Jan. 5, 1943. E. MARTINOVSKY 2,307,630

PROPELLER BLADE PITCH CONTROL MECHANISM

Filed Nov. 13, 1939 2 Sheets-Sheet 1

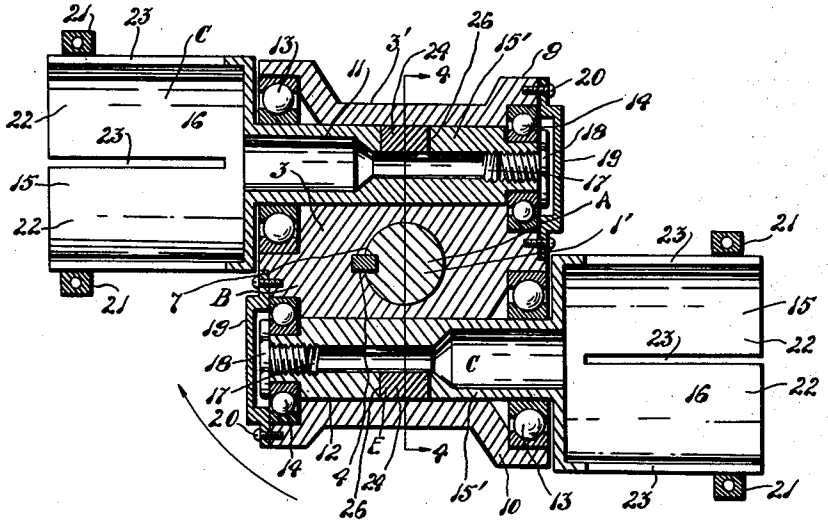


FIG. 1.

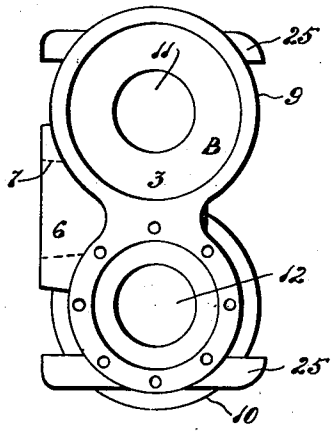


FIG. 2.

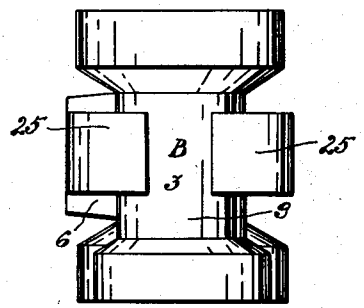


FIG. 3.

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PROPELLER BLADE PITCH CONTROL MECHANISM

Filed Nov. 13, 1939 2 Sheets-Sheet 2

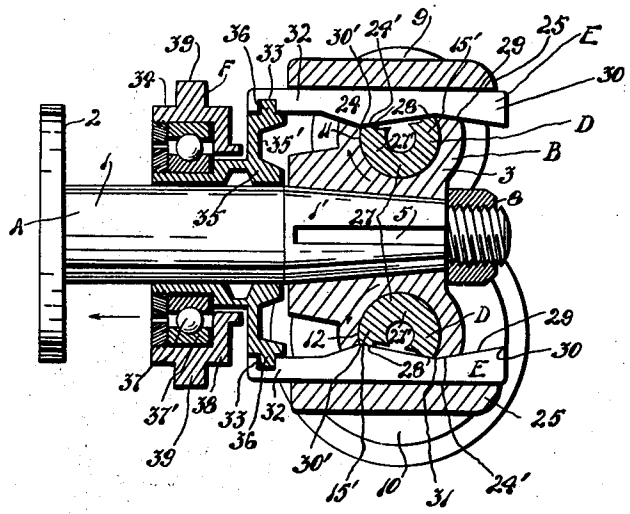


FIG. 4.

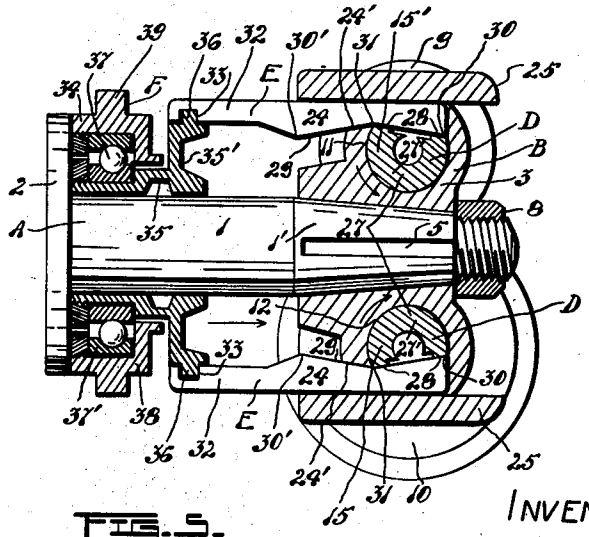


FIG. 5.

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UNITED STATES PATENT OFFICE

2,307,630

PROPELLER BLADE PITCH CONTROL MECHANISM

Emil Martinovsky, Gerald, Saskatchewan, Canada

Application November 13, 1939, Serial No. 304,229
In Canada June 24, 1938

3 Claims. (Cl. 170—163)

My invention relates to improvements in propeller blade pitch control mechanisms and the principal object of my invention is to provide a device of the character herewithin described which will enable the pitch of such propeller blades to be efficiently varied through a definite range while the latter are in operation.

A further object of my invention is to provide a device of the character herewithin described by means of which the pitch of such blades may be completely reversed thereby enabling the propeller to be used as an effective air brake.

A further object of my invention is to provide a device of the character herewithin described in which any suitable manually or automatically operated means may be used for controlling the pitch of said propeller blades.

A further object of my invention is to provide a device of the character herewithin described which in consequence of the attainment of the above stated objects will materially increase the operating efficiency of air screw propelled airplanes, snow planes and vehicles of similar character.

A further object of my invention is to provide a device of the character herewithin described which is of a comparatively simple construction, requires the minimum of adjustment in its operation and will not easily become out of order.

With the above more important objects in view and such other minor objects as may appear as the specification proceeds, my invention consists essentially in the arrangement and construction of parts all as hereinafter more particularly described, reference being had to the accompanying drawings, in which:

Figure 1 is a cross-sectional front elevation of my invention.

Figure 2 is an end view of my propeller blade mounting hub.

Figure 3 is a plan view of the hub shown in Figure 2.

Figure 4 is a longitudinal cross-section of my invention viewed along the line 4—4 in Figure 1 and showing the mechanism positioned in one extreme of the propeller blade pitch.

Figure 5 is a longitudinal cross-section of my invention viewed similarly as in Figure 4 but showing the mechanism positioned in the opposite extreme of the propeller blade pitch.

In the drawings like characters of reference indicate corresponding parts in the different figures.

Briefly my invention may be said to consist of an engine driven shaft A, a propeller blade mounting hub B positioned thereupon, a pair of propeller blade mountings C rotatably secured to said hub and provided with cam followers D, a pair of longitudinally slidable cams E and a cam actuating means F to govern the sliding movement thereof.

It will be observed from the accompanying drawings that upon the external manipulation of the cam actuating means F, the longitudinal sliding movement of the cams E will rotate the cam followers D and simultaneously impart a rotary movement to the associated engine blade mountings C.

Referring now to my invention in detail, the engine driven shaft 1 is provided on one end thereof with a flange plate 2 whereby it may be rotated by any suitable power source. The opposite extremity of the shaft 1 carries a propeller blade mounting hub 3 secured thereon by means of a key 4 positioned in a keyway 5 formed in the frusto-conical portion 1' of the shaft 1 and a corresponding keyway is provided in the body of the hub 3.

My propeller blade mounting hub 3 comprises an essentially rectangular body portion 3' integral with a centrally disposed mounting boss 6 which in turn is provided with a concentric, longitudinally extending aperture 7 whereby the entire assembly may be secured upon the shaft portion 1' and retained thereon by means of a nut 8.

The opposed sides 9 and 10 of the body portion 3' of my hub 3 are of a cylindrical configuration as will be clearly apparent from Figures 2 and 3 in the accompanying drawings and have a pair of parallel apertures 11 and 12 extending transversely therethrough.

The axes of the apertures 11 and 12 are positioned at right angles in respect to the shaft 1 and are offset equally from the center thereof.

Both ends of the cylinders 9 and 10 are of an increased diameter as compared with the medial portions thereof and a pair of anti-friction bearings 13 and 14 are provided in the correspondingly increased diameters of the apertures 11 and 12.

My propeller blade mountings 15 comprise a blade socket 16 integral with a mounting shank 15' which is rotatably journalled in the aforementioned bearings 13 and 14. The end of each shank 15' is internally threaded as at 17 to receive the shank of a retaining bolt 18, whereby the blade mountings 15 may conveniently be retained in the said bearings 13 and 14 as will clearly be apparent from Figure 1. A dust cover plate 19 secured to the hub 3 by means of the

bolts 20 helps to exclude all foreign matter from the interior working parts.

The propeller blade root is inserted and retained in the socket 16 in any convenient manner, the means herein illustrated comprising a circumferential clamp ring 21 pressing together a plurality of segmental lateral wall sections 22, the latter being rendered partially resilient by the formation of a plurality of peripheric slots 23.

My means for rotating the propeller blade mountings 15 consists of a pair of longitudinally sliding cams 24 diametrically opposed in respect to the shaft 1 and sliding in channel-like cam guides 25 formed integrally with the cylinders 9 and 10.

As aforesaid the guides 25 are of a U-shaped cross-sectional configuration and pass directly through the cylinders 9 and 10. A central aperture 26 extends longitudinally along the entire length of said guides 25 and is designed to receive the sliding cams 24.

My cam followers 27 are formed integrally with the shank 15' of my mountings 15 and comprise a two-cornered, semi-annular lug 27', both corners 28 of which are in a constant engagement with the cam surfaced track 24' provided at the forward portion of the cams 24.

The cam track 24' assumes the form of a converging incline 29, the highest elevations 30 and 30' of which are located at the foremost and rearmost extremities thereof respectively, and substantially decline at an identical degree to a lowest elevation 31 formed at the medial length thereof.

The rearward portion 32 of the cam 24 is provided with a recess 33 which constantly engages an externally operable cam actuating means 34.

The aforesaid means 34 comprises a cam actuating sleeve 35 longitudinally slidable upon the shaft 1 and having an integral body portion 35' extending outwardly therefrom. The said portion 35' is provided at the periphery thereof with an annular extension 36 which constantly engages the aforementioned recess 33 of the cam portion 32.

Secured upon the sleeve 35 is an end-thrust bearing 37, the outer ball race 37' of which in turn carries a circumferential casing 38. The latter is provided with an annular ring 39 which may communicate with any conventional means for longitudinally sliding the cam actuated assembly 34 along the shaft 1.

Having thus described my invention, I shall now present a method of its operation.

It will be clear that when the propeller shaft 1 revolves all components of my invention excepting the ball race 37' and the associated ring 39 will revolve therewith as a unit. By means of these members 37' and 39, the cam actuator assembly may be caused to slide longitudinally along the shaft 1, thus imparting a similar movement to the cams 24 within their guides 25.

The cam followers 27, responsive to this movement of the cams 24, will be caused to rotate, one of said lug corners 28 following an ascending incline of the cam track 24' to one of its highest elevations 30 or 30' and the opposite lug corner 28 following a descending incline of the said track 24' to its lowest elevation 31.

From the foregoing it will be observed that when the elevation 31 is in a vertical alignment with an imaginary center of the lug 27' and the corners 28 are on a horizontal level, the medial position has been reached in the rotation of the associated blade mountings 15 and accordingly no pitch is given to the propeller blades therein positioned.

When, however, the cam actuating assembly 34 is externally manipulated and moved to the right on the shaft 1 until its position as indicated in Figure 4 has been reached, the cam followers 27 and the associated blade mountings 15 will rotate in a clockwise direction until a maximum forward pitch of the propeller blades is attained.

Similarly a corresponding movement of the assembly 34 upon the shaft 1 to the left as indicated in Figure 5, will rotate the said followers 27 and the associated mountings 15 in a counterclockwise direction until a maximum reverse pitch of the propeller blades has been reached.

Since many modifications can be made in the invention herein described and since the accompanying drawings have been prepared only to illustrate the relative arrangement and interaction of parts and not with regard to accuracy of dimensions for manufacturing purposes which in view of this disclosure I consider to entail merely mechanical skill together with or without the skill of the mechanical draftsman, and since many apparently widely different embodiments of this invention may be made within the scope of the accompanying claims without departing from the spirit and scope of the same it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense and I desire only such limitations placed thereon as justice dictates.

What I claim as my invention is:

1. In a propeller blade pitch control mechanism which includes inter alia a rotatable blade mounting, a means for rotating said mounting comprising an externally operable cam actuator, a sliding cam connected therewith and a cam follower, said follower being formed integrally with said mounting and comprising a two-cornered lug having a generally semi-annular shape both of said corners bearing continuously upon the surface of said sliding cam whereby upon the external manipulation of said cam actuator said follower responds to the movement of said cam and rotates said associated mounting.

2. The device as defined in claim 1 in which said cam comprises a rearward portion communicating with said cam actuator and a forward portion providing a cam surfaced track, said track being of a highest elevation at the foremost and the rearmost extremities thereof and substantially declining to a lowest elevation at the medial length thereof, both of said corners of said follower bearing continuously upon the said cam surfaced track, whereby upon the external manipulation of said cam actuator said follower responds to the movement of said cam and rotates said associated mounting.

3. A propeller blade pitch control mechanism comprising in association with an engine driven shaft a hub positioned thereupon, a pair of rotatable propeller blade mountings, said hub having a centrally disposed mounting boss and a longitudinal aperture extending therethrough to receive said shaft and a body portion, the two opposed sides of said body portion being of a cylindrical configuration and having a pair of blade mounting apertures extending transversely therethrough, the central axis of said apertures being at right angles to said shaft and offset equally in respect thereto, each of said apertures being provided with an anti-friction bearing at both extremities thereof, said blade mountings

comprising in combination a cylindrical shank, a blade root receptacle provided thereon and a cam follower integral therewith, said shank being rotatably positioned within said bearings, and a means for rotating said mountings, said means comprising in combination a cam operating sleeve longitudinally slidable upon said shaft, an end-thrust bearing positioned upon said sleeve, an externally operable circumferential casing communicating with said bearing, a pair of cam guides formed integrally with said body portion at each of the two opposed sides thereof and in a diametrically opposed relationship to said shaft, and a pair of sliding cams, said cams having a rearward portion communicating with said sleeve and a forward portion, said latter portion providing a cam surfaced track, said track being of a highest elevation at the foremost and the rearmost extremities thereof and substantially declining to a depression at the medial length thereof, said cam followers having external corners bearing upon said cam surfaced track, whereby upon the external manipulation of said circumferential casing said bearing and associated sleeve may be caused to slide longitudinally upon said shaft, said sliding movement being communicated to said cams, and said cam followers responding to the cam surfaced track provided thereon may rotate said associated blade mountings.

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