May 11, 1937. W. LILY 2,080,224

PROPELLER

Filed June 26, 1934

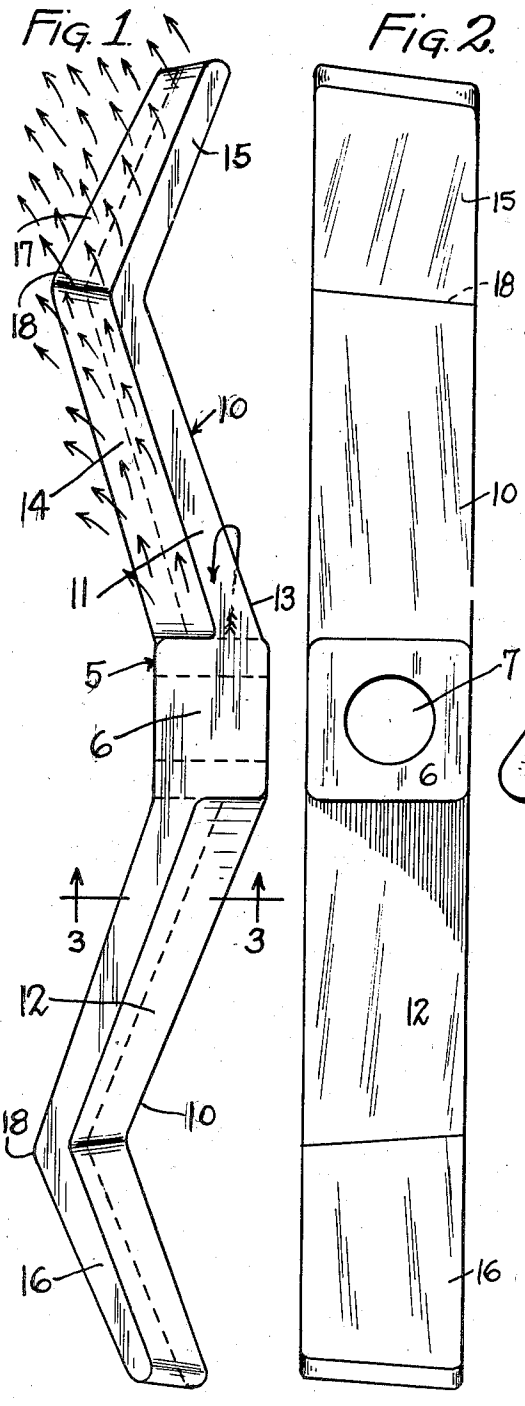


Fig. 1.

Fig. 2.

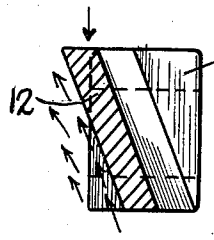


Fig. 3.

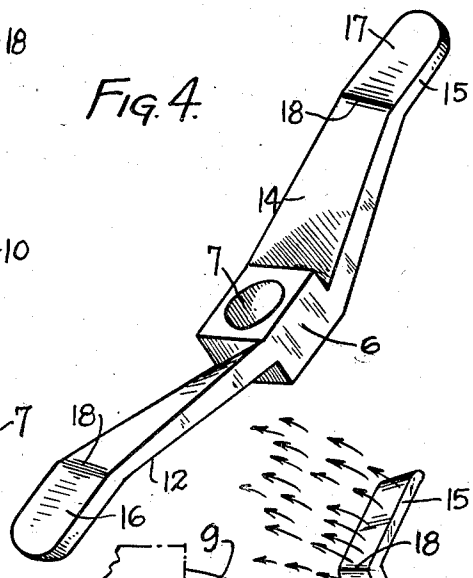


Fig. 4.

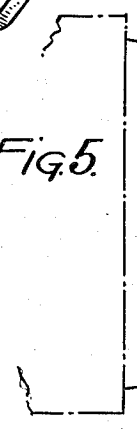
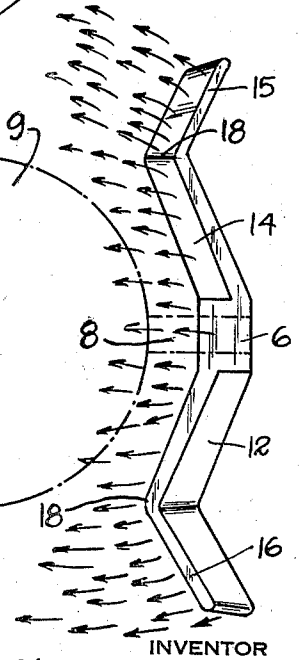


Fig. 5.



INVENTOR

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PROPELLER

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Application June 26, 1934, Serial No. 732,400

1 Claim. (Cl. 170—159)

This invention relates to propellers and in particular to a novel construction thereof which increases the efficiency in operation and consequently consumes less power in its operation.

An important object of my invention is to so construct a propeller particularly adapted for air use that the air is accumulated at the outer ends of the blades thereof on specially constructed surfaces so that the thrust or pulling power of the propeller is materially increased over the present type propeller.

A still further object of my invention is to provide a propeller the principles of construction, of which may be readily incorporated in water propellers, air fans, and all types of air craft propellers whether used for operating a plane or sustaining it in air as a helicopter.

A still further object of my invention is to construct a propeller so that parts of the blades thereof are disposed at two different angles to each other so that the air in back of the blades is urged outwardly by a centrifugal force which is imparted to the air by the angularity of the blade. In the regular type of propeller as employed the air behind the propeller has a centripetal action, that is, it tends to seek the center of rotation where the air movement is slowest and the result is that a solid air column is not built up behind the propeller. In my device I force the air outwardly by centrifugal action so that an air column of greater diameter than the propeller itself is built up behind the propeller and acts upon the outer ends of the propeller blades to provide a greater thrust. In the ordinary type of propeller, the outer ends are considered ineffective as driving parts, the tips of the blades only acting as air cutters.

Another object of my improved propeller construction is the reduction of the drag, and vacuum at the back of the blades and also to free the inner ends of the blades of compression friction and thereby reduce parasitic resistance, all of which tend to render a propeller inefficient and with the particular angular arrangement of my blades I am able to increase the efficiency of the propeller and at the same time use one of smaller diameter to obtain greater thrust or pulling power. I have found in operation that my new type propeller is capable of developing more pulling power than the propellers in present day use.

Changes and variations may be made in the construction shown and described without departing from the principles of the invention or sacrificing its chief advantages; hence such invention is not to be confined to the structure shown in the accompanying drawing in which;

Figure 1 is a top plan view of a propeller constructed in accordance with my invention, showing the arrangement of the blade angles employed.

Figure 2 is a view looking from the front of the propeller illustrated in Figure 1, the propeller being in vertical position.

Figure 3 is a section taken on the line 3—3 of Figure 1 showing the angular disposition of one of the blades in relation to the hub of the propeller.

Figure 4 is a view in perspective of the propeller showing the rear side thereof or side that is to the left in Figure 1, and gives a visual idea of the appearance of the propeller, and

Figure 5 is a view employed to illustrate the column of air that is larger than the diameter of the propeller, the engine being illustrated in outline.

Referring to the drawing in detail, 5 indicates the propeller having the usual hub 6 bored as at 7 to provide a means of mounting the propeller on a driving shaft which in Figure 5 is indicated as at 8, and may be operated by the engine 9. The propeller comprises the oppositely disposed blades 10 each having inner and outer blade portions. The inner blade portions at the opposite sides of the hub or median line of the propeller are indicated as 11 and 12. The front of the propeller or the side away from the front end of the engine is indicated by 13. The inner portion 11 of the blade is disposed at a downwardly and rearwardly sloping angle (as viewed in Figure 1) starting at the upper forward corner of the hub 6 and terminating at the lower rear corner thereof, thus providing a flat angularly disposed blade surface 14 behind which air accumulates as the propeller revolves in the direction indicated by the arrow in Figure 1.

As each blade is of the same construction, it is believed that a description of one and its air properties will suffice. Beyond the inner portion 11, the blade is bent or formed at an obtuse angle to provide the outer blade portion 15, the outer portion of blade part 12 being indicated by the numeral 16. What is meant by each blade being the same is that it is the same when viewed at the upper part of Figure 1 and has the same air cutting tendency and building up characteristics, but as viewed in the lower half of Figure 1 the blade is sloped downwardly and forwardly.

Each blade is thicker nearest the hub for strength and while shown with squared ends the

blades may be rounded on their outer ends if desired and the hub may be rounded. The vertex of the obtuse angles made by the meeting surfaces 14 and 17 of the blade portions 11 and 15, and identified by the numeral 18 is the point at which the air is held against moving toward the center of the propeller by reason of the angle of direction that the outer part of the blade takes beyond the vertex. This part of the blade builds up the pressure and the thrust on the blade becomes greater in this outer portion and greater efficiency is developed.

The column of air that is built up behind the propeller as indicated in Figure 5 is larger in diameter than the propeller itself, but the air pressure around the center of the propeller is much less than about the outer parts thereof with the result that back drag is reduced and further, the air column behind the propeller being larger does not taper to a point as does the column of air behind the regular propeller now in use.

It is evident that the propeller as constructed may be employed with an engine turning left or right without necessitating any change in construction and may be used in tandem at both ends of an engine with equal effect.

It is also evident that the propeller blades may be sharpened both on the front and rear edges to produce a blade that has a streamline effect and while being shaped lengthwise as described is cross sectional in shape in the same manner as the present ones.

What I claim is:

A propeller of the character described comprising a rectangular hub portion and blades extending from said hub, the inner and outer portions of each of said blades being disposed at an obtuse angle to each other, the leading edge and rear edge of said blades extending from diagonally opposite corners of the hub portion and said inner portions extending rearwardly at an angle from the face of the hub.

WILLIAM LILY.