March 22, 1938. M. P. SHACKELFORD 2,111,947

PROPELLER

Filed Aug. 20, 1935

Fig. 1.

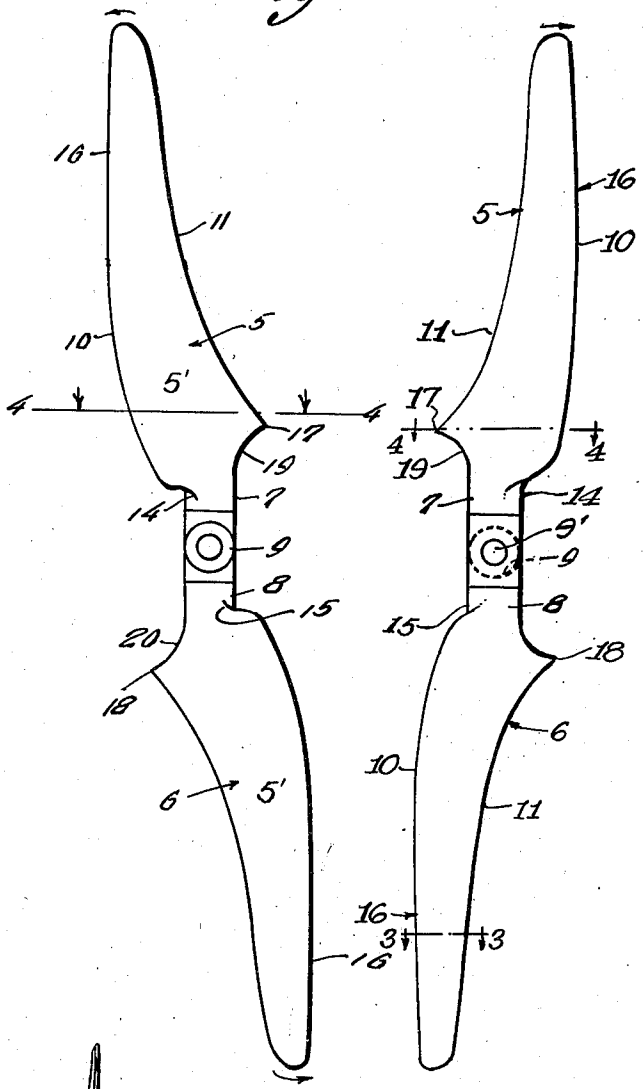
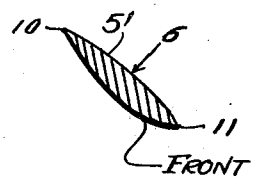


Fig. 2.

Fig. 3.



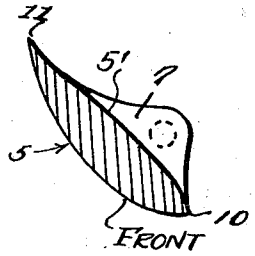
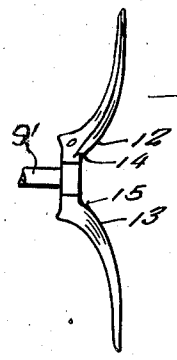


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE

2,111,947

PROPELLER

Marshal P. Shackelford, Livingston, Tex.

Application August 20, 1935, Serial No. 37,081

5 Claims. (Cl. 170—159)

My invention relates generally to a propeller or screw which is adapted for either air or water operation, and particularly to a propeller having bird-wing shaped blades designed to produce more equalized lift from tip to hub, and an important object of my invention is to provide a propeller of this character having increased aero-dynamic effect closer to the hub, so that the diametrical length of the blades may be reduced without decreasing the total aero-dynamic effect of the propeller.

Another important object of my invention is to provide a propeller having blades which graduate in thickness from the tips to the hub whereby increased strength as well as increased air displacement and aero-dynamic effect is achieved, the aero-dynamic effect being greatly increased at points close to the hub.

Another important object of my invention is to provide a propeller of the character indicated above which to a great extent takes the place of a changeable pitch propeller for use at different altitudes.

Other important objects of my invention will be apparent from a reading of the following description in connection with the drawing, wherein for purposes of illustration I have shown a preferred embodiment of the invention.

In the drawing:—

Figure 1 is a rear elevational view of the embodiment.

Figure 2 is a front elevational view.

Figure 3 is a transverse sectional view taken through Figure 2 approximately on the line 3—3 and looking in the direction of the arrows.

Figure 4 is a transverse sectional view taken through Figure 2 approximately on the line 4—4 and looking downwardly in the direction of the arrows.

Figure 5 is an edge elevational view of the embodiment.

Referring in detail to the drawing, the numerals 5 and 6 refer generally to the blades each of which has a shank 7, 8 immediately merging into and connected with the hub which is generally designated 9 and to which the shaft 9' of the propelling engine is connected. The numeral 10 indicates the leading edge and the numeral 11 indicates the trailing edge of each blade.

As shown in Figure 5 the radially outward portions of the fronts of the blades are in approximately the same plane, that is, a plane which traverses the axis of the propeller, but that the radially inward portions curve inwardly and backwardly as indicated by the numerals 12 and 13, this curvature terminating at the points 14 and 15 adjacent the shanks. It will be recognized that the most forward boundaries of the blades in Figure 5 are the leading edges 10 of the blades, while the rearwardmost boundaries of the blades are the trailing edges 11.

The axis of the blades is displaced with respect to a diametrical line through the longitudinal extension of the shanks.

The leading edge 10 has a comparatively straight portion 16 which is graduated and curved more markedly as the hub is approached until the point 14 is reached, in the case of the blade 5, and the point 15 in the case of the blade 6, a sharply inturned portion forming a junction with the respective side of the shanks 7 and 8. It is to be observed that the axes of the blades are arranged at an angle to the longitudinal extension or axis of the shanks 7 and 8; so that the blades are properly described as displaced with respect to the axis of the propeller shaft, and both axially and circumferentially with respect to the shanks.

The trailing edges 11 follow roughly the curvature of the leading edges 10, but the trailing edges are shorter and terminate at the points 17, 18 so as to provide a relatively wide blade surface at this point of the blade and close to the hub. The trailing edges are from the points 17 and 18 cut sharply and curvedly inwardly to meet the adjacent sides of the shanks 7 and 8 at points which are radially outwardly displaced with respect to the points 14 and 15.

Each blade is flat and thin at its tip but becomes thicker and wider in a graduated manner as far as the points 14 and 17 and 15 and 18, respectively, where the blades are the thickest, as generally indicated in Figures 3 and 4.

The long leading edges are curved in the graduated manner spoken of from the tips toward the hub to enable the blade to act upon more air or water at a point close to the hub, so as to increase the pull or lift near the hub of the propeller. The trailing edge is curved in a similar manner and is more curvedly graduated and shorter, so as to compress the air backwardly and outwardly as it flows through the propeller, so as to increase the purchase or aero-dynamic lift effect at points close to the hub, which cannot be achieved with ordinary straight bladed propellers.

The purpose of the curved blade displaced as described and having the curvature and cross-section shown is to give a greater length to the

blade without causing it to reach out as far from the hub as would ordinarily be required, so that the aero-dynamic effectiveness of the propeller is brought closer to the hub, and greater aero-dynamic efficiency is obtained from a propeller in accordance with the present invention from the same motive power.

The blades are also graduated in thickness and width from the tips to the hub for the double purpose of increasing the strength of the blade as well as their air displacing and aero-dynamic effect near the hub. The pitch of the blades is also graduated from a very flat pitch at the tips of the blades to a steep pitch near the hub, so as to crowd the air to a greater extent around the hub. The body of the blade is so shaped as to have a graduated pitch on the working surface 5' extending from the trailing edge to the leading edge as shown in Figure 3. The exact degrees of pitch will be determined by the size of the propeller and other well known factors.

Although I have shown and described herein a preferred embodiment of my invention, it is to be definitely understood that I do not desire to limit the application of the invention thereto, and any change or changes may be made in the materials, and in the structure and arrangement of the parts, within the spirit of the invention and the scope of the subjoined claims.

What is claimed is:—

1. A propeller of the character described comprising a hub portion, axially aligned shanks extending from opposite sides of the hub, a bird-wing shaped blade extending radially outwardly from each shank and displaced axially and circumferentially with respect to the axis of the hub, each blade having forwardly curved leading and trailing edges, the leading edge being longer than the trailing edge and said trailing edge terminating in a circumferentially extending wing acting to crowd the air close to the hub of the propeller, said wing extending away from the leading edge.

2. A propeller of the character described, said propeller comprising a hub, shanks projecting radially outwardly from opposite sides of said hub, blades fixed on the outer ends of said shanks, said blades curving forwardly and radially outwardly with respect to the axis of the propeller, the portion of the blades nearest the shanks being wider and more abruptly curved than radially outlying portions of the blades, the first mentioned portion having a part extending axially rearwardly beyond the shank.

3. A propeller of the type described, said propeller comprising a hub having comparatively small cross section, shanks extending from opposite sides thereof, a blade on the radially outward end of each shank, each blade comprising a portion curved abruptly forwardly and outwardly with respect to the axis of the propeller immediately adjacent the shank, said portion being relatively wide and large in cross section compared to the shank and the remainder of the blade, said portion being relatively acutely pitched and including a wing extending in a lateral and axially rearward direction beyond the rear and side of the shank.

4. A propeller of the type described, said propeller comprising a hub having comparatively small cross section shanks extending from opposite sides thereof, a blade on the radially outward end of each shank, each blade comprising a portion curved abruptly forwardly and outwardly with respect to the axis of the propeller immediately adjacent the shank, said portion being relatively wide and large in cross section compared to the shank and the remainder of the blade, said portion being relatively acutely pitched and including a wing extending in a lateral and rearward axial direction beyond the rear end side of the shank, the said remainder of the blade decreasing in an outwardly direction in pitch, cross section, width and forward curvature.

5. A propeller of the type described, said propeller comprising a hub having comparatively small cross section shanks extending from opposite sides thereof, a blade on the radially outward end of each shank, each blade comprising a portion curved abruptly forwardly and outwardly with respect to the axis of the propeller immediately adjacent the shank, said portion being relatively wide and large in cross section compared to the shank and the remainder of the blade, said portion being relatively acutely pitched and including a wing extending in a lateral and rearward axial direction beyond the rear and side of the shank, the said remainder of the blade decreasing in an outwardly direction in pitch, cross section, width and axially forward curvature, the radially outward extremity of said blade being comparatively flat.

MARSHAL P. SHACKELFORD.