No. 634,885. Patented Oct. 17, 1899.

J. GLOVER.

BLADE FOR SCREW PROPELLERS.

(Application filed June 10, 1897.)

(Model.) 2 Sheets—Sheet 1.

FIG. 1.

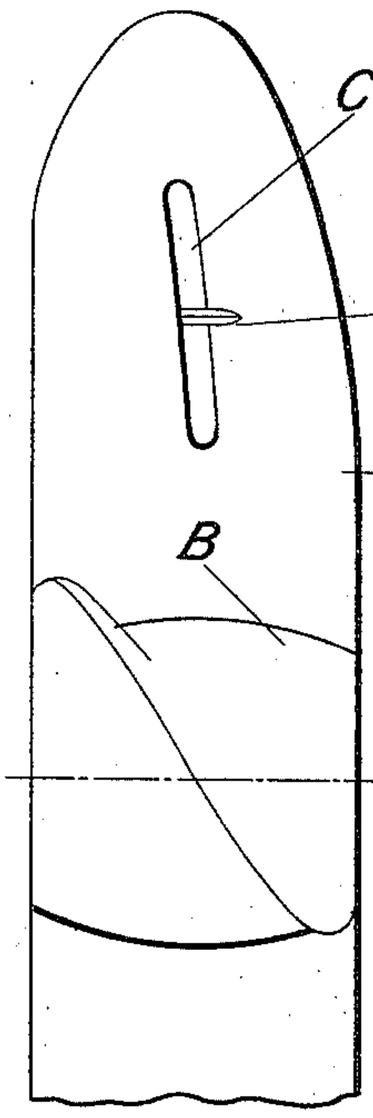

FIG. 2.

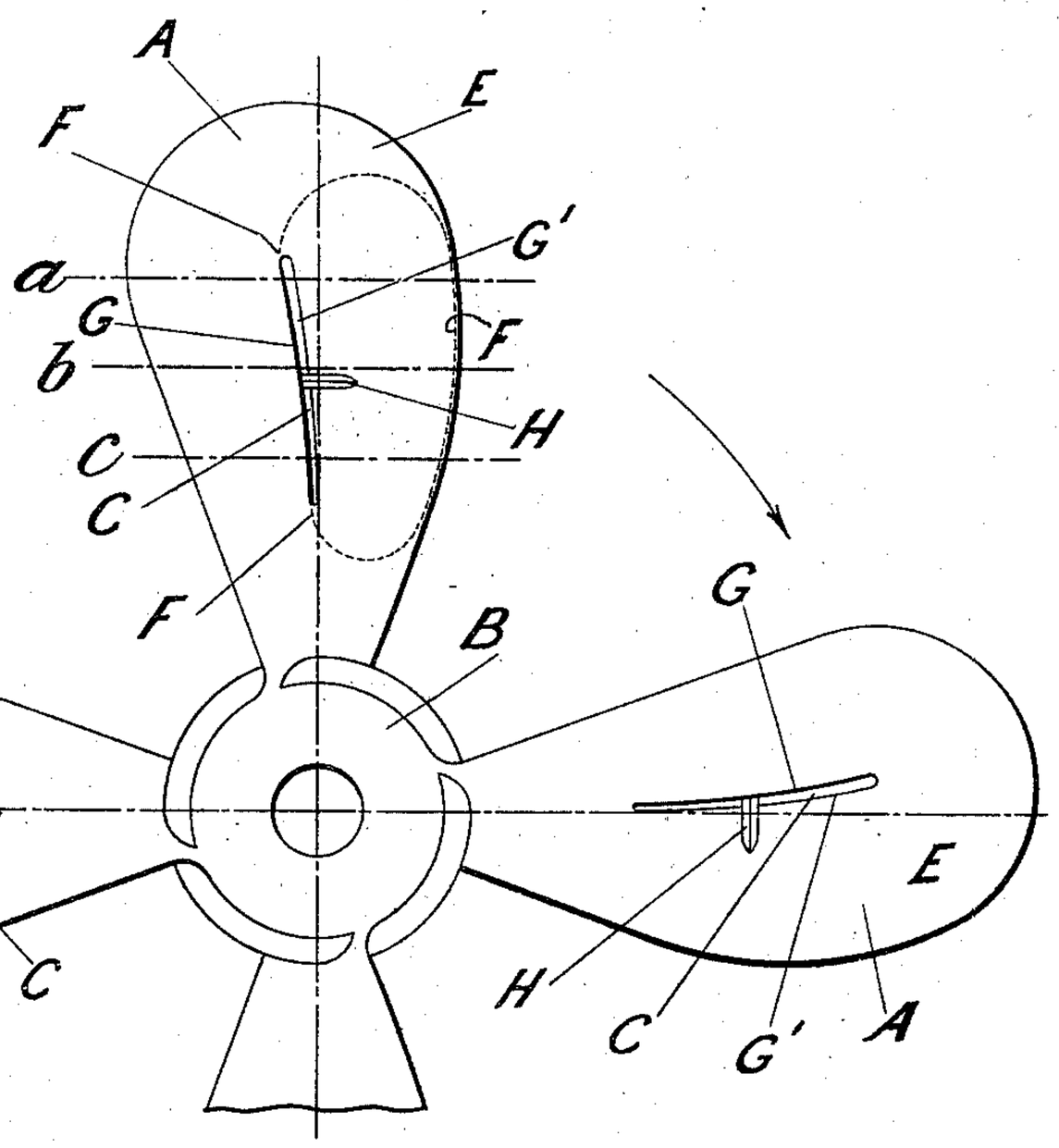

FIG. 3.

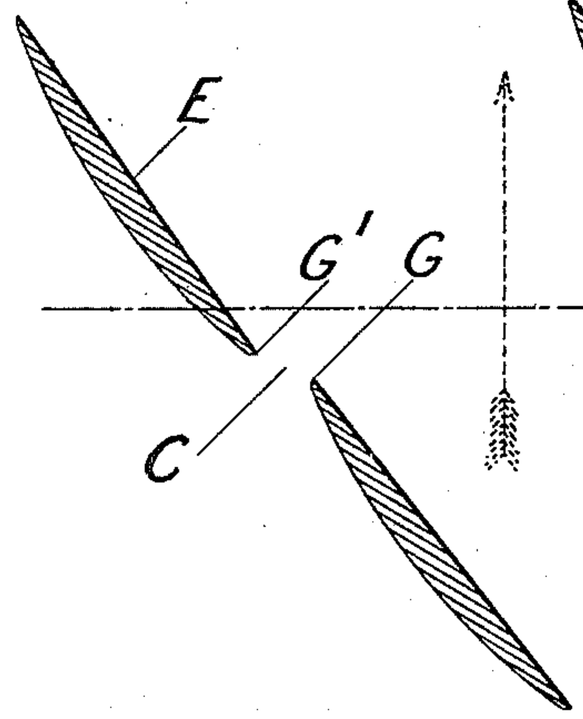

FIG. 4.

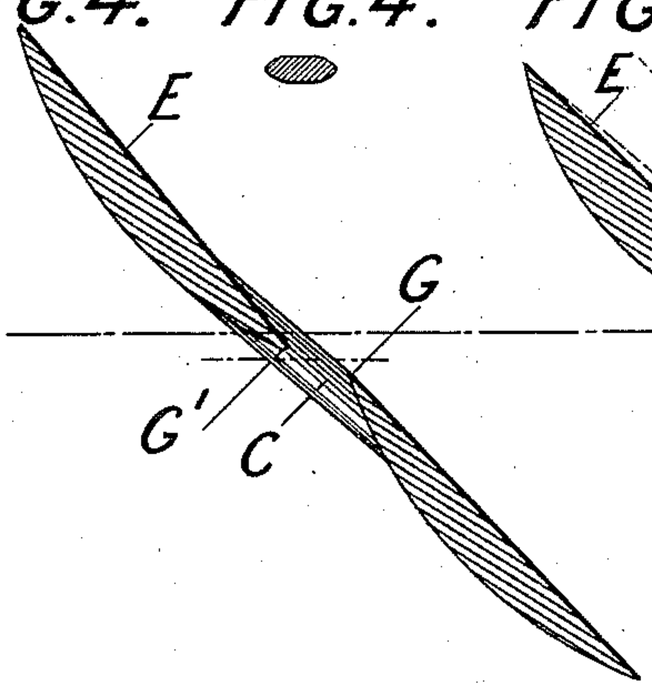

FIG. 4.A

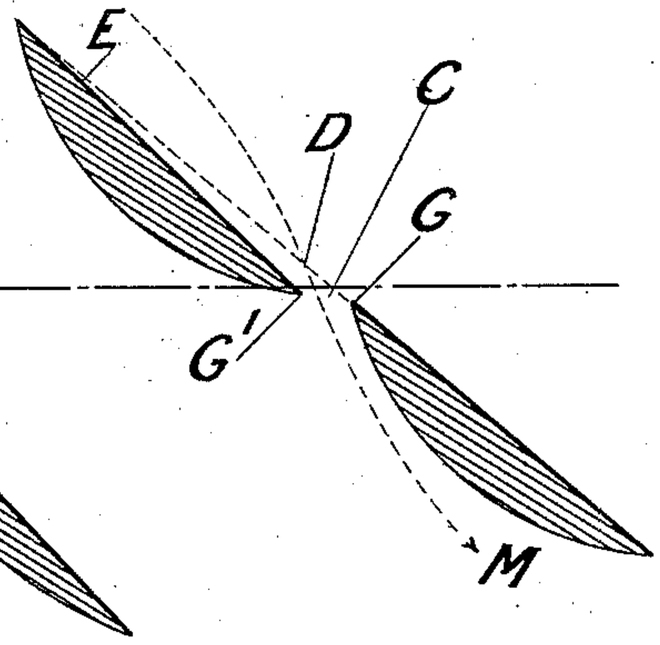

FIG. 5.

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No. 634,885. Patented Oct. 17, 1899.

J. GLOVER.

BLADE FOR SCREW PROPELLERS.

(Application filed June 10, 1897.)

(Model.) 2 Sheets—Sheet 2.

FIG. 6.

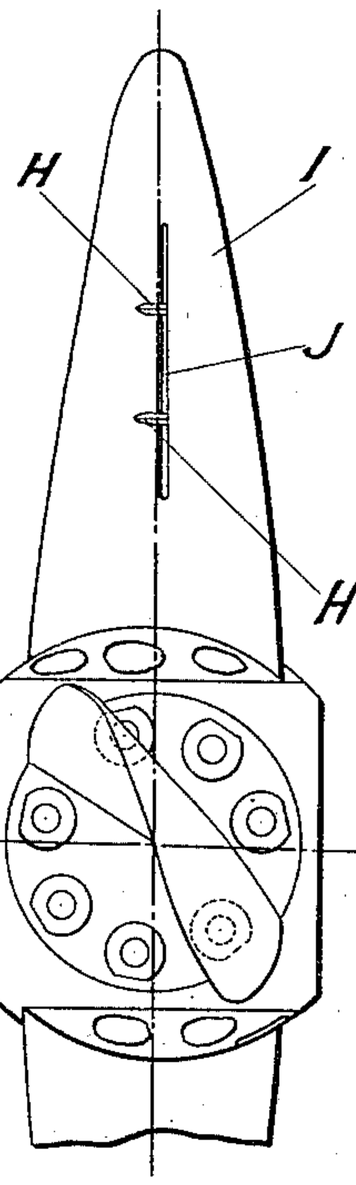


FIG. 7.

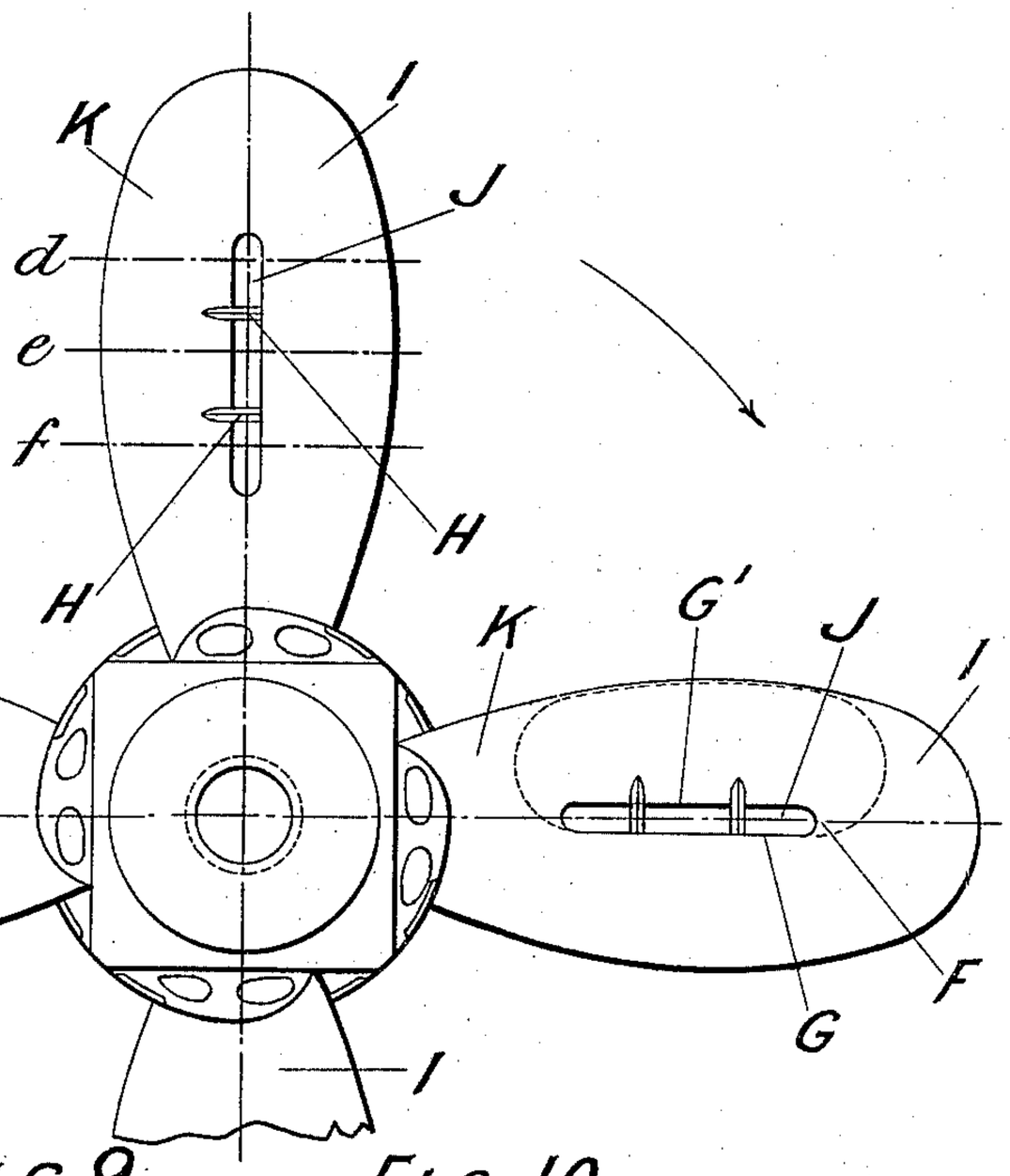


FIG. 8.

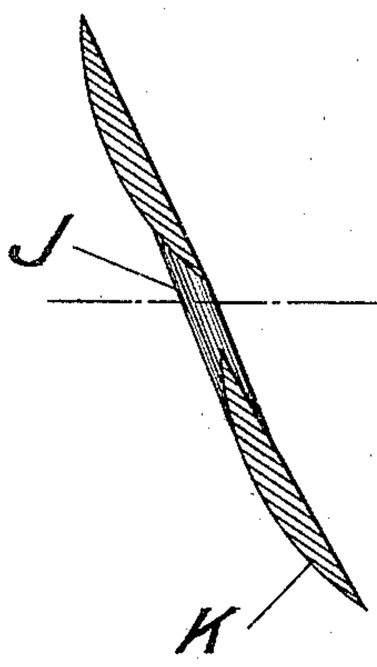


FIG. 9.

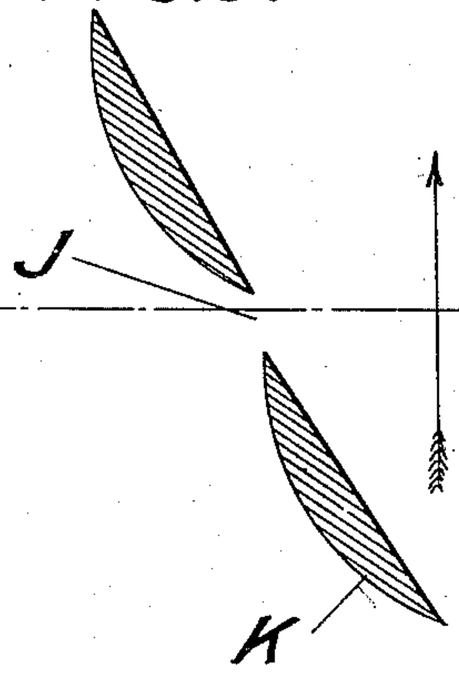
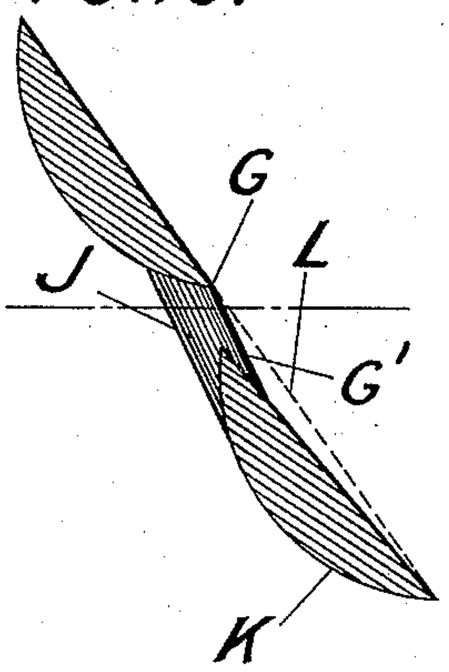


FIG. 10.



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UNITED STATES PATENT OFFICE.

JAMES GLOVER, OF NORTH MELBOURNE, VICTORIA.

BLADE FOR SCREW-PROPELLERS.

SPECIFICATION forming part of Letters Patent No. 634,885, dated October 17, 1899.

Application filed June 10, 1897. Serial No. 640,275. (Model.)

To all whom it may concern:

Be it known that I, JAMES GLOVER, a subject of the Queen of Great Britain and Ireland, and a resident of North Melbourne, Victoria, have invented certain new and useful Improvements in Blades for Screw-Propellers for Steamships, of which the following is a full, clear, and exact description.

At present there are certain disadvantages attendant on the working of screw-propellers of steamships. These disadvantages are as follows: First, when air is carried downwardly from the surface of the water by the revolution of the propeller a partial vacuum is created at the forward or passive sides or faces of the propeller-blades; second, the loss of useful effect of the slip which occurs in the working of screw-propellers; third, the vibration which is invariably present while the propeller is working.

My invention has for its object to overcome to a considerable extent, if not entirely, the foregoing disadvantages, thus effecting a positive gain in propulsive efficiency without increasing the blade area and requiring a less number of revolutions of the propeller and greater speed and quicker turning of the vessel being attained.

I attain my object, first, by making mid-width of a screw-propeller blade a curved aperture or a straight aperture commencing from about one-third of the length of said blade and terminating at about two-thirds of its length; second, by setting back either the leading half portion or the following aft portion of the active or driving face of the blade to the extent of the length, or thereabout, of the aforesaid aperture.

In order that my invention may be better understood, I will now refer to the accompanying sheets of drawings, in which similar letters of reference indicate similar parts wherever they occur.

Figures 1 and 2 illustrate, respectively, the starboard side and aft elevations of a screw-propeller having my improved blades cast solid, with the boss and the leading edges cut away more than the after edges. Figs. 3, 4, and 5 represent sectional plans upon the lines *a b c*, shown in Fig. 2, of one of my propeller-blades. Fig. 4^{A} is a transverse section of a brace that serves for the purpose of strengthening the blades of my large propellers. Said Figs. 1 to 5 represent what I term a "coarse-pitch screw-propeller." Figs. 6 and 7 represent starboard side and aft elevations of a propeller having blades made according to my invention and suitably attached to the boss. Figs. 8, 9, and 10 represent sections of Fig. 7, taken upon the lines *d e f*, respectively. Figs. 6 to 10 represent what I term a "fine-pitch propeller" having blades made with my improvement.

The scale of Figs. 1, 2, 6, and 7 is three-quarters of one inch to the foot and that of Figs. 3, 4, 4^{A}, 5, 8, 9, and 10 is one and one-half inches to the foot.

Figs. 1 to 5 illustrate my screw-propeller blades having a pitch of fifteen-eighths of the diameter, being coarser than usual, and I propose using this form of screw-propeller for large vessels. The blades shown in these figures are not only unsymmetrical in shape, but are made integral with the boss A; but I wish it to be here understood that said blades may be made separate, as shown in Figs. 6 and 7, and may be secured in any suitable manner to said boss A, and, further, that neither the manner of securing the blades nor the boss forms any part of my present invention.

C is the curved aperture of each blade, the leading half portion of which is what I term "set back" from the helical to the said curved aperture C, as indicated by the deviation from the dotted-face line D in Fig. 5, which represents the contour of the said helical line. The area of the set back of the leading half portion E lies between or extends from a point slightly beyond the two ends of the said curved aperture C and the leading edge of the blade. This "setting back" of the said leading half portion E will be further understood upon reference to the upper blade of the screw-propeller. (Illustrated in Fig. 2.) In this view the dotted line F, extending from the edge G of the said curved aperture C and running along the leading edge of the blade, represents that portion which is set back, as aforesaid, from the helix or true screw, the greatest set back being along the edge G′ of the said curved aperture C, as clearly shown in sectional Figs. 3, 4, and 5. Therefore it will be now understood that there is a gradual inclination from said edges G and G′ toward the helical shape,

which commences at that part of the dotted line situated along the leading edge of the blade. H is a brace which serves to strengthen the leading and also the following half portions of the blade. Along the said curved aperture C there may be either one or two braces, such as H, as shown in Figs. 1, 2, 6, and 7. They are cast with the blade, as shown in Figs. 1 and 2, or they may be dispensed with when small screw-propellers are employed.

Now my invention may be partly modified when a screw-propeller is required to be used for small vessels. In this case I make a screw-propeller, as illustrated in Figs. 6 to 10, having a blade made also with a mid-width aperture J, and this propeller, as shown, has a pitch of nine-eighths of the diameter, being finer than usual. This modified form of blade for a screw-propeller has the following or aft half portion K of the blades set forward from the dotted helical line L to the straight aperture J, the deviation being from said dotted line L. (Shown on the left-hand blade of Fig. 10.) The aforesaid portion K, which is what I have hereinbefore termed "set forward," is situated between the edges G and G′ of the before-mentioned aperture J and the rounded ends of said dotted line F and also the following or aft edge of the blade. This "setting forward" is similar in character to that described with reference to the setting back of the leading half portion E of coarse-pitch screw-propellers, as shown in Figs. 1 to 5.

I may here point out that the passive sides or forward faces of the blades shown in the drawings are convex shaped—that is to say, the forward surface of the metal body of each blade is rounded off between the leading and the following edges of the blades to the tip thereof and the edges of either the curved or straight apertures C or J, respectively.

I do not confine myself to any particular pitch or diameter of my propeller nor to any kind of metal that may be employed in its construction.

In order that the action of the blades while in the water may be understood, I shall refer to Figs. 1 and 2 only for the reason that a similar action takes place with the blades shown at Figs. 6 and 7.

In the working of my propeller the following half portion of the blade will cause a stratum of water to rush through the curved aperture C in the direction shown by dotted arrow, Fig. 5, thereby diminishing the partial vacuum which is generally created at M, Fig. 5, and also lessening the resistance to the movement or turning of that portion of the blade. The motion of the water through the said curved aperture C is effected without any shock or eddy on account of the leading portion E and the following half portion, respectively, of each blade being so arranged as to cause only a slight change in the direction of the water passing through. The water disposed of as aforesaid is part of that just acted on by the said leading portion E of the blades and set in motion aft, so that it will be seen that the remaining part of the water coming into contact with the following half portion of the blades will have an accelerated motion imparted to it by reason of the said following half portion acting on water which has not been previously in direct contact with the blades.

I claim—

1. A screw-propeller blade having an aperture extending from about one-third to about two-thirds of the length of said blade, said blade having the forward surfaces rounded off between the leading and the following edges to the tip and the edges of the aperture and the said blade having a half portion shaped to deviate from the helical line of the blade, the deviation commencing from approximately an edge of the blade and terminating at the edges of the aperture, and the area of the deviation extending from a point just beyond the two ends of the aperture and an edge of the blade.

2. A screw-propeller blade having a curved aperture C extending from about one-third to about two-thirds of the length of said blade and having a forward half portion E "set back" from the helical line and gradually commencing from the dotted line F of the leading edge of said blade and terminating at the edges G G′ of the aperture, the said blade having the forward surfaces rounded off between the leading and the following edges to the tip and the edges of the aperture, and the area of the "set back" extending from a point just beyond the two ends of the aperture and the leading edge of the blade.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JAMES GLOVER.

Witnesses:
ALBERT E. B. SWANSON,
EDWIN C. HUGHES.