

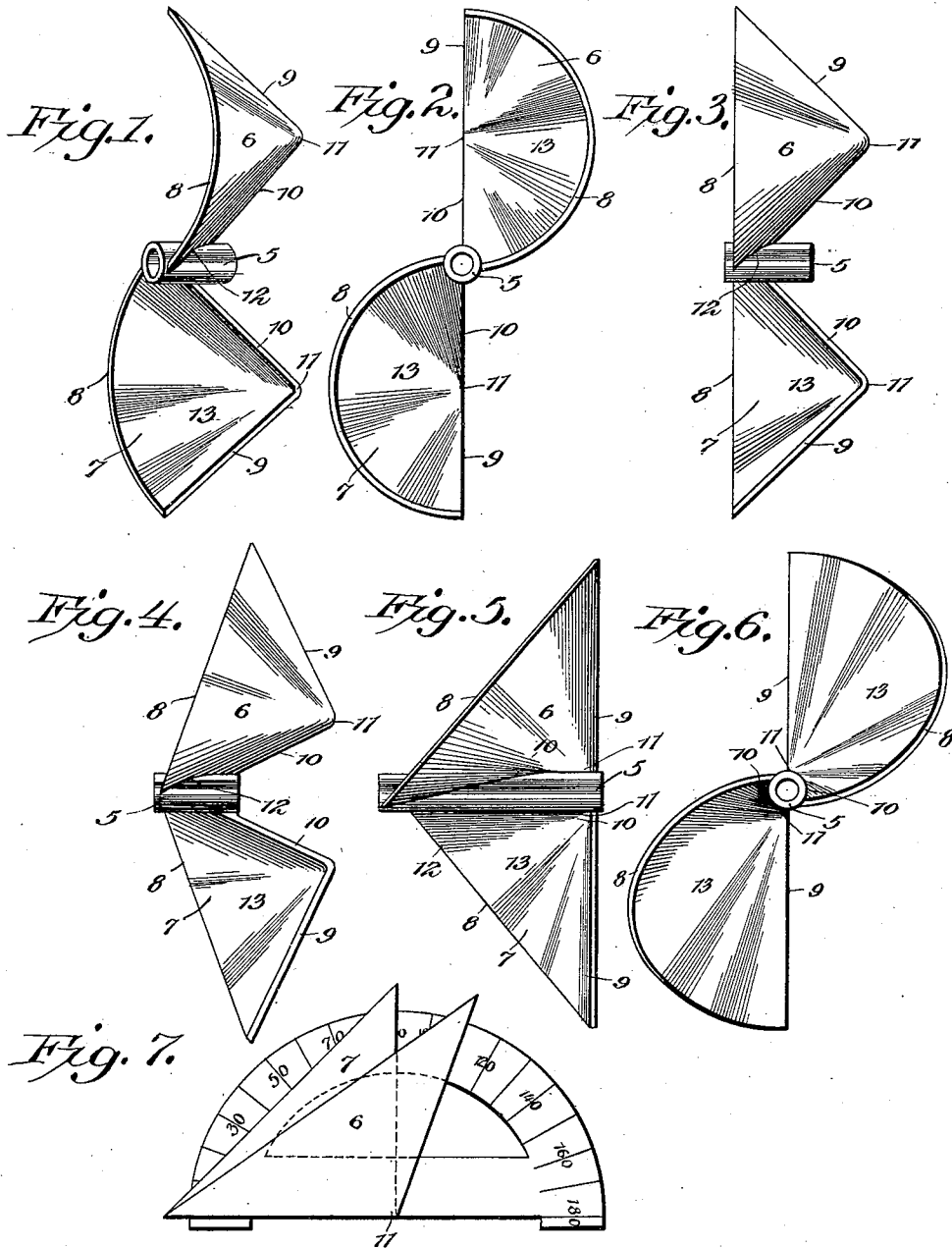
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Patented Jan. 21, 1902.

W. O. WHITNEY.
PROPELLER.

(Application filed Jan. 9, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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PROPELLER.

SPECIFICATION forming part of Letters Patent No. 691,514, dated January 21, 1902.

Application filed January 9, 1901. Serial No. 42,670. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM O. WHITNEY, a citizen of the United States, residing at Glens Falls, in the county of Warren and State of New York, have invented a new and useful Propeller, of which the following is a specification.

My present invention relates to a novel propeller adapted for use in various arts either as a propelling member acted upon by a fluid—as, for instance, in the operation of windmills, turbines, engines, or like transmittal devices—or operated by suitable power and acting upon a fluid—as, for instance, in the propulsion of vessels—that is to say, the device is capable of being driven under fluid-pressure for the translation of power or of being driven mechanically against the resistance of a fluid—as, for instance, water or air—in the propulsion of vessels or for projecting air-blasts.

The object in view is to provide a device of this character capable of generating a maximum energy by a minimum expenditure of power, the desired end being attained by providing the propeller with a hub and a series of blades each having the form of a section of a cone, the blades at diametrical sides of the hub being disposed in the same direction with respect to the rotation of the propeller when in use.

The invention consists, further, in certain peculiarities of form and arrangement, all of which will be hereinafter more fully explained, illustrated in the accompanying drawings, and defined in the appended claims.

In said drawings, Figure 1 is a perspective view of one form of my propeller complete. Fig. 2 is an elevation thereof looking toward the bases of the blades. Fig. 3 is a side elevation thereof. Fig. 4 is a side elevation of a slightly-different form of propeller, showing the center clearance between the blades somewhat decreased and their bases disposed in angularly-related planes. Fig. 5 is an elevation of still another form of propeller, showing the adjacent edges of the blades attached throughout their lengths to the hub and showing the bases of the blades disposed in planes having a more acute angular relation than in the preceding figure. Fig. 6 is a view similar to Fig. 2, but illustrating the subject-mat-

ter of Fig. 5; and Fig. 7 is a view illustrating the manner of disposing the angular edges of the blade at any desired angle to secure a proper pitch of the cone.

Referring to the numerals employed to designate corresponding parts throughout the views, 5 indicates a hub, preferably of cylindrical form, and 6 and 7 the blades cast integral with the hub or secured thereto by any suitable means. These blades are disposed at opposite sides of the hub, with their axes parallel with the axes thereof and having their bases disposed in the same plane at right angles to the hub. As shown in the drawings, each of the blades has the form of a section of a cone and is defined by a curved base edge 8 and a pair of straight front edges 9 and 10, which converge from the ends of the base edge 8 to the apex 11 of the blade.

In the form illustrated in Figs. 1, 2, and 3 of the drawings the hub 5 is comparatively short and the edges 10 of the blades or portions of said edges are secured to the face of the hub along spiral lines, as indicated at 12—that is to say, the edges 10 of the oppositely-disposed blades are secured to the opposite sides of the hub, so that the front edges of the blades will lie in the same plane having a diametrical relation with the hub, as shown more clearly in Fig. 2, and in order to do this and at the same time effect a connection between the hub and a considerable portion of the adjacent edge of the blade it is necessary that the latter be secured to the hub along a spiral line. The result of this construction will be to produce a propeller whose blades are disposed with their working surfaces 13 faced in the same direction with reference to the direction of rotation and with an extended central clearance. This arrangement of the semiconical blades causes them to discharge the fluid with great freedom, which results in the development of high propulsive energy either when employed for forcing fluid under pressure or when being driven itself under fluid-pressure for the translation of such power.

In Fig. 4 I have illustrated a slightly-different form of propeller, the variation consisting in tilting the blades for the purpose of decreasing the central clearance between their apexes and by disposing their bases or

curved base-faces in angularly-related planes. It is obvious that in this form of the invention the blades are also connected to the hub along spiral lines and are disposed with their front faces in a common plane which passes through the axis of the hub.

In Figs. 5 and 6 I have illustrated still another variation which may be effected without departing from the spirit of my invention. In this form the blades are tilted to a still further degree to dispose their entire inner edges in spiral lines along the face of the hub, the central clearance being entirely eliminated and the bases of the blades being disposed in still greater angular relation.

It will be observed, however, that in each of the several forms of my invention which I have illustrated for the purpose of explaining a few of the many ways in which it may be embodied there are a number of common features—that is to say, each of these forms embodies a pair of blades having the form of a cone-section. Each embodies a hub to which the adjacent front edge of the blade is secured along a spiral line, and in each the front faces of a pair of diametrically opposed blades are disposed in the same plane, having a diametrical relation to the hub.

By experiment I have found that a propeller constructed in accordance with my invention is capable of developing greater power than a screw-propeller of the same diameter, the conditions under which the devices are operated being the same. I have also found that while a blade having the form of a cone-section is particularly effective its effectiveness is increased under some circumstances if the straight front edges thereof are disposed at an angle greater than ninety degrees with respect to each other. The meaning of this statement is made plain by Fig. 7 of the drawings, in which I have illustrated the manner of ascertaining the extent of this angular relation. The reason why this particular form of blade is most efficient is that in revolving it does not tend to retain the water as much as blades having their front edges disposed in more acute angular relation; but I do not wish to be limited to the use of blades having the form of any particular section of a cone or having their front edges disposed in any particular angular relation, nor to the use of a propeller having any definite number of blades, as it is evident that my invention in its broadest aspect resides in the provision of a propeller having blades formed as cone-sections and secured to the hub along spiral lines irrespective of the pitch of the blades.

It will be obvious that in some constructions the edges of the blades secured along spiral lines to the hub will extend from the base of the blade to the apex thereof, and in other constructions the edge directly opposed to the hub will only extend a short distance from the base. This variation will be neces-

sitated, of course, by the different inclinations of the blades or the change in pitch thereof, and while the edges 10 are generally straight the portions thereof in actual contact with the face of the hub may be cut out somewhat in order to produce the special form of attachment which is a material feature of the present invention.

From the foregoing it will be observed that I have produced a simple, ingenious, and effective propeller embodying a construction best calculated to effect the accomplishment of the several objects stated; but while the embodiments of my invention illustrated and described are believed at this time to be preferable I desire to reserve the right to effect such changes, modifications, and variations thereof as may be properly comprehended within the scope of the protection prayed.

What I claim is—

1. A propeller consisting of a hub, and blades each of which has the form of a cone-section, the adjacent edges of said blades being secured to the face of the hub along spiral lines.

2. A propeller consisting of a hub and blades having the form of cone-sections, the adjacent edges of said blades being secured to the hub along spiral lines to present the front edges of said blades in a common plane.

3. A propeller consisting of a hub and blades having the form of cone-sections and each defined by a curved base edge and by angularly-related inner and outer front edges, the inner front edges of said blades being secured to the face of the hub along spiral lines to present their outer front edges in planes disposed radially to the hub.

4. A propeller consisting of a hub and blades having the form of cone-sections, the adjacent corners only of the blades being secured to the hub along lines having an angular relation to the axis of the hub.

5. A propeller consisting of a hub and blades having the form of cone-sections, said blades being attached at their inner corners to the hub and having their axes parallel therewith.

6. A propeller consisting of a hub, and semi-conical blades disposed at diametrically opposite sides of the hub and secured to the face thereof along spiral lines, the axes of the semi-conical blades being in substantial parallelism with the hub.

7. A propeller consisting of a hub and blades, each of which has the form of a cone-section, one edge of each blade being secured to the face of the hub along a line having an angular relation to the axis of said hub.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM O. WHITNEY.

Witnesses:

H. E. DELONG,

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