No. 619,136. Patented Feb. 7, 1899.

W. J. CARVER.

PROPELLER.

(Application filed Feb. 16, 1898.)

(Model.)

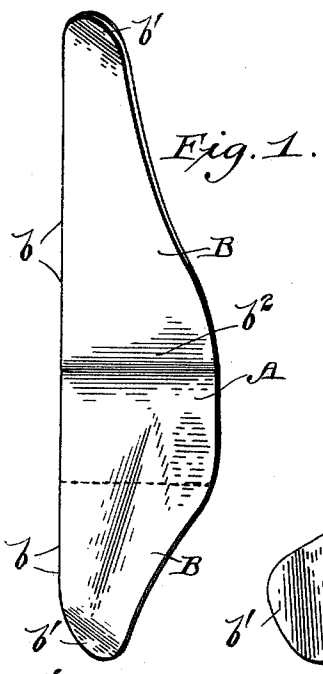


Fig. 1.

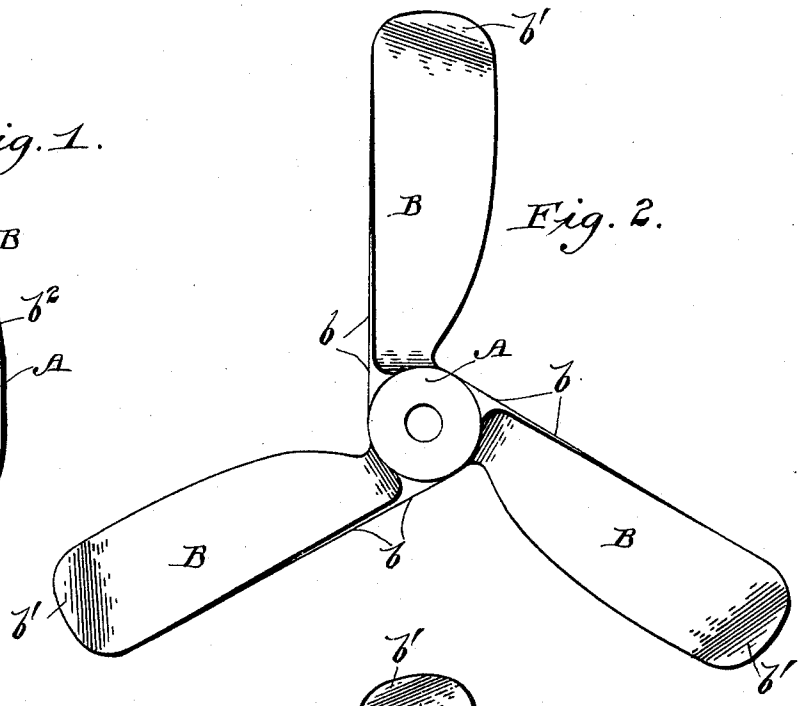


Fig. 2.

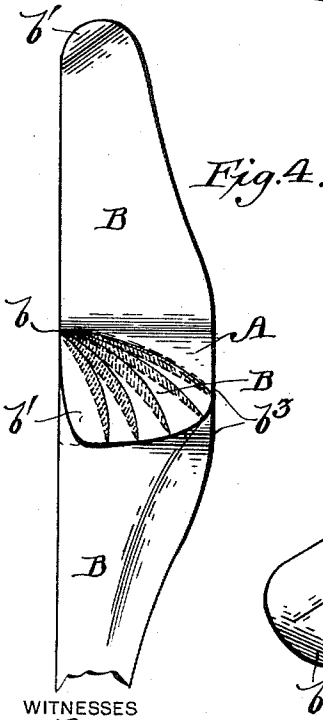


Fig. 4.

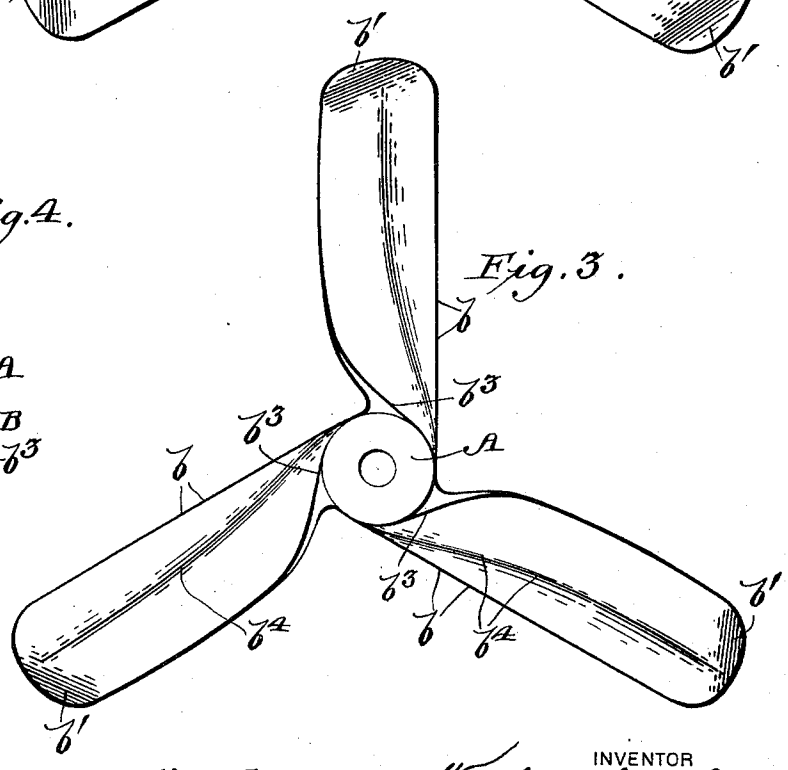


Fig. 3.

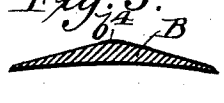


Fig. 5.

WITNESSES

Severance.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM JAMES CARVER, OF TACOMA, WASHINGTON.

PROPELLER.

SPECIFICATION forming part of Letters Patent No. 619,136, dated February 7, 1899.

Application filed February 16, 1898. Serial No. 670,551. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM JAMES CARVER, a citizen of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Propellers; 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 propellers for driving boats, ships, and all sorts of water-craft; and it consists in constructing a propeller with blades having varying angles with relation to the axis of the shaft at different distances from the center of the same, the said angles all starting from a tangent at the rear corner of the hub.

It also consists in providing a propeller with suitable blades which are broader at their base, where the power to drive is the greatest, and narrower at their outer ends.

It also consists in certain other novel features of construction, as will be hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 represents a side elevation of my improved propeller. Fig. 2 represents a rear elevation of the same. Fig. 3 represents a front elevation thereof. Fig. 4 represents a top plan view looking at the end of one of the blades, the different angles of the blade at different points being indicated in dotted lines; and Fig. 5 represents a detail sectional view through one of the blades.

In constructing propellers it is the aim to produce one which with a given power and revolution will exert the greatest force upon the water with a minimum of centrifugal action in the water and a minimum of surface disturbance.

By my improved propeller I am enabled to produce an advanced result in this direction.

A in the drawings represents the hub of a propeller constructed in accordance with my invention, and B B indicate the blades. The hub A may be made of any desired diameter, according to the work that the propeller is designed to do. As seen from the drawings, the rear edges *b b* of the blades B are preferably formed upon a tangent to the periphery of the hub, so that the different angles of each blade throughout all spring from the one tangent at the rear. As seen in Fig. 4, the angle of the blade at the hub is more nearly parallel with the axis of the shaft than the angle of the blade at any other point. The angle at this point extends from the rear tangent to a point a little beyond the axis of the shaft at the front of the propeller, or at an angle with the axis of, say, about twenty degrees. The cross-sections of the blade from this point extend at angles which gradually leave their proximity to the plane of the axis until at a point near the tip of the blade the propeller approximates an angle of nearly seventy degrees with respect to the axis of the shaft. Beyond this point the extreme tip of the blade is bent over slightly to the rear, as at b', its extreme edge approximating ninety degrees, or being nearly flush with the edges of the rear tangent. As seen from Fig. 1 of the drawings, the base b^2 of the blade is preferably made the full width of the hub A and gradually decreases in width toward the tip. The forward edge of the blade is therefore constructed upon a double compound curve, as illustrated in Fig. 1 of the drawings. It will thus be seen that the blade has a narrower bearing-surface upon the water at its tip than it does at its base, the bearing-surface of each blade increasing gradually toward the hub, where the greatest power can be exerted, it being nearer the axis of the shaft. The front edge of each blade preferably extends for a short distance upon a tangent b^3 to the periphery of the front end of the hub, being gradually curved off from that point to conform to the different angles of the blade. The forward side of the blade is also provided with a thickened ridge portion about centrally thereof, as at b^4, which forms a strengthening web or portion to the blade. The rear or working surfaces of the blades are preferably concaved, as shown in Fig. 5 of the drawings, so as to offer a good bearing-surface to the water. It will be observed that the base of the blades being struck from the rear tangent and being at a slight angle also exert a pressure upon the water toward the rear, this pressure constantly increasing toward the tip of the blade. It will be apparent that the blades are thus constructed with great strength, and the tip portion, which is bent over slightly, will serve

in a great measure to destroy the liability of surface agitation. It will be observed by looking at the rear elevation of the propeller that the bearing-surface of each blade which exerts a pressure upon the water to the rear is almost uniform from tip to hub, it slightly decreasing toward the hub.

Propellers constructed in accordance with my invention will tend to destroy the centrifugal force usually produced in the water by propellers and which is deleterious to the swift movement of the vessel through the water. The construction of the tips as above mentioned is also well calculated to prevent surface disturbance. It will be apparent that a propeller constructed in this manner has a large effectual driving pitch and is therefore able to utilize the power used to the greatest effect. It will be apparent that any desired number of blades may be used upon a propeller constructed in accordance with my invention without departing in the least from the spirit thereof.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A propeller, comprising a hub, blades having their rear edges formed upon straight lines which are tangent to the periphery of the hub at the rear end thereof, the body portion of the said blades extending forward at varying angles to the axis of the shaft, the rear or working surface being slightly concaved and the forward surface being provided with a thickened strengthening portion, substantially as described.

2. A propeller, comprising a hub, blades formed thereon having their bases arranged on angles with relation to the axis of the shaft, the angles of the body portion of the blade increasing toward the tip and all of said angles springing from a line tangent to the periphery of the hub at the rear, and bent-over portions formed at the tips of the said blades for preventing surface agitation, substantially as described.

3. A propeller, comprising a hub, blades formed thereon, the rear edges of the said blades from end to end springing from a line tangent with the periphery of the hub, and the forward edges of the said blades being arranged at tangents to the forward edges of the hub for short distances and curving toward the rear therefrom, and bent-over portions formed at the tips of the blades for preventing surface agitation, substantially as described.

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

WILLIAM JAMES CARVER.

Witnesses:
FRANK J. MILLER,
A. J. HOLMES.