

C. M. LEE,
FAN, PROPELLER, &c.
APPLICATION FILED AUG. 16, 1916.

1,341,653.

Patented June 1, 1920.
3 SHEETS—SHEET 1.

Fig. 1.

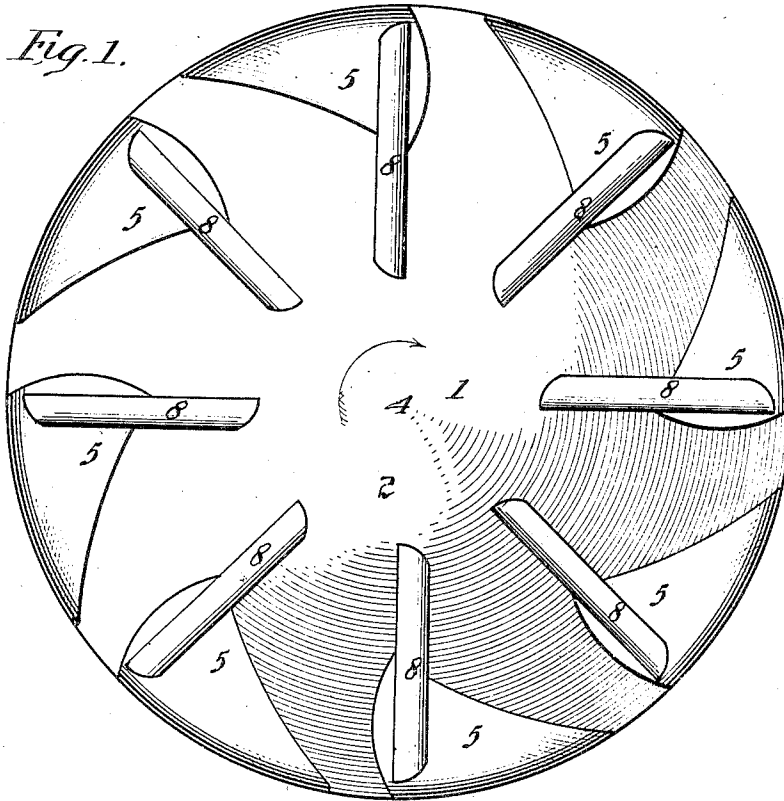
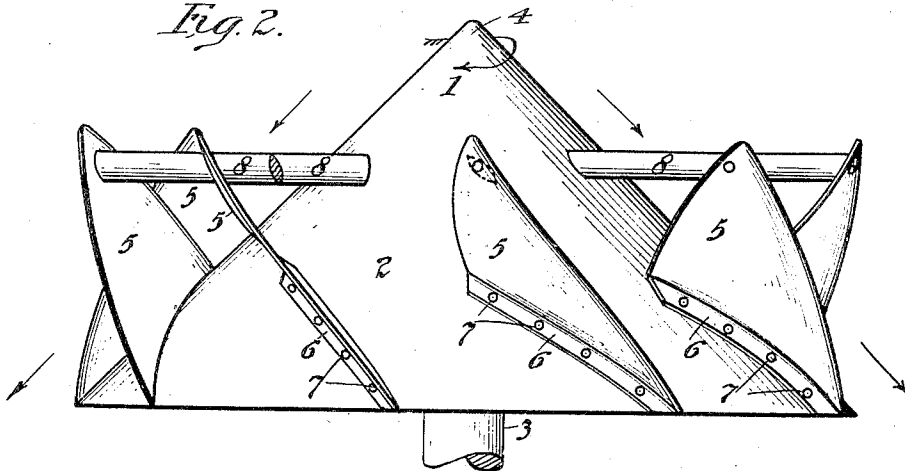


Fig. 2.



WITNESSES:

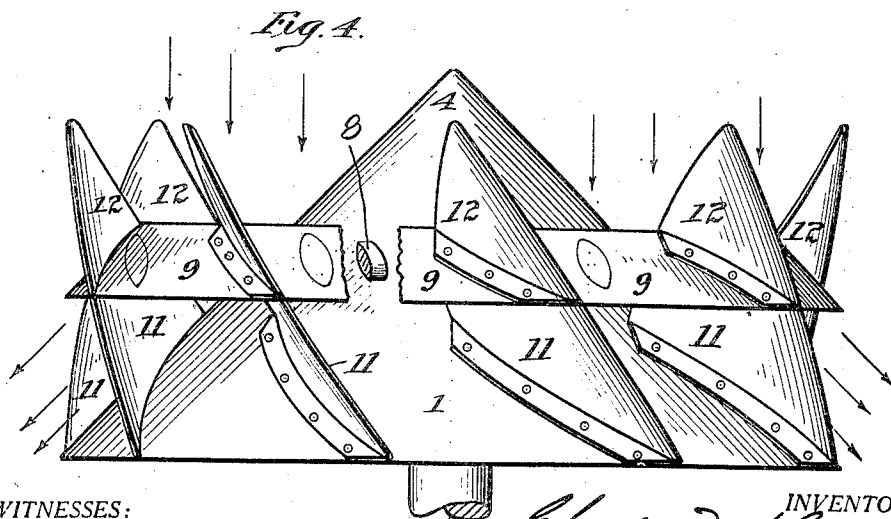
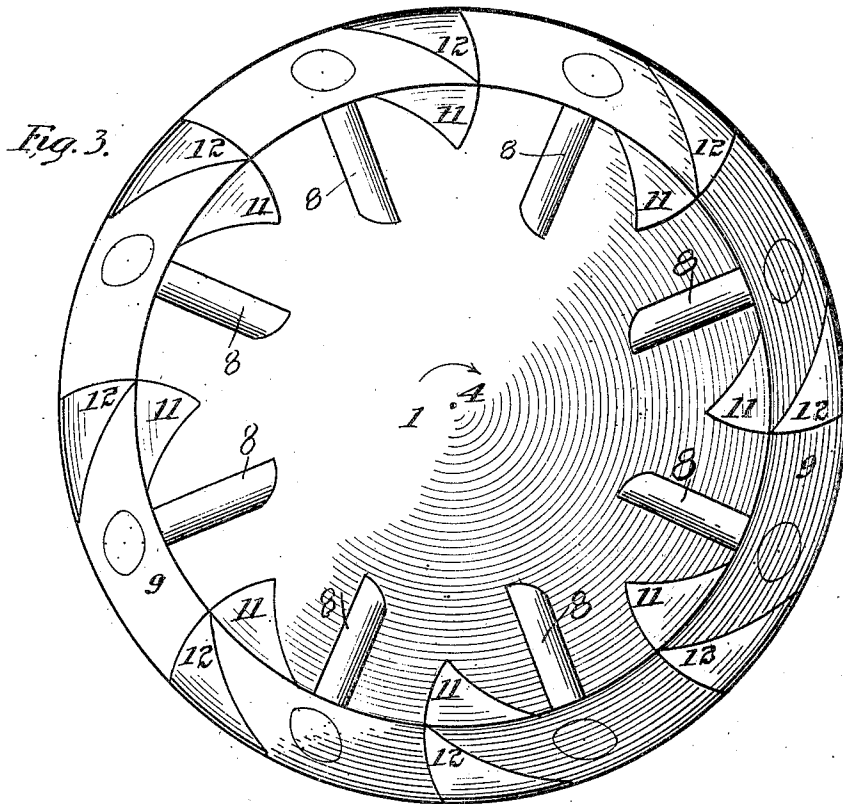
F. M. Davis
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Charles M. Lee INVENTOR.
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3 SHEETS—SHEET 2.



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Wm. E. Hann

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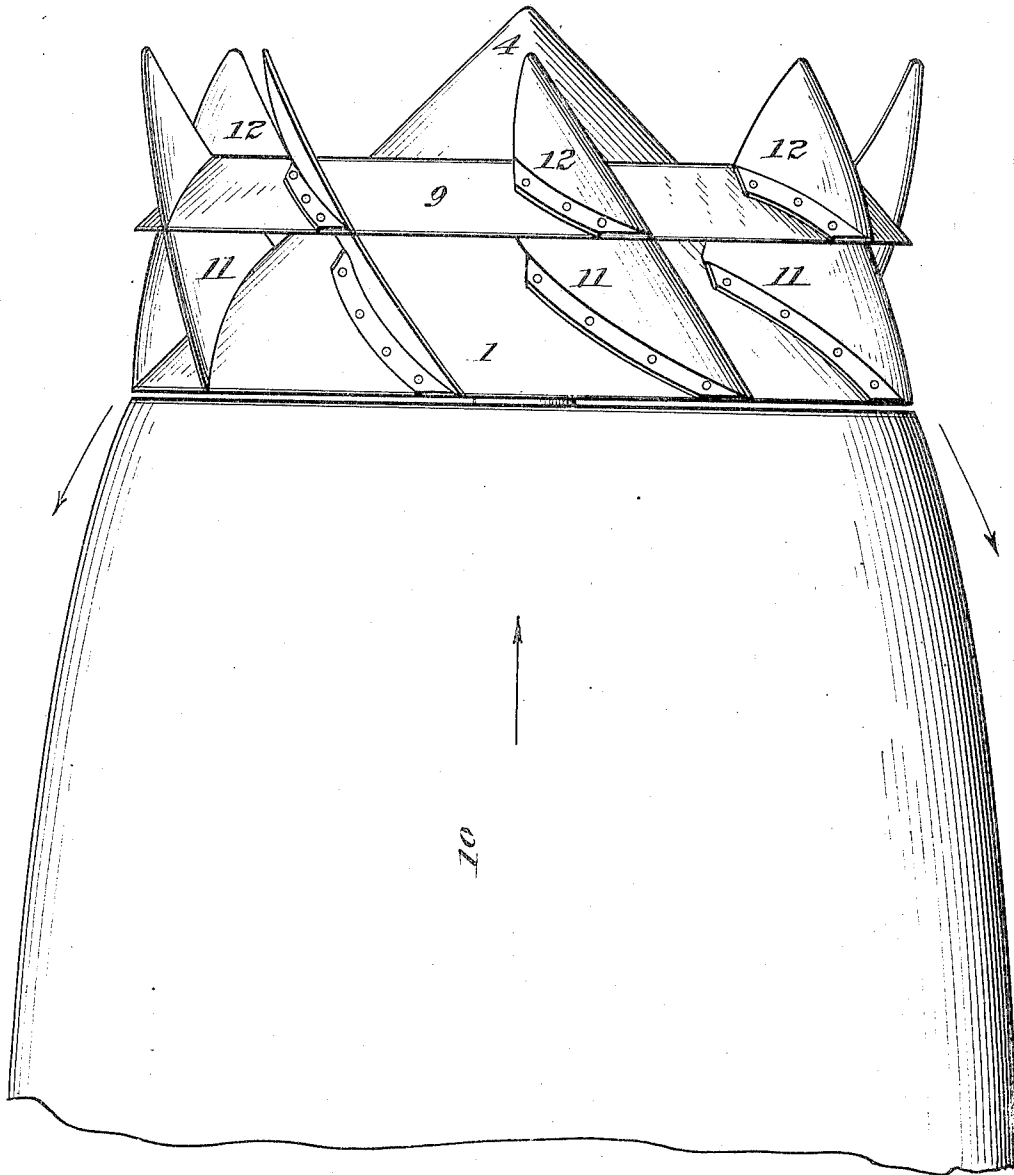
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3 SHEETS—SHEET 3.



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Fig. 5.

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UNITED STATES PATENT OFFICE.

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1,341,653.

Specification of Letters Patent.

Patented June 1, 1920.

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To all whom it may concern:

Be it known that I, CHARLES M. LEE, a citizen of the United States of America, and a resident of Falls City, county of Richardson, and State of Nebraska, have invented certain new and useful Improvements in Fans, Propellers, &c., of which the following is a specification.

The present invention relates to screw propellers, meaning thereby such helix-carrying devices as are used to propel submarine and other vessels, or to circulate air for ventilating purposes and the like; and its object is, generally, to provide an improved device of that character; and, more particularly, a more economically constructed device of that character; and further, such a device whereby the propeller blades shall be firmly braced; and further, such a device having bracing rods which shall minimize the water displacement and water friction thereon; and further, such a device which shall have a plurality of sets of blades, one set being disposed farther from the axis of the propeller's rotation than another set; and further, such a device wherein the water acted on by the propeller shall be deflected in such a way as to offer less resistance to the passage of the vessel through the water, than heretofore.

These and any other objects appearing hereinafter are attained by, and the invention finds preferable embodiment in, the structure hereinafter described and illustrated by the accompanying drawings, in which—

Figure 1 is an end view of a screw propeller;

Fig. 2 is a side view thereof;

Fig. 3 is an end view of a modified construction;

Fig. 4 is a side view of the same; and

Fig. 5 is a side view of the bow portion of a submarine vessel furnished with such screw propeller.

In the embodiment of the invention chosen for illustration by the drawings and for detailed description herein, the screw propeller 1 has a central or hub portion 2 coaxial with and rotated by the shaft 3. This hub portion is conoidal in form as shown, with an apex 4. Helically disposed propeller blades 5 are carried by the hub portion, and may be formed by press-dieing the same from a suitable sheet metal blank, so

as to give them the convexo-concave shape shown and the attaching flange 6 whereby they may be riveted at 7 to the hub portion. This construction is very simple and economical. In Figs. 1 and 2 suitable brace rods 8 extend between the hub portion and the parts of the blades remote from the hub portion, thus to secure the blades from deflection by the water, etc. In order to minimize the water displacement by these rods and the water friction thereon, such rods have their greatest cross-sectional extension in the direction the water acted on by the propeller passes thereby or there-through; the rod's cross-sectional extension at right angles to the water's direction of movement being the least. This is particularly shown in the cross-section of one of the rods as seen in Fig. 2.

In the modification shown in Figs. 3 and 4, there is provided a thin annular member 9, as of sheet metal, connecting the blades at points remote from the hub portion. This member 9 is spaced from, and is parallelly disposed relatively to, the surface of the hub portion. Braces 8' extend from the surface of the hub portion to points on said member 9 midway between the vanes 11. Said member thus acts as a brace for the blades. Furthermore, inasmuch as the water passing back between the hub portion and this member 9 is held by said member against the same degree of centrifugal or radial motion the rotation of the blades would otherwise give to it, it is manifest that the thrust of the propeller on the water is more nearly in the direction opposite to that of the vessel's motion, which is a very desirable end.

The conoidal hub portion, assisted by the combination therewith of the annular member 9, effects a further advantage especially when the propeller is applied to the bow of a vessel, as the submarine vessel 10 shown in Fig. 5. It will be seen that the conoidal hub portion deflects the water laterally from the vessel's sides, whereby the friction of the water thereon is lessened; and in fact a slight air space near the vessel's stem, between vessel and water, may be created, the tendency of which is to draw the vessel forward; the annular member 9 all the while directing the water rearwardly and preventing it from too great a divergence, under the action of the conoidal hub

portion and the centrifugal motion imparted by the blades themselves.

It will be seen that by connecting the annular member 9 to the blades at their middle portions, or by securing member 9 between inner blades 11 and outer blades 12 (which is essentially the same), two sets of blades are provided, one set being farther from the propeller's axis than the other set. The propeller blades 5 are mounted upon the outer surface of the conoidal hub member, and it is preferable that the blades, or at least the major parts of the blades, be within the limits of the axially projected area of the base of said hub member. The surface of the conoidal hub member is also preferably disposed at an angle of 45 degrees with respect to the axis of said member so that the fluid upon which the propeller is acting is deflected from its course at an angle of approximately 45 degrees.

The invention being intended to be defined solely by the claims, is not to be limited to or by details of construction shown or described.

I claim:—

1. In a screw propeller, a conoidal hub portion, propeller blades carried by the hub portion, and a continuous annular member of unitary character spaced from and parallelly disposed relatively to the surface of the hub portion, and connecting the blades at medial points remote from the hub portion, whereby substantially two sets of blades are formed, one set within said member and another set outside it.

2. A device of the character described, comprising a rotary hub of conoidal shape, a plurality of blades disposed spirally thereon, the outer and inner edges of said blades being substantially parallel, an annular band of conoidal shape mounted on the outer edge of said blades, and a plurality of

spirally disposed blades mounted on said band.

3. A device of the character described, comprising a rotary hub of conoidal shape, a plurality of blades disposed spirally thereon, the outer and inner edges of said blades being substantially parallel, an annular band of conoidal shape mounted on the outer edge of said blades, and a plurality of spirally disposed blades mounted on said band, the outer and inner blades being spaced correspondingly and disposed substantially in paired alinement, and each pair of blades having mutually alined edges disposed substantially to describe a common cylindrical surface when the device rotates.

4. A device of the character described, comprising a plurality of spaced concentrically arranged conoidal members of like angularity with respect to their common axis, in combination with a plurality of sets of vanes arranged peripherally of said members respectively and standing outward thereon, and adjacent members being held in rigid relation to each other by the corresponding intermediately positioned vanes.

5. A device of the character described, comprising a pair of concentric conoidal members suitably spaced apart, a plurality of spirally disposed vanes arranged peripherally between said members in spaced mutual relation, and braces arranged alternately with respect to said vanes for rigidly securing said members with respect to each other.

Signed at Falls City this 11th day of 30 August 1916.

CHARLES M. LEE.

Witnesses:

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F. A. HEBENSTREET.