Dec. 27, 1932. E. A. L. THAYER 1,892,182

SCREW PROPELLER

Filed April 30, 1931

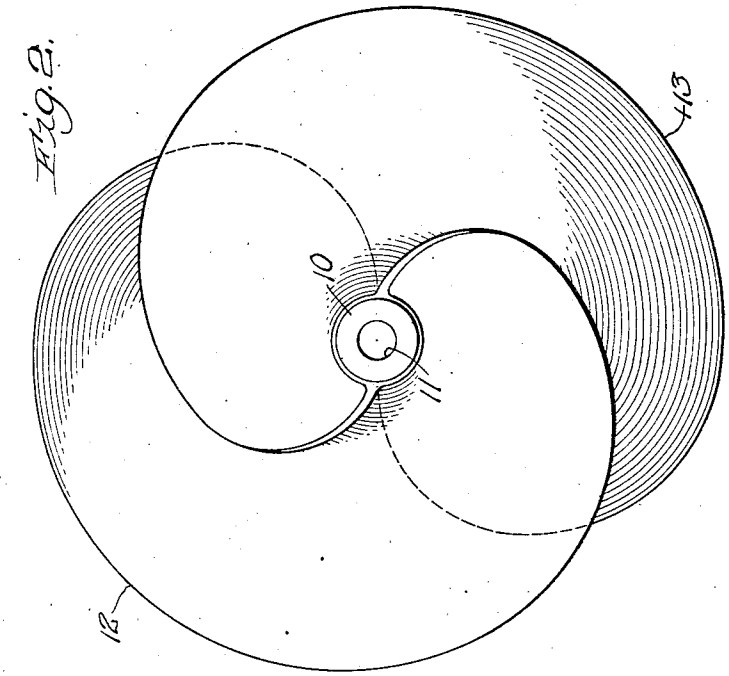

Fig. 2.

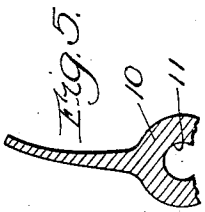

Fig. 5.

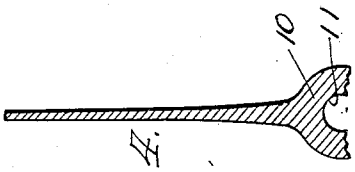

Fig. 4.

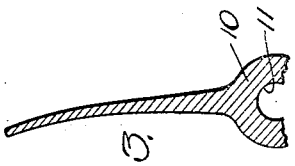

Fig. 3.

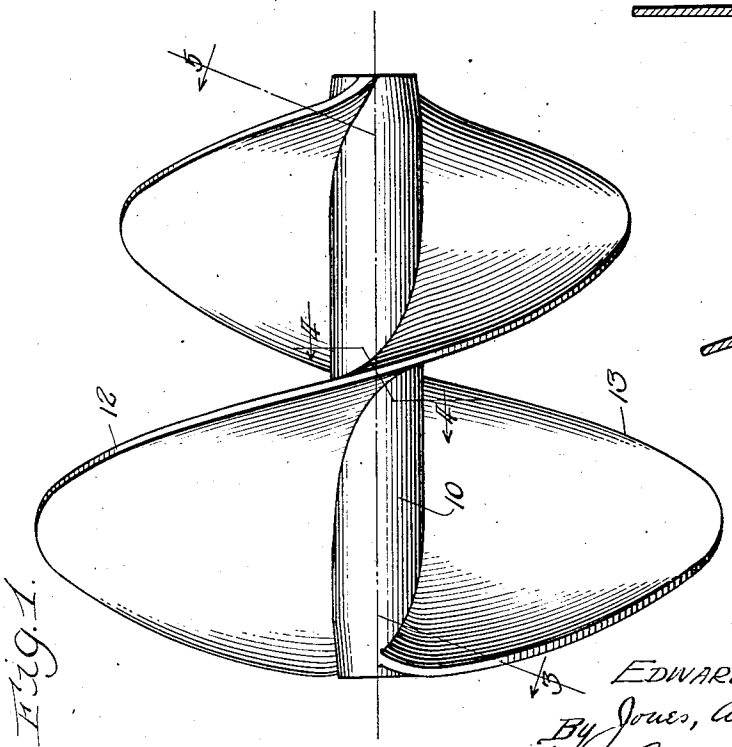

Fig. 1.

Inventor:
EDWARD A. L. THAYER
By Jones, Addington, Ames & Seltzer
Attys.

Patented Dec. 27, 1932 1,892,182

UNITED STATES PATENT OFFICE

EDWARD A. L. THAYER, OF CHICAGO, ILLINOIS

SCREW PROPELLER

Application filed April 30, 1931. Serial No. 533,962.

This invention relates to a screw propeller and has special reference to a screw propeller of the type for use in conjunction with marine and aerial navigating vessels.

More particularly, this invention relates to a screw propeller having one or more substantially helicoidal blades each of which preferably makes practically a complete convolution around the stem or hub thereof, the front and rear portions of the blade being concavo-convex when viewed in cross-section. The terms "front" and "rear" are here used relatively to the motion of the propeller when working to move the vessel in a forwardly direction. The convex faces of the blade portions at opposite ends of the convolution face each other, the respective concave and convex faces merging in substantially flat surfaces at a desired point between the ends of the convolution. The prime object of this construction is to provide a propeller by which the liquid acted upon by the blade as the propeller revolves will tend to be directed backwardly and toward the hub to obviate the tendency usual in propellers as hitherto generally constructed to carry the water around with the blades and by which the liquid will be directed with a minimum resistance to the center of the propeller. Such a propeller would act with a maximum efficiency of propulsion and would produce a minimum of commotion in the water.

The dished front portion of the convolution forming the blade cuts into the water or other fluid so as to afford the least resistance in entering and directs the fluid into the central portion of the propeller to be acted upon by the oppositely dished rear portion of the convolution forming the blade, the liquid being directed centrally rearward to increase the effect of propulsion as though the propeller were acting on a solid mass. The outer ends of the blade being formed with oppositely dished faces, the propeller will act with substantially the same efficiency of propulsion in moving the vessel in either direction of travel, that is, backwardly or forwardly.

The number of blades of a propeller depends on the area of the propelling surface in proportion to the length thereof. The width of the blades is, of course, reduced in proportion to the number thereof. It has been found that in using two blades each of which makes a complete convolution around the hub, the largest diameter of the blades should be approximately equal to or not substantially greater than the length thereof. The blade is gradually narrowed in width in both directions from an enlarged substantially central portion and the blades are bowed backward a little instead of being perpendicular to the hub from the enlarged portion of the convolution to the rear end thereof to produce a tendency in the fluid which they drive backward to converge to a point. It is assumed that this convergent tendency may balance the divergent tendency due to the centrifugal force attending the revolution so that the two forces being in equilibrium will cause the fluid to be projected backward from the screw in a cylindrical column. The blades are bowed forward a little from the enlarged portion on the convolution noted above to the leading end thereof to cut into the fluid so as to afford the least resistance in entering and to direct the fluid into the propeller instead of deflecting the same therefrom.

The provision of a pair of blades having an entire convolution on the hub gives a maximum area of propelling surface with a minimum width of blade thereby requiring a minimum of thrust or force exerted on the shaft to propel the vessel. By reason of the comparatively small width of blade at the forward end thereof and the dished or inclined condition of the blade thereat, the entire propeller is live and practically devoid of fluid drag between convolution of the blades.

One of the objects of this invention is to provide a propeller of the type noted above in which the blade makes a complete convolution around the hub, the front end thereof being inclined forwardly and the rear end being inclined rearwardly to afford a maximum efficiency of propulsion.

Another object of this invention is to provide a propeller of the character noted above

in which the leading end of the blade gradually increases in width to an enlarged central portion, thereafter abruptly decreasing in width to minimize drag as between the blades and to afford a live propelling area throughout the propeller and to prevent accident to the propeller in case of collision with projecting solids.

Other objects and advantages will hereinafter be more fully pointed out and for a more complete understanding of the characteristic features of this invention, reference may now be had to the following description when read together with the accompanying drawing, in which latter:

Figure 1 is a side elevational view of the propeller embodying the features of this invention;

Fig. 2 is a front elevational view of Figure 1;

Fig. 3 is a vertical sectional view of a blade showing a portion of the hub taken on the line 3—3 of Figure 1;

Fig. 4 is a view similar to Fig. 3 taken on the line 4—4 of Figure 1; and

Fig. 5 is a view similar to Fig. 3 taken on the line 5—5 of Figure 1.

Referring now more particularly to the drawing, the device of this invention comprises a propeller hub or stem 10 having a central bore 11 for receiving a power shaft of a vessel. A pair of substantially helicoidal blades 12 and 13 extend from the hub, each blade preferably making practically a complete convolution therearound.

The dynamic pressure of the reaction developed between the water and the helicoidal surfaces of the blades when revolved in one direction drives the vessel forward and to insure a maximum efficiency of propulsion, each blade is bowed in a direction toward the rear from a substantially central portion of the convolution as shown more particularly in Fig. 3. The fluid acted upon by the blades is urged to converge to a point although it is assumed that this convergent tendency may balance the divergent tendency due to the centrifugal force attending the revolution so that the two forces being in equilibrium will cause the fluid to be projected backward in a cylindrical column.

Referring now more particularly to Fig. 5 of the drawing, the leading end of the blade is shown to be bowed in the opposite direction to that of the rear end of the blade. It is contended that this shape permits the entrance of the propeller into the liquid with the least commotion thereto, the blade cutting into the liquid as an auger into a solid. This easy entrance of the water into the propeller prevents "churning" to a substantial degree, which latter would result in a substantial measure were the blade disposed perpendicularly to the hub or at a rearward inclination thereto. After the liquid is in the screw with a minimum of resistance, the reaction between the liquid and the rearwardly bowed helicoidal surfaces takes place in the manner above described.

It will also be noted that the leading end of the blade tapers in width gradually from the hub to an enlarged portion substantially centrally of the length thereof. By referring to Fig. 2 of the drawing, it will be seen that there is very little overlapping of the blades and that in practical effect, there is no drag and every portion of the blade is put to work. Also, by reason of this gradual taper from a central portion to each end there is little likelihood of the blades catching in weeds or bumping into logs and the like. It is a common occurrence for a blade of the usual type to be broken from the shaft by striking a projecting solid member. In the instant application, a projecting member would be given a glancing blow in any event and there would be no danger of fracturing or breaking the blade. There are no sharp edges to catch weeds or refuse and therefore the propeller may be said to be weedless.

While but a single embodiment of this invention is herein shown and described, it is to be understood that various modifications may be apparent to those skilled in the art without departing from the spirit and scope of this invention and, therefore, the same is to be limited only by the scope of the prior art and the appended claims.

I claim:

1. A screw propeller comprising a hub for engaging a power shaft, and a plurality of substantially helicoidal blades on said hub, the front and rear portions of each of said blades being concavo-convex when viewed in cross-section with the convex faces facing each other and the respective concave and convex faces merging in a substantially flat surface between the ends of said blades.

2. A screw propeller comprising a hub for engaging a power shaft, and at least one substantially helicoidal blade forming practically a complete convolution on said hub, the front and rear portions of said blade being bowed in directions away from each other.

3. A screw propeller comprising a hub for engaging a power shaft, and at least one substantially helicoidal blade forming practically a complete convolution on said hub, the front and rear portions of said blade being concavo-convex when viewed in cross-section with the convex faces facing each other and the respective concave and convex faces merging in a substantially flat surface between the ends of said blade.

4. A screw propeller comprising a hub for engaging a power shaft, and a plurality of substantially helicoidal blades each of which forms practically a complete convolution on said hub, said blades being gradually reduced in width from an enlarged central por-

tion to the hub and having the front and rear portions of each of said blades bowed in opposite directions.

5. A screw propeller comprising a hub for engaging a power shaft, and at least one substantially helicoidal blade forming practically a complete convolution on said hub, said blade being gradually reduced in width from an enlarged central portion to the hub and having the front and rear portions of said blade bowed in directions away from each other.

6. A screw propeller comprising a hub for engaging a power shaft, and a substantially helicoidal blade on said hub, the front and rear portions of said blade being concavo-convex when viewed in cross-section with the convex faces facing each other and the respective concave and convex faces merging in a substantially flat surface between the ends of said blades.

In witness whereof, I have hereunto subscribed my name.

EDWARD A. L. THAYER.