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CURRENT-PROPELLED TURBINE

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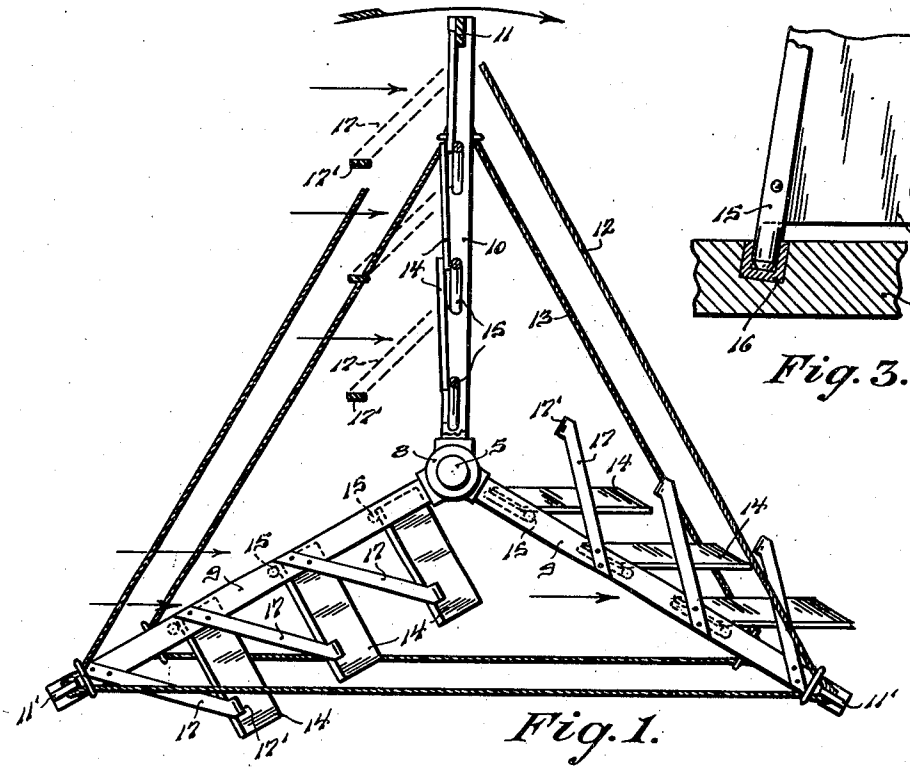


Fig. 1.

Fig. 3.

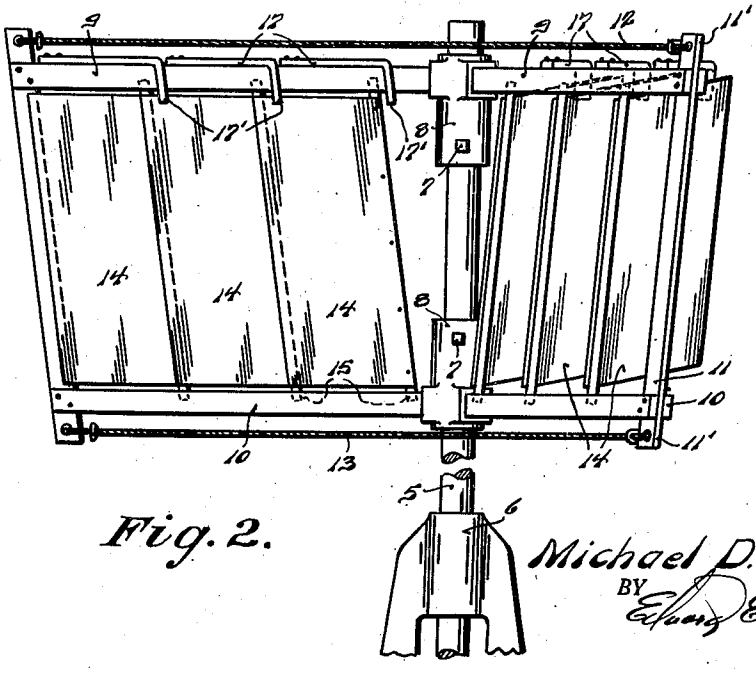


Fig. 2.

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CURRENT-PROPELLED TURBINE

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3 Claims. (Cl. 170—20)

This invention relates to motors of the character propelled by wind or water and has as its object the provision of a turbine arrangement capable of using the power of the current to a greater extent than has, in the class of simple swinging-vane current motors, been heretofore possible.

More specific objects and advantages of the invention will appear in the course of the following description.

The invention consists in the novel construction, adaptation, and combination of parts hereinafter described and claimed.

In the drawing:

Figure 1 is a top plan view of a current-propelled turbine constructed according to the present invention with a portion of one wing assembly shown in horizontal section.

Fig. 2 is an elevational view thereof looking in the direction of the current arrows of Fig. 1, the foot-supporting structure being broken away; and

Fig. 3 is an enlarged detail vertical section illustrating the manner by which the wings are pivotally mounted.

Designated by the numeral 5 in the drawing is a rotary vertical mast such as is conventionally employed as the driven member in a turbine of the character herein described, the lower end of the mast extending through the journal bearing 6 of a suitable foot support while the upper end, where more than the single tier of current-influenced wings which I illustrate are employed, may be connected by guys with suitable anchor posts. The arrangement in the manner shown, is that of a wind turbine, the vane assembly being suspended by the mast where used as a water motor.

Secured rigidly to the mast as by means of set screws 7 are a pair of hub members 8 providing circumferentially-spaced sockets for the reception of radial arms or spokes 9 and 10 which are arranged complementary to one another in pairs, three pairs being shown. Each of said arms is terminally slotted and fitting in the slots are vertical braces 11, the braces being desirably extended above and below the arm assembly to form cleat projections 11' through which stay ropes 12 and 13 are passed.

The described hub members, arms, braces and stay ropes constitute with the mast a truss for the support of a plurality of wings 14. These wings I shape to a rhomboidal plan configuration and preferably form the same from sheet metal with rods 15 being riveted or otherwise integrally attached to lie laterally of the wings, the rods projecting beyond the upper and lower edges of the wings and being pivotally received in bearing caps 16 sunk in the opposing faces of the complementary arms.

Describing the shape of these wings in more particularity, it will be noted that the rhomboidal shape is such as to define an acute angle between the wing's upper edge and the outer free edge and an obtuse angle between said free edge and the wing's lower edge, thus providing an overhang of the upper relative to the lower free portion of the wing which, in conjunction with the wing pivot which lies in inclined relation to the axis of the mast with the upper end farther from the mast axis than the lower end, provides a self-closing action of the wings into positions at which the same lie radially of the mast. In such normal closed positions, a slight overlap is provided as between the several associated wings of each pair of arms to prevent movement of the wings past the radial lines of the arms, the outermost wing of each series lapping its free edge over the brace 11. In order that this brace may be properly positioned to accommodate the lapping I extend the upper arm 9 of each pair of spokes radially beyond the lower arm 10, thus inclining the brace to an extent equivalent to the inclination of the wing's edge. For limiting the opening movements of the wings, brackets 17 which provide stop fingers 17' are attached to the arms 9.

The turbine, in operation, is driven under the pressure influence of wind or water current striking the face of the closed overlapping wings, the wings opening as the direction of travel opposes the current. By reason of the wing configuration providing an overhang of the upper free edge in conjunction with the inclination of the wing axis, the wings tend automatically to revert from open to closed positions, the result being that closure is effected considerably in advance of such point in their rotary travel as has previously been effected without mechanical means. Otherwise stated, while in prior simple turbines the wings which in open positions lie at an approximate 90° angle to the plane of the arms and correspondingly close under the influence of the current only at such time as the arms have passed slightly beyond a position at right angles to the direction of current, the wings in the present arrangement close approximately 30° in advance of this point. Where prior attempts have been made to advance the point of closure by limiting the opening angle, the major resistance to the current which is thereby developed as the wings travel in a direction opposing the current has more than

offset the advanced point of closure. A considerable advantage which is derived through the utilization of my wing arrangement is that the range of effective power-developing travel of the wings is in inverse proportion to the strength of the power current whereby to obtain an appreciable transmission of power with relatively weak power current.

No limitations are intended except as expressly set forth in the claims hereto annexed.

What I claim is:

1. A wing for a current-propelled turbine formed to a rhomboidal plan configuration and hingedly suspended for swinging movement about an axis inclined from the perpendicular to locate the outer extremity of the wing's free edge in overhanging relation to the inner extremity of the wing's hinged edge.

2. In a current-propelled turbine, the combination of a rotatable mast provided with horizontal arms radiating therefrom, a plurality of wings pivotally associated with each of said arms for swinging movement about axes inclined from the perpendicular into and from overlapping relation to one another, said wings being of a relative rhomboidal plan configuration with the pivotal axis of each wing lying proximate to and parallel with the inwardly sloping edge of the wing, said overlap of the wings acting to limit the travel thereof in the closing movement of the wings, and means for limiting the opening movement of the wings such that the travel thereof is confined to an approximate 90° movement.

3. In a current-propelled turbine, in combination with a rotatable mast provided with arms radiating therefrom and arranged in pairs, one arm above the other arm of a respective pair, a plurality of gate-forming wings hingedly mounted between the complementary arms of each of said pairs for opening and closing movements from and into the radial line of the arms, said wings overlapping one another in their closed position and thereby preventing passage of current between the same, the pivotal axis for the respective wings being inclined from the perpendicular to have the vertical weight center of the wings lie in closer proximity to the hinge axis at the upper than at the lower portion of the wing to gravitationally influence the wings into their closed positions, and means for limiting the travel of the wings in their opening movement.

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