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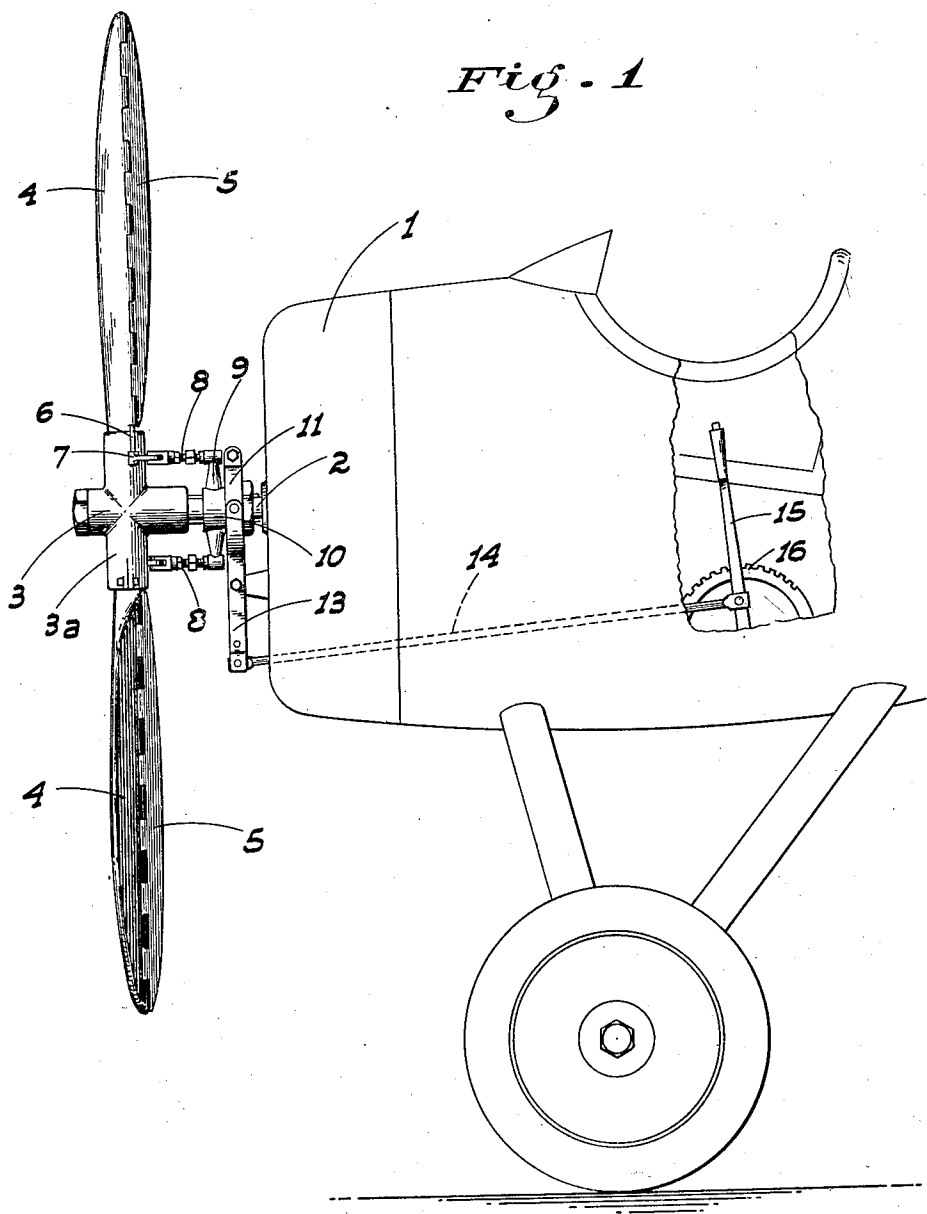
A. E. MILLER ET AL
VARIABLE CAMBER PROPELLER

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2 Sheets-Sheet 1

Fig. 1



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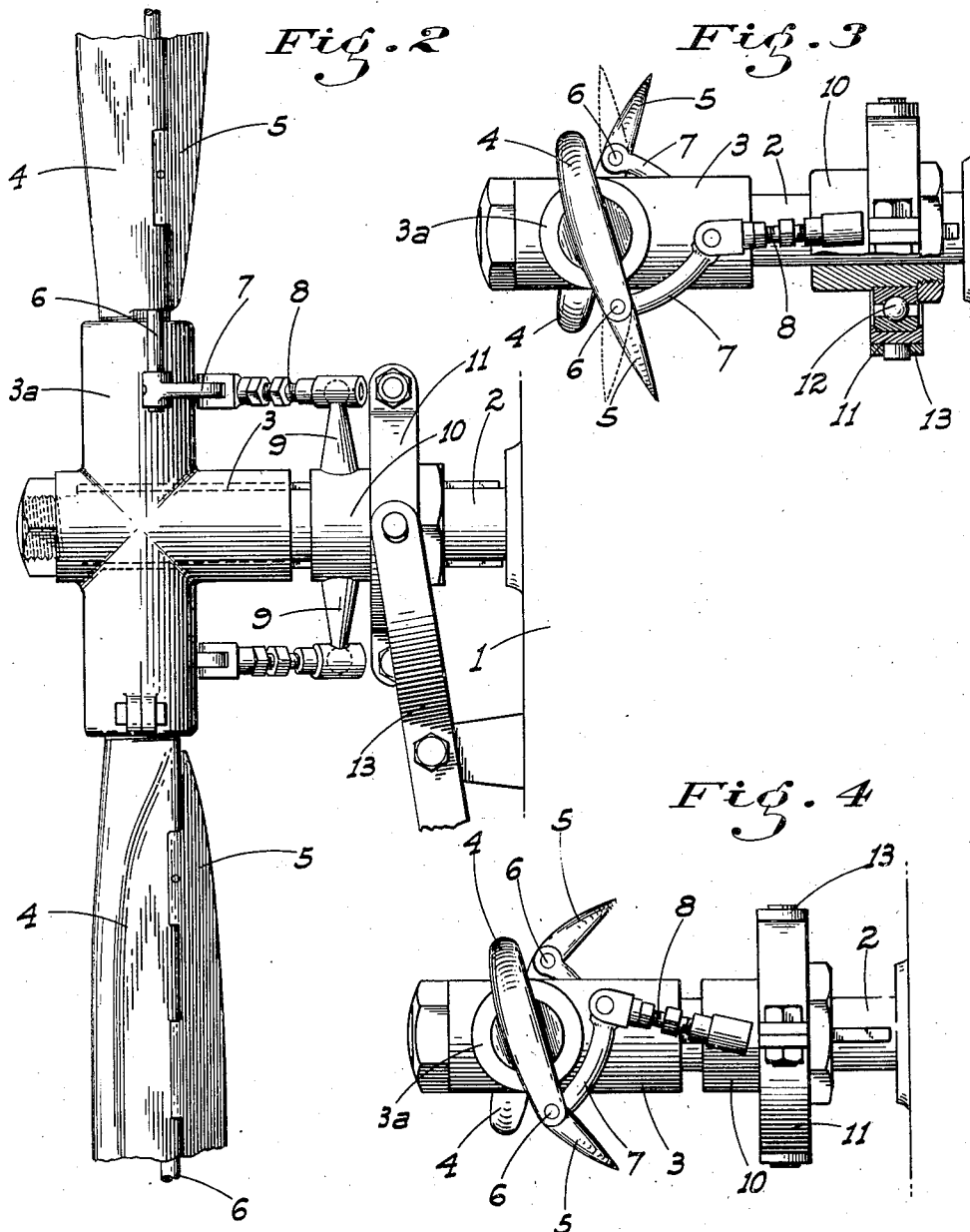
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VARIABLE CAMBER PROPELLER

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This invention relates to airplanes, and particularly to the construction of the propellers of the same. In effect a propeller is nothing more than a wing, or in other words the propeller's action or lift is caused by driving an airfoil through the air. Since by changing the camber of a wing it is possible to change its lifting effect, the same holds true of a propeller.

We make use of this fact in the present invention, the principal object of which is to construct the blades of a propeller so that they have adjustable trailing edge portions in order that the camber or transverse form of the blades may be altered; and to provide a means whereby these edge portions may be adjusted by the pilot and mechanically held in any position while the airplane is in flight.

The same principle may also be applied to lifting propellers or helicopters, or to supporting wing units.

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 we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claim.

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

Fig. 1 is a fragmentary side outline of an airplane, showing our adjustable camber propeller and the means for adjusting the same.

Fig. 2 is an enlarged fragmentary side view of the propeller and its control means.

Fig. 3 is a top plan view of the structure, partly in section, showing the propeller blade elements in their normal position.

Fig. 4 is a similar view, showing the camber of the blades increased.

Referring now more particularly to the characters of reference on the drawings, 1 denotes the fuselage of an airplane, from the front end of which the drive shaft 2 projects from the motor as usual. This shaft projects forwardly a slightly greater distance than in ordinary practice, and on its forward end is fixed a standard hub 3, in the opposed

bosses 3a of which are fixed ends of the opposed blades 4. The blades may be of conventional form, except that their rear or trailing edge portions 5 are formed separate from the main blade portions, and are hinged thereto along their adjacent edges by shafts 6, which extend lengthwise of the blades as clearly shown.

These shafts extend beyond the portions 5 inwardly of the outer ends of the hub bosses in overhanging clearance relation thereto. At these ends the shafts are rigidly connected to the adjacent ends of pylons 7, which extend thence rearwardly in overhanging relation to the hub on the opposite sides of the same. At their rear ends the pylons are pivoted on the forward ends of the longitudinally adjustable links 8, which at their rear ends are swivelly connected to the outer ends of arms 9, which project oppositely and radially from a collar 10. This collar is slidably splined on the shaft 2 so as to be always maintained in the same relation to the propeller. This collar is engaged by a yoke 11, there being anti-friction bearings 12 of the annular and thrust type between the collar and yoke, so that the resistance to relative rotation is reduced to a minimum.

The shift fork 13, which is pivoted intermediate its ends on to the fuselage or motor, is connected to the yoke and has a control rod 14 leading thence to the pilot's compartment of the airplane. At this end the rod is connected to a control lever 15, which is provided with a pawl and ratchet mechanism indicated at 16 so that it may be held immovable in any position.

It will, therefore, be seen that by shifting the lever in one direction or the other, the air entering surfaces of the propeller blades will be simultaneously changed from a normal camber as shown in Fig. 3, to a greater camber or one of convex form, as shown in Fig. 4; or the camber may be made relatively concave as indicated in Fig. 3, thereby tending to negative the forward propelling action of the propeller and exert a braking effect.

For taking off or for climbing, where the maximum engine and propeller speed is desired, the camber or section of the airfoil (the

propeller) is flattened out, while for speed and cruising the camber is increased and the engine speed may be lessened. The camber adjusting action we feel will give better or more practical results than can be obtained by adjusting the pitch of the propeller blades as a whole, since such form of adjustment tends at times to stall the engine, if not handled very carefully. With the adjustment of the camber on the other hand, the propeller blades retain their normal, easy lead into the air at all times, any difference of the thrust being had only in the trailing edges of the blades. Also this arrangement enables the blades themselves to be rigidly mounted so that there is no tendency for any excessive vibration or misalignment to be had as is the case when the propellers are turnable in the hub.

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

While the 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 claim.

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

A propeller comprising main blade portions and trailing edge portions initially separate therefrom, hinge means between the blade portions including shafts secured to the trailing edge portions and projecting beyond the inner ends of the same, a hub having laterally extending portions from which the main blade portions project, the shafts overhanging said lateral hub portions, pylons rigidly connected to the projecting ends of the shafts and extending rearwardly and laterally of the blades on opposite sides of the hub, a shaft projecting rearwardly from the hub, a collar splined on said shaft, opposed arms projecting outwardly from the collar, links parallel to the shaft flexibly connecting said arms and pylons, the latter being positioned so as to be concealed from in front by the lateral hub portions, and means to slide the collar along the shaft.

In testimony whereof we affix our signatures.

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