April 7, 1931. C. H. GUNN 1,799,745

AIRPLANE PROPELLER BLADE

Original Filed Dec. 1, 1928

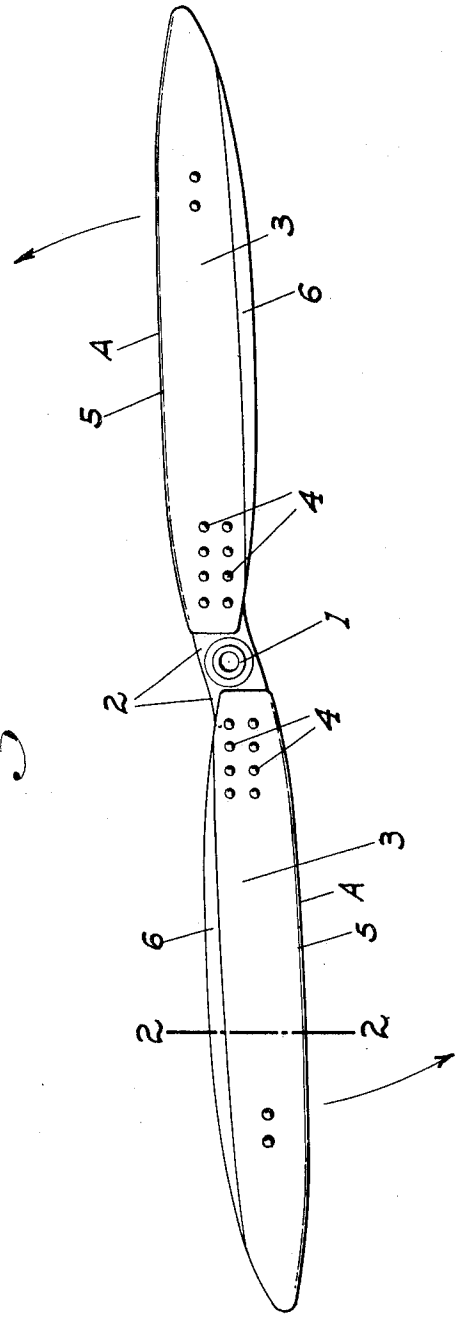


Fig. 1

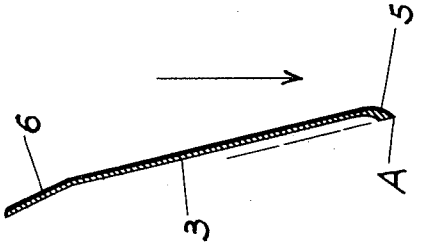


Fig. 2

INVENTOR

C. H. Gunn

BY

ATTORNEY

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UNITED STATES PATENT OFFICE

CHARLES H. GUNN, OF SAN MATEO, CALIFORNIA, ASSIGNOR TO AIRCRAFT SPECIALTIES COMPANY, OF SAN MATEO, CALIFORNIA, A CORPORATION

AIRPLANE PROPELLER BLADE

Original application filed December 1, 1928, Serial No. 323,054. Divided and this application filed July 1, 1929. Serial No. 375,060.

This invention relates to propeller blades for airplanes and is a division of my co-pending application for patent, Serial No. 323,054, filed December 1st, 1928, on an airplane propeller.

The principal object of the present application is to provide blades for the purpose so constructed that they will have considerably greater efficiency than the usual form of blade, as has been actually demonstrated by comparative tests.

A further object is to construct the blade so that the efficiency increasing feature aids in strengthening and bracing the blades so that they may be made relatively light and still have ample strength.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a front elevation of my improved blade as mounted in connection with a propeller.

Fig. 2 is an enlarged cross section of the blade taken on the line 2—2 of Fig. 1.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes the supporting hub of the blades—a metal member suitably bored and key-slotted to receive the end of the engine drive shaft in the usual manner. Formed with the hub and projecting radially therefrom are flat arms 2 set at acute angles relative to the axis of the hub. The propeller blades 3 of suitable size and peripheral contour are made of relatively thin metal of even thickness throughout and are removably secured against the outer faces of the arms 2 by a number of bolts 4.

To further stiffen the blades and also to add to the efficiency thereof, the leading edge of each blade (which is substantially straight from end to end) is provided throughout its extent with a relatively small lip or flange 5 which is turned toward the back of the blade. The rear face of this lip is flat and parallel to the main face of the blade, and forms a sharp air cutting edge A with the curved outer surface of the blade along its leading edge.

The blade is also bent on a slight angle toward the back face thereof for practically its full length and some distance from the following edge to form a stiffening and air banking or deflecting flange 6 whose transverse width is considerably greater than that of the lip 5.

By reason of the cross sectional shape of the blades it will be seen that the blades may be made quite thin and so will be relatively light, while having ample strength to resist distortion and buckling when in operation.

The main pitch of the blade, which is governed by the angle or pitch of the arms 2, is of course determined from the known speed of the engine in conjunction with the accepted mathematical formula, and the efficiency of the blades with such pitch is greatly enhanced by the peculiar cross sectional shape above described. The leading edge of each blade engages and cuts cleanly through the air at an angle to a vertical plane by reason of the sharp edge A; and this air passing by the flat surface of the flange or lip 5 will then rebound sharply against the back surface of the blade beyond the lip, which acts to provide a good frictional grip of the blade with the air and greatly increases its propulsive efficiency by lessening the slip. The backwardly angled flange 6, catching such air with the rotary advancing movement of the propeller has a tendency to bank this air and deflect the same rearwardly, also giving greater propulsive efficiency. Also this flange, bending as it does away from the front face of the blade and consequently deflecting even further from a vertical plane than the main portion of the blade, offers practically no resistance to the air in front of the propeller and this feature also has its effect in increasing propeller efficiency.

As a result of this construction I have found from actual trials in the air that the

efficiency of my blade over one of ordinary type, used with the same engine and airplane, showed an increase of approximately 15%.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention as defined by the appended claims.

Having thus described my invention what I claim as new and useful and desire to secure by Letters Patent is:

1. In an airplane propeller, a blade of substantially even cross section throughout; the leading edge of the blade being formed with a relatively small lip turned back from the front face of the blade and whose rear face is substantially parallel to the main surface of the blade.

2. In an airplane propeller, a blade of substantially even cross section throughout; the leading edge of the blade being formed with a relatively small lip turned back from the front face of the blade, and its following edge being bent backwardly for substantially its full length at an acute angle to the forward face of the blade to form a flange of great transverse width relative to the width of the lip.

3. In an airplane propeller, a blade of substantially even cross-section throughout; the front face of the blade along its leading edge being formed with a rearward curvature while the back face of the blade along said leading edge is substantially parallel to but rearwardly of the main blade surface to meet said curvature and form a sharp edge therewith.

In testimony whereof I affix my signature.

CHARLES H. GUNN.