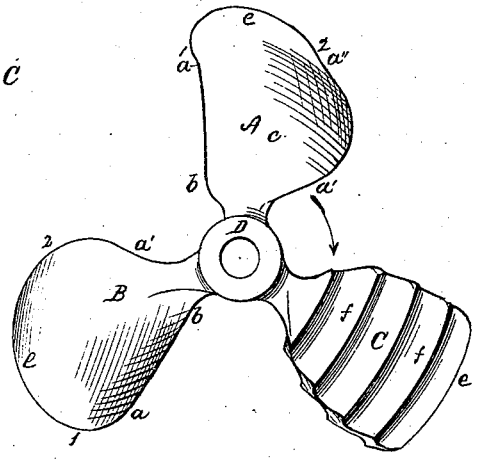


Fig. 2.



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UNITED STATES PATENT OFFICE.

HARRY A. CROSSLEY AND GEORGE W. FRENCH, OF CLEVELAND, OHIO.

IMPROVEMENT IN SCREW-PROPELLERS.

Specification forming part of Letters Patent No. **183,373**, dated October 17, 1876; application filed September 21, 1876.

To all whom it may concern:

Be it known that we, HARRY A. CROSSLEY and GEORGE W. FRENCH, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Screw-Propellers, of which the following is a full, clear, and exact description.

This invention consists in a screw-propeller the blades whereof are formed with concave faces and correspondingly convex backs, corrugated, crimped, fluted, or not, as desired, to augment the resisting-surface, having their outer ends reversely curved, and set on the hub in the same or different planes, and at the same or different angles or pitch, whereby the resistance is so increased that as the vessel progresses its motion is accelerated without increasing the proportionate number of revolutions of the wheels, and whereby, when the vessel is to be backed, the blades act to throw the water outwardly from the sides, instead of against the stern, of the vessel, substantially as hereinafter specified.

In the drawings illustrating this invention, Figure 1 is a perspective view. Fig. 2 is a front view; Fig. 3, a rear view. Figs. 4, 5, and 6 are central longitudinal sections of the several forms of the blades.

A B indicate blades of a screw-propeller having in common a concave face, correspondingly-convex back, and reversely-curved ends or tips, and secured to the hub D in the same plane and at the same pitch or angle, or alternately in different planes and pitches or angles, for a purpose hereinafter referred to. In blade A its edge from *a* to *b* is straight and thickened to afford better and greater resistance in backing. Its edge from *a* to *a'* is somewhat parabolic and sharp, so as to afford the least resistance in entering the water. Its face *c* is concave, but extending to the edge *a b* on a level. Its back *d* is of a convexity corresponding to the concavity of the face, and its outer end or tip *e* is curved reversely to the face and back curves from the points 1 to 2, or front to, or nearly to, rear edges, so as to gather the water and throw it outwardly from the stern on opposite sides of a longitudinal line parallel with the wheel or propeller shaft, whereby the vessel is made to respond promptly to the action of the propeller. The concavity in the face of the blades serves to gather the water, and thus obtain greater resistance, and, consequently, increased power to move the vessel.

The center of concavity may extend transversely or diagonally across the blades, as is best suited for the vessel to which they are to be applied relatively to its destined speed.

It will be noticed that the concavity and convexity are not uniform or regular throughout the blades. For illustration, the edges *a b* and *a' a''* are in the same plane, and the edge *a b* is in the same plane with the center of the concavity, while edge *a' a''* is in a higher plane. The back is convex both longitudinally and transversely, and this construction will be found best adapted for advantageous action in entering and leaving the water.

In the blade B the edge *a b* is curved but slightly, its center being beyond the blade, and its edge *a a'* is elliptical, or nearly so, both edges being sharpened. Its concavity *c* has its surrounding edges or limits convexly formed, so as to most readily shed the water. Its back *d* is perfectly convex, except at its end or tip *e*, which is reversely curved from points 1 to 2, or from front to, or nearly to, rear edges. A blade of the shape of blade A should be set on the hub at a less pitch or greater angle than such a one as B, in order to obtain the best results in motion—a necessity arising from the shape of such blades.

In the blade C is shown a feature—namely, the corrugations, flutes, or furrows *f*—which may be employed in either of the other blades. They are shown in a blade of ordinary form, in order to illustrate the manner in which better results may be obtained in forward or backward motion with such blades. Each of such corrugations constitutes a concavity in which the water is gathered, and is deepest at its end *g*, where the most power is to be gained, and gradually decreases rearwardly to such extent that that edge of the blade is almost straight, whereby the water is readily shed. A blade thus grooved, fluted, or otherwise furrowed will present the entire tip or outer end from front to rear in a shape corresponding to that marked *e* in the other blades, and thus obtain the advantages inherent therein.

After a vessel has got under way, could the pitch or angle of the blade be changed, greater speed might be obtained without increasing the number of revolutions of the propeller. In a measure to accomplish this the blades should be alternately set on the hub in different planes. If three blades be used, two should be set at the same angle or pitch forward, and the other rearward and at an increased pitch or less angle. The varying resistance thus afforded gives the result.

What we claim is—

1. A propeller-blade having one edge straight, or nearly so, and the other parabolic or elliptical, a concave face, convex back, and a reversely-curved tip or edge, substantially as and for the purpose specified.

2. The blades of a screw-propeller, having corrugations, flutes, or grooves, deepest at their forward ends, and decreasing rearwardly in depth gradually, substantially as and for the purpose specified.

3. A screw-propeller having blades set at different angles or pitches, and in different planes on the hub, substantially as and for the purpose described.

4. A propeller-blade having corrugations, flutes, or grooves, decreasing gradually in depth rearwardly, and its tip or edge curved backwardly, substantially as shown and described.

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Witnesses:
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