July 31, 1934. B. SMITH 1,968,227

AIRCRAFT

Filed April 8, 1933

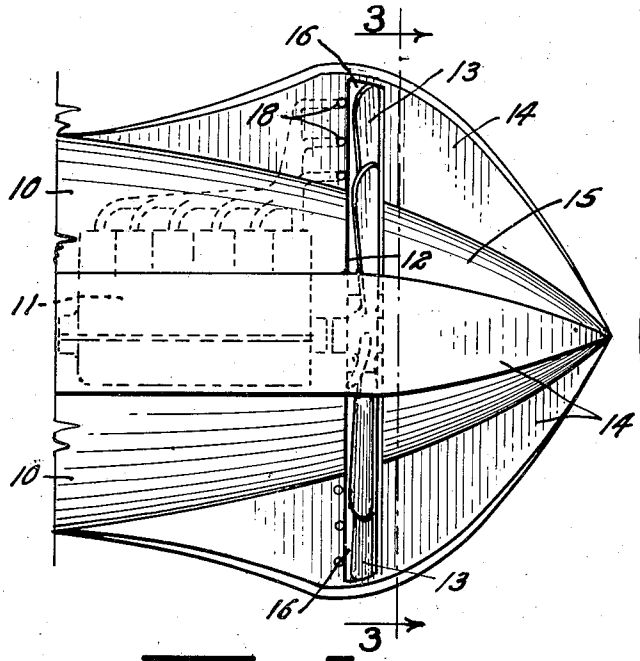


Fig. 1

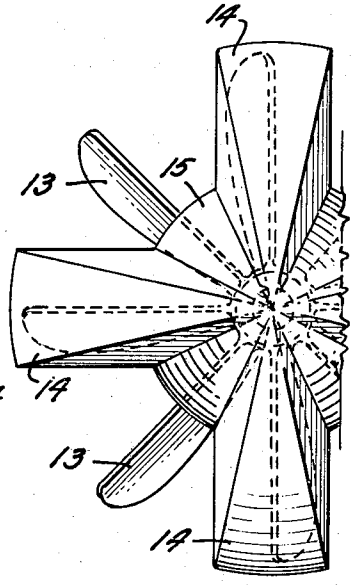


Fig. 2

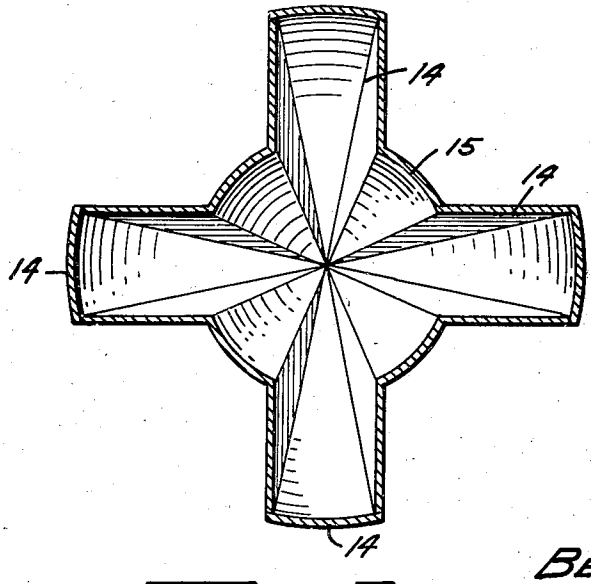


Fig. 3

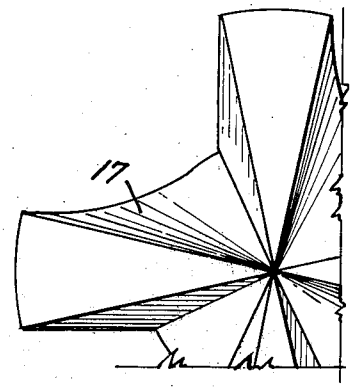


Fig. 4

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7 Claims. (Cl. 244—14)

This invention relates to a method and means for increasing the efficiency of air craft propellers. It is well known that the axial portion of a propeller has very little or no propelling effect. This is due to the fact that the rotative speed of this portion through the air is relatively low, and also due to the fact that structural requirements prevent an effective blade design at the hub portion of the propeller. Since no propelling effect is being obtained from this axial or hub portion, it, of course, is creating a resistance to passage through the air, and instead of being of any assistance, is an actual detriment to the progress of the ship. One of the principal objects of the present invention is to provide a construction which will prevent the axial or hub portion of a propeller from creating resistance to the progress of the ship.

It is also a well known fact that the principal propelling effect of a propeller is obtained from the portion of the blades adjacent their extremities. The extreme blade portions are of course moving more rapidly through the air than the inner portions of the blade and their effective result is proportionately increased. This result can be still further increased if means can be provided for increasing the density of the air in the zone in which the extreme portions of the propeller blades travel. Another object of the present invention is to accomplish the above by compressing the air which normally creates resistance on the hub portion of the propeller outwardly into the peripheral area in which the extreme portions of the propeller blades travel.

Loss of efficiency of a propeller is also attributable to the fact that air is a very free flowing medium, and that the propeller blades in rotating cause the adjacent air to whirl with them. This whirling air has little or no reactive propelling effect. Another object of the present invention is to provide means which act to reduce the whirling of the air in the propeller zone so that the majority of the air will be held in place for direct reactance upon the propeller blades so as to exert useful propelling action.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 is a side elevation illustrating the forward extremity of a typical fuselage or motor gondola of an air craft, illustrating a propeller hood of novel design applied thereto to accomplish the above objects of the present invention.

Fig. 2 is a fragmentary front elevation of the construction of Fig. 1.

Fig. 3 is a cross section through the hood of Fig. 1, taken on the line 3—3, Fig. 1.

Fig. 4 is a fragmentary front elevation of an alternate form of hood.

The principal objects of the present invention are attained by forcing the air outwardly from the axial portion of the air stream, so as to create a circle of relatively dense air adjacent the extremities of the propeller blades, and by providing means for preventing this circle of relatively dense air from rotating with the propeller, so that a direct rearward push may be obtained therein.

The above might be accomplished with various constructions, one construction for accomplishing it being illustrated in the drawing, in which, the forward extremity of a typical fuselage or motor gondola is illustrated at 10. A typical motor in indicated within the fuselage 10 in broken line at 11. The motor 11, of course, may be of any desired type and is only indicated diagrammatically on the drawing.

The forward extremity of the fuselage 10 terminates in a flat transverse drum like end 12 immediately in front of which the blades 13 of a propeller are rotated by means of the engine 11. A series of longitudinally extending, pointed ribs 14 support a conical, stream-lined hood 15 immediately in front of the propeller blades 13. The ribs 14 are provided with lateral passages 16 through which the extremities of the blades 13 pass as they revolve. The ribs 14 are also stream-lined so as to create a minimum of air resistance, and taper to the pointed extremity of the hood 15.

These ribs may be constructed in any desired manner, for instance, they may be formed of relatively thin light sheet material integrally with the hood 15, as shown in Fig. 3. Any desired number of ribs may be employed and any desired number of propeller blades 13 may be employed. As illustrated, there are four equally spaced, relatively wide ribs 14 supporting the hood 15, and there are eight, equally spaced propeller blades 13. With this construction, four of the propeller blades will be exposed between the ribs while the remaining four are concealed within the ribs 14.

The above construction operates as follows: as the air craft moves forwardly in the air, the axial, slip stream will be separated by the streamlined point of the hood 15 and directed outwardly and rearwardly between the ribs 14. Thus, between each pair of ribs 14 there will be a volume of relatively dense air. This air is prevented from whirling by the ribs 14 and forms a comparatively solid unyielding mass against which the pressure faces of the blades 13 can strike with a firm impact as they move out of the protected zones of the ribs 14.

With this construction we have eliminated the drag or resistance of the hub portion of the propeller; have increased the compression or density of the air against which the effective portions of the propeller react; and have eliminated the lost power occasioned by the whirl of the slip stream of the usual propeller. The blades, in moving through the protected area of the ribs, require but a minimum of power and lessen the load on the engine. This allows them to accelerate before they enter the high compression air channels.

We therefore have an ideal condition. Blades impacting at a high velocity into an area of highly compressed air maintained in an effective position for reaction upon the blades. This greatly increases the tractive efficiency of the propeller, the speed of the aircraft and its climbing qualities without requiring a proportionate increase in engine power.

The blades 13 are, of course, subjected to an instant impact and strain the moment they leave the protection of the ribs 14. If desired, this strain may be lessened by forming the ribs, as illustrated in Fig. 4. In this construction, each rib is provided with an outwardly extending or inclined side 17 on the exit or outgoing side of the rib. This allows the blade to enter more gradually into the high compression channel and places the strain thereon more gradually.

The effects of the above construction become more apparent as the aircraft accelerates through the air to increase the pressure in the compression channels between the ribs. If desired, an area of compression may be immediately created between the ribs for "take-off" purposes by positioning a series of compressed air orifices 18 in the ribs and connecting these orifices to a source of compressed air or to the exhaust of the engine 11. With this construction, streams of compressed air or compressed gases are projected into the propeller zone between the ribs 14 so as to provide an initial compression zone to increase the initial tractive effect of the propeller. This increases the climbing angle of the ship by proportionately increasing its acceleration and allows a "take-off" to be made in a relatively short distance.

The discharge from the orifices 18 can also be employed while flying to increase the pressure in the pressure passages between the ribs and proportionately increase the speed of the ship.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:—

1. An engine and propeller housing construction for aircraft, comprising: an engine housing having a lesser forward area than the rearward area thereof; a relatively flat head truncating the forward extremity of said housing; a conical-like hood positioned forwardly of said housing in spaced relation to said head substantially in surface alignment with said housing; a series of ribs projecting outwardly from said housing and from said hood; a propeller mounted to rotate between said hood and said head, the blades thereof being sufficiently long to project beyond the latter, said ribs being apertured for the passage of said blades.

2. A hood for aircraft propellers comprising: a truncated, conical member; relatively closely spaced ribs extending outwardly from said member; and means for maintaining said member stationary ahead of the hub portion of a propeller, said member having a lesser diameter than said propeller, said ribs extending outwardly beyond the diameter of said propeller so as to confine the air entering the propeller zone into relatively closely spaced channels.

3. A hood for aircraft propellers comprising: an axial portion which will cover the hub portion of a propeller; and spaced apart portions which will completely cover the blades of said propeller at spaced apart points during its revolution.

4. An aircraft propeller housing comprising: a conical hood centrally positioned in front of said propeller; a body member in the rear of said propeller, the surfaces of said conical member and said body member lying substantially in alignment; a series of relatively wide ribs formed on said conical member; a series of similar ribs formed on said body member, said ribs being connected beyond the periphery of said propeller so as to continue thereover, each rib being of greater width than the width of the blades of said propeller so as to completely shield the latter from the air stream.

5. An aircraft propeller housing comprising: a conical hood centrally positioned in front of said propeller; a body member in the rear of said propeller, the surfaces of said conical member and said body member lying substantially in alignment; a series of relatively wide ribs formed on said conical member; a series of similar ribs formed on said body member, said ribs being connected beyond the periphery of said propeller so as to continue thereover, each rib being of greater width than the width of the blades of said propeller so as to completely shield the latter from the air stream, each of said ribs tapering to a point substantially coincident with the apex of said conical member.

6. An aircraft propeller housing comprising: a conical hood centrally positioned in front of said propeller; a body member in the rear of said propeller, the surfaces of said conical member and said body member lying substantially in alignment; a series of relatively wide ribs formed on said conical member; a series of similar ribs formed on said body member, said ribs being connected beyond the periphery of said propeller so as to continue thereover, each rib being of greater width than the width of the blades of said propeller so as to completely shield the latter from the air stream, each of said ribs tapering to a point substantially coincident with the apex of said conical member, the ribs of said body member being reduced in stream line curve to fit into the apex thereof.

7. An aircraft propeller housing comprising: a conical hood centrally positioned in front of said propeller; a body member in the rear of

said propeller, the surfaces of said conical member and said body member lying substantially in alignment; a series of relatively wide ribs formed on said conical member; a series of similar ribs formed on said body member, said ribs being connected beyond the periphery of said propeller so as to continue thereover, each rib being of greater width than the width of the blades of said propeller so as to completely shield the latter from the air stream, said ribs coinciding in number with the number of blades on said propeller.

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