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L. E. REID

2,292,089

PROPELLER

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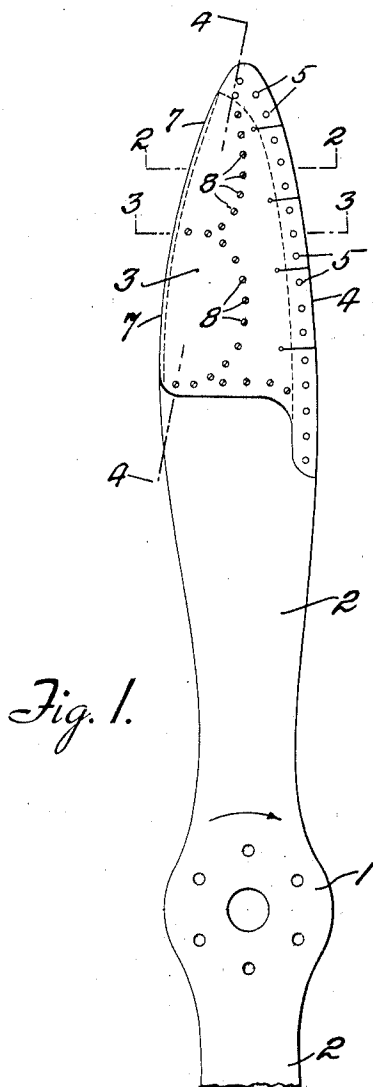


Fig. 1.

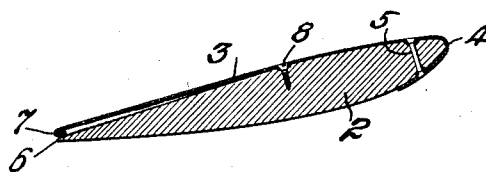


Fig. 2.

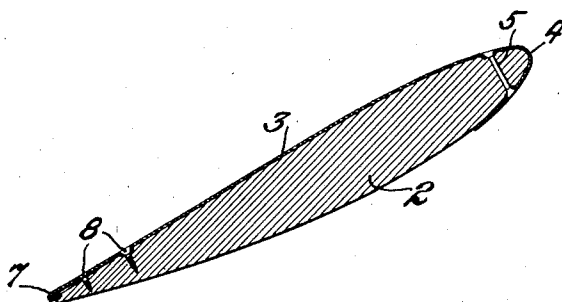


Fig. 3.

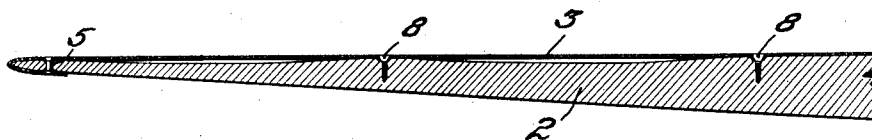


Fig. 4.

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UNITED STATES PATENT OFFICE

2,292,089

PROPELLER

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6 Claims. (Cl. 170—161)

This application relates to improvements in propellers particularly for use on aeroplanes.

In my prior U. S. Patent No. 2,126,813 granted August 16, 1938, I disclosed and claimed improvements relating to change of the effective pitch of the blades under varying conditions of operation. The present invention is directed particularly to overcoming shocks and vibration by the provision of automatic cushioning means on the blades which results in a more uniform air flow over the surfaces of the blades. In this manner the efficiency of the propeller is increased, the motor speed is maintained more uniform and the efficiency of the aeroplane and its speed are increased. This is accomplished by providing one or more yieldable panels on the pressure face of the blades which serve as shock absorbers when the air inflow is choppy or variable, when changing the direction of the plane, or when banking, or during climbs or dips. The vibration of the propeller blades is thereby greatly reduced and the smoothness of operation is increased. Another object and advantage of the invention is to provide a simple, rugged and durable form of structure which may be conveniently assembled at comparatively low cost. Other objects and advantages will be understood from the following description and accompanying drawing which illustrates a preferred embodiment of the invention.

Fig. 1 is a face view of the improved propeller blade showing the pressure face thereof; Fig. 2 is an enlarged section on the line 2—2 of Fig. 1; Fig. 3 is an enlarged section on the line 3—3 of Fig. 1; and Fig. 4 is an enlarged section on the line 4—4 of Fig. 1.

The hub 1 of the propeller is shown having a central opening for receiving the driving shaft and carries the blades, only one of the blades being shown in full. Each blade is formed of a body or core 2, preferably of wood and integral with or otherwise united with the hub. On the pressure face of each blade is mounted a flexible sheathing, preferably of sheet metal which provides surfaces which are yieldable under change in air pressure. This sheathing may be in the form of one or more panels 3, one such panel being shown in the drawing at the outer portion of the blade. The sheathing is shown as curved around and embracing the leading edge 4 of the blade, being firmly secured thereto by rivets 5. The sheathing extends from the leading edge over the pressure face of the blade to the thin trailing edge 6 of the blade. It extends along and terminates at or near the trailing edge. The

sheathing is displaced outwardly from the face of the body as it approaches the trailing edge and at that edge is turned over and bent inwardly to form an edge 7, as shown in Fig. 2, so as to rest against the pressure face at the trailing edge. The bent in edge is preferably made narrow so as to maintain a thin trailing edge.

It has been found by tests that the vibration is minimized and greater smoothness of air flow obtained by providing other or additional fastening means for the sheathing by screws 8 which pass through the sheathing and engage the body of the blade. These screws are shown in Fig. 1 in the general form of two semi-circles which adjoin each other at the trailing edge for the purpose of providing a stiff support at the middle and at the ends of the panel, thus providing rigid supports at displaced portions of the sheathing along the trailing edge as well as at inner intermediate portions of the sheathing. As shown in Figs. 2 and 4 the body of the blade is slightly hollowed out in portions within the rows of screws 8 so as to provide shallow spaces for the flexing of the sheathing within the rows of fastening screws and along the trailing edge.

In operation, under changing conditions of air flow and pressure against the blade, the sheathing will yield and move inwardly toward and away from the body of the blade, particularly at and near the trailing edge. Thus the sheathing forms a cushion or shock absorber for changes in air pressure against the blade thereby minimizing the vibration of the blade and giving more uniformity of pressure against the blade under changing conditions of air currents and during the various manipulations of the plane. It has been found that this results in maintaining a more uniform speed of the driving motor and increases the efficiency and speed of the plane.

Any desired number of these panels may be provided for the blade and although the sheathing shown and described is in the form of a single sheet, it could be sub-divided into sections. Likewise the trailing edge of the sheathing could be of other form than of the hook form shown and the fastening means could be otherwise arranged without departing from the scope of the invention. Likewise instead of forming one or more shallow depressions in the body of the blade, the spacing of the sheathing from the blade could be otherwise obtained by displacing the sheathing outwardly from the body of the blade, one way of accomplishing this being indicated by the hooked edge 7 of the sheathing.

Various other modifications may be made without departing from the scope of the invention.

I claim:

1. A propeller blade comprising a blade body, a yieldable metal sheathing on the pressure face of said body extending to and along and terminating at the trailing edge of said body, said sheathing in itself forming cushioning means and being spaced from the pressure face of said body and adapted to yield towards and away from the body of the blade under change of pressure against the sheathing, and means for fixedly securing the sheathing to said body at portions only of the periphery of the sheathing.

2. A propeller blade comprising a blade body, a yieldable metal sheathing on the pressure face of said body extending to and along and terminating and yieldingly supported at the trailing edge of said body, said sheathing in itself forming cushioning means and being spaced from the pressure face of said body and adapted to yield towards and away from the body of the blade under change of pressure against the sheathing, and means for fixedly securing the sheathing to said body at portions only of the periphery of the sheathing.

3. A propeller blade comprising a blade body, a yieldable sheathing on the pressure face of said body extending to and along and terminating at the trailing edge of said body, said sheathing in itself forming cushioning means and having an inwardly turned edge towards said body at the trailing edge of the body for yieldingly supporting the sheathing and for spacing the sheathing from said pressure face, and means for fixedly securing the sheathing to said body at portions only of the periphery of the sheathing.

4. A propeller blade comprising a blade body, a yieldable metal sheathing on the pressure face of said body extending to and along and termi-

nating at the trailing edge of said body, said sheathing in itself forming cushioning means and being spaced from the pressure face of said body and adapted to yield towards and away from the body of the blade under change of pressure against the sheathing, and means for fixedly securing the sheathing to said body at displaced portions only along the trailing edge and at other portions of the sheathing.

5. A propeller blade comprising a blade body, a yieldable metal sheathing on the pressure face of said body extending to and along and terminating at the trailing edge of said body, said sheathing in itself forming cushioning means and said body having a shallow depression under said sheathing for permitting said sheathing to yield towards and away from the body of the blade under change of pressure against the sheathing, and means for fixedly securing the sheathing to said body at portions only of the periphery of the sheathing.

6. A propeller blade comprising a blade body, a yieldable metal sheathing on the face of said body extending to and along and terminating at the trailing edge of said body, said sheathing in itself forming cushioning means and being spaced from the pressure face of said body and adapted to yield towards and away from the body of the blade under change of pressure against the sheathing, and means for fixedly securing the sheathing to said body at displaced portions only along the trailing edge and at other portions of the sheathing, the securing of the sheathing at said other portions being in a line of a general curved form extending inwardly from one of said displaced portions and curved to return to another of said displaced portions to form a yieldable surface within the curved line.

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