Feb. 18, 1930. T. DUPREY 1,747,230

ELECTRICALLY ADJUSTABLE PROPELLER

Filed Aug. 3, 1927 3 Sheets-Sheet 1

Fig. 1.

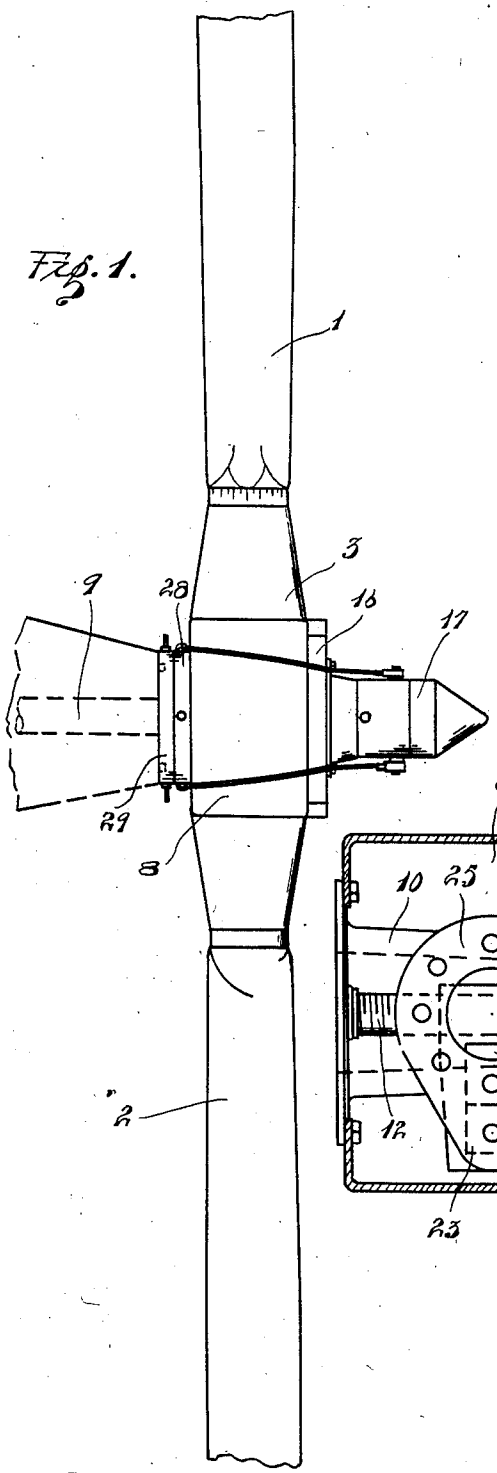


Fig. 2.

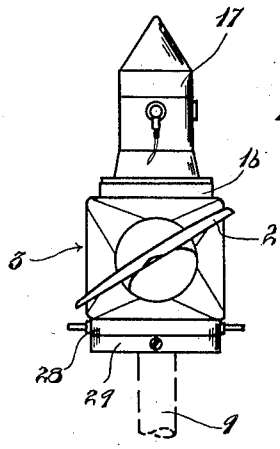
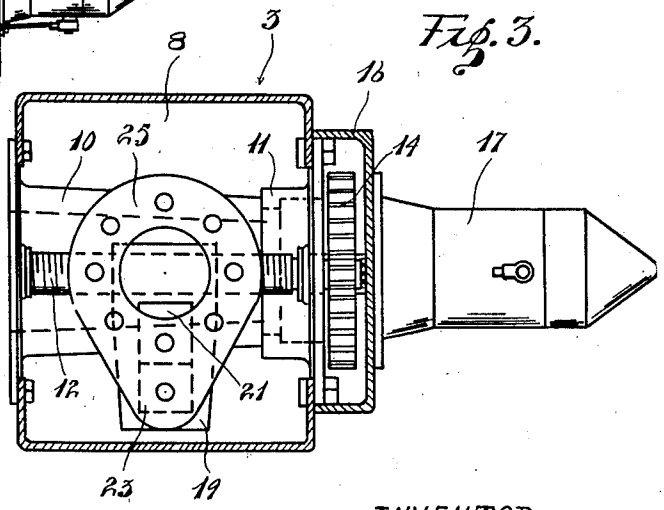


Fig. 3.



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Filed Aug. 3, 1927 3 Sheets-Sheet 2

Fig. 4.

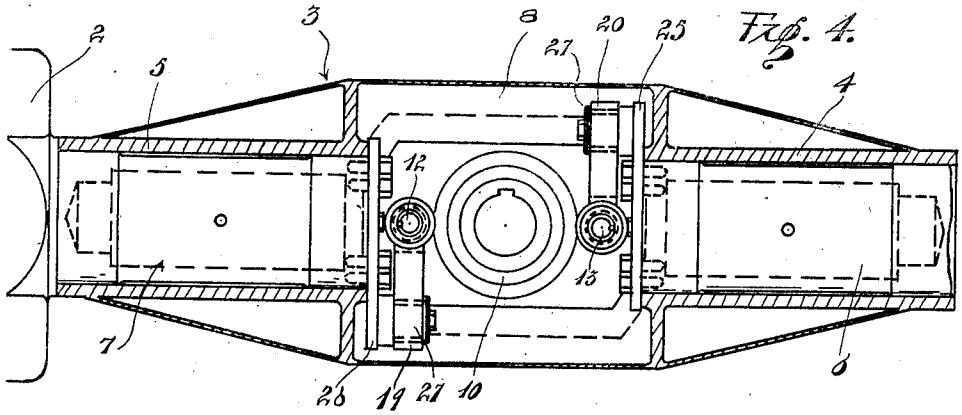


Fig. 5.

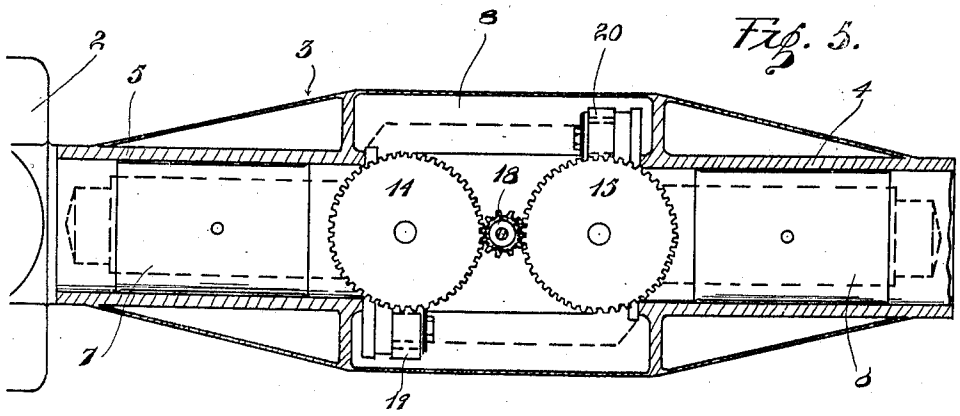
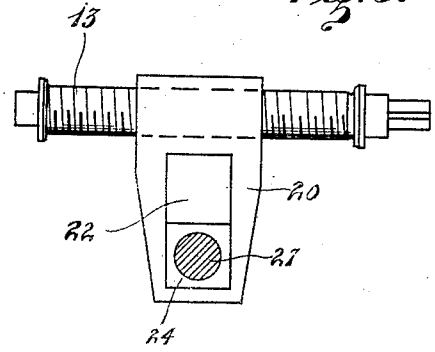


Fig. 6.



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Feb. 18, 1930. T. DUPREY 1,747,230

ELECTRICALLY ADJUSTABLE PROPELLER

Filed Aug. 3, 1927 3 Sheets-Sheet 3

Fig. 7.

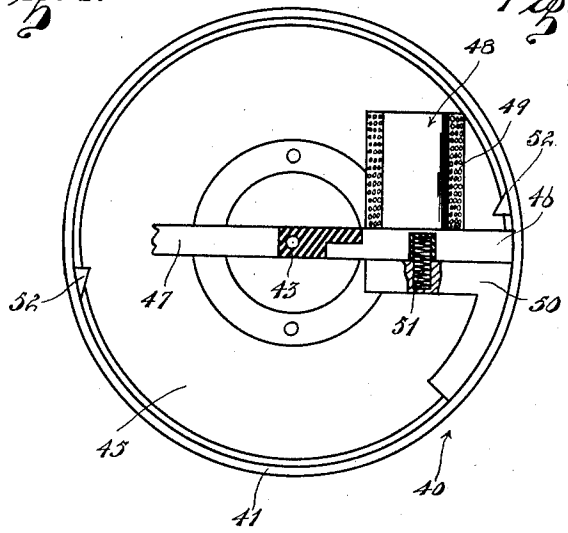


Fig. 8.

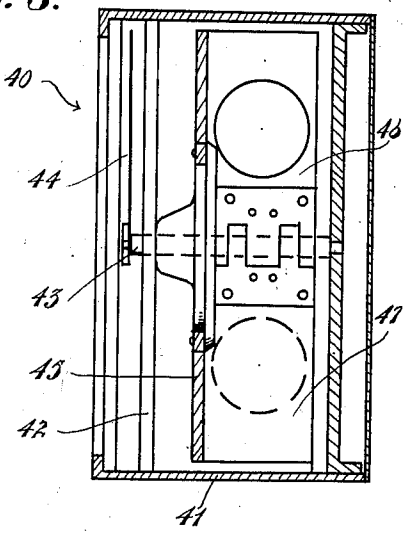
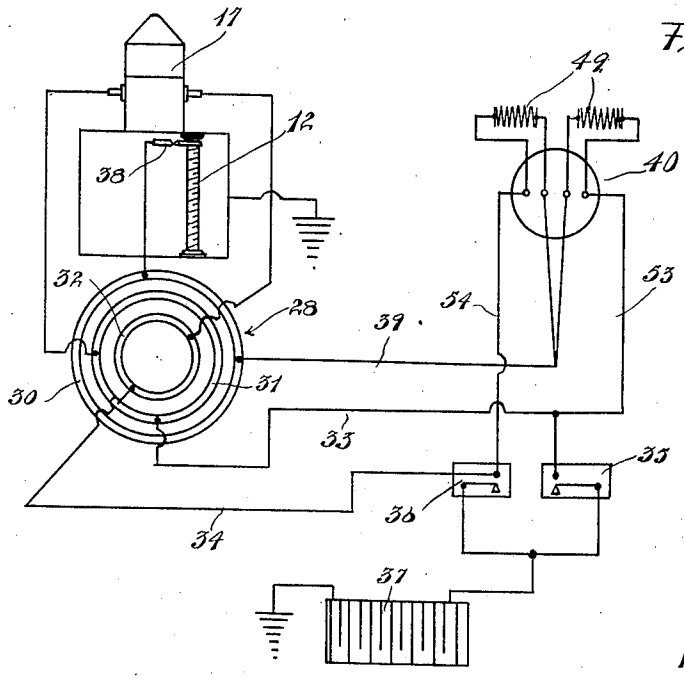


Fig. 9.



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UNITED STATES PATENT OFFICE

THOMAS DUPREY, OF LONG BEACH, CALIFORNIA

ELECTRICALLY-ADJUSTABLE PROPELLER

Application filed August 3, 1927. Serial No. 210,327.

An object of my invention is to provide a power actuated means for adjusting the blades of an airplane propeller.

Another object is to so position and arrange the actuating motor that it will not be influenced by the centrifugal force of the rotating propeller.

Still another object is to provide an adjustable propeller which may be installed without disturbing or rearranging the general structure of the plane.

An advantage of my invention resides in the simplicity of the drive between the motor and the blades, and in the few parts required in the operation of my device.

Other objects, advantages, and features of invention may appear from the accompanying drawing, the subjoined detailed description, and the appended claims.

In the drawing—

Fig. 1 is a fragmentary side elevation of my electrically adjustable propeller.

Fig. 2 is an end view of the same.

Fig. 3 is a transverse sectional view of my propeller.

Fig. 4 is a fragmentary longitudinal sectional view of my propeller.

Fig. 5 is a view similar to Fig. 4 but showing the drive gears.

Fig. 6 is a side elevation of the adjustable screw and traveller.

Fig. 7 is a rear view of the adjustment indicator.

Fig. 8 is a transverse sectional view of the same.

Fig. 9 is a wiring diagram illustrating the method of operating my propeller.

Referring more particularly to the drawing:

My propeller comprises a pair of blades 1, 2 which blades are adjustably mounted in a hollow hub 3, in a manner to be further described. The hollow hub 3 comprises bearings 4, 5 in which the shanks 6, 7 of the blades 1, 2, respectively, are journaled. A central operating compartment 8 is formed in the hub 3 between the bearings 4, 5 and the drive shaft 9 of the motor is secured in the central section as follows: A sleeve 10 is securely bolted, or otherwise secured, to the rear face of the section 8, and this sleeve fits into a socket 11 which is bolted, or otherwise secured, against the front face of the section 8. The drive shaft of the motor is suitably keyed, or otherwise secured, in the sleeve 10 and socket 11 whereby the propeller is rotated.

In either side of the sleeve 10 and within the central section 8, I journal a pair of adjusting screws 12, 13. To the forward ends of the screws 12, 13 are secured gears 14, 15, respectively, which gears are enclosed in a housing 16 on which housing the electric motor 17 is mounted. A pinion 18 is mounted on the armature shaft of the motor and meshes with the gears 14, 15, thus simultaneously rotating said gears when the motor is operated. The motor is adapted to be rotated both forwardly and reverse through suitable control switches as will be further described.

Each of the adjusting screws 12, 13 are threaded through a traveller 19, 20 and this traveller is adapted to move back and forth over the length of the screw as the screw is rotated through the action of the pinion 18 and the gears 14, 15. The travellers 19, 20 are each formed with a vertical slot 21, 22, respectively, in which a block 23 or 24 is adapted to slide. To the ends of the blade shanks 6, 7 is securely bolted, or otherwise secured, an arm 25, 26, respectively, which arms are positioned within the central section 8 and adjacent the screws 12, 13.

The arms 25, 26 are each provided with a pin 27 which extends into the block 23 or 24 and is journaled in said block. Thus it will be seen that as the travellers 19, 20 move back and forth along the screws 12, 13 the arms 25, 26 will be swung, thus rotating the shank 6, 7 and the blades 1, 2 to properly adjust the blades to the required pitch.

Since the motor 17 rotates with the propellers 1, 2 the current supplying the motor is fed thereto through movable contact rings 28 and stationary contact rings 29 bearing against them. The movable rings 28 are positioned in a housing secured to the central section 8 and the stationary rings are secured to the engine casting, or other suitable stationary part of the plane. The contact rings 28 comprise an outer indicator ring 30, a for-

ward drive ring 31, and a reverse ring 32. The rings 31, 32 are connected by leads to the motor 17 and also by leads 33, 34 to control switches 35, 36, respectively. One side of both switches 35, 36 are connected to a battery 37 while the other side is connected to the rings as stated and as is shown in Fig. 9. The indicator ring 30 is connected to a point contact switch 38 on the screw 12, which switch makes contact on each revolution of the screw. The ring 30 is then connected through lead 39 to a dash indicator 40 upon which is shown the amount of pitch of the blades.

It is obvious that when flying the operator could not accurately determine the pitch of the blades without some indicating means in front of him. My indicator comprises a housing 41 in which is positioned a dial 42 calibrated to indicate the pitch of the blades. A shaft 43 is journalled in the housing and a pointer 44 is secured to the shaft and travels over the dial 42. A disc 45 is secured to the shaft 43, the outer portion of which disc is formed of metal and the inner portion surrounding the shaft is of some suitable insulating material.

A pair of plates 46, 47 are journaled on the shaft 43 rearwardly of the disc 45 and the sections of the plates surrounding the shaft are insulated therefrom so that there is no transferring of magnetism from one plate to another. Mounted on each of the plates 46, 47 is a soft iron core 48 surrounded by a coil 49. A metal bar 50 is secured to the housing 41 below each of the plates 46, 47 and an insulated coil spring 51 normally urges the plate 46 or 47 upwardly away from the bar 50 against a stop lug 52. The lead 39 extends to one side of both of the coils 49, the other end of each coil being connected to one of the switches 35, 36 through leads 53, 54.

In operation we will assume that the switch 35 rotates the motor 17 in a direction to give a forwardly pitch to the blades, and, therefore, termed the forward switch. Current is fed through the lead 33 from the battery 37 to the ring 31 and thence to the motor. This causes the screw 12 to rotate and at each rotation of the screw the contact 38 is closed which causes current to flow to the ring 30, thence through lead 39, and then to the coil 49 and lead 53, back to the switch 35. The coil 49 being energized forms an electro-magnet with the core 48 and causes the bar 46 to be attracted downwardly to the metal bar 50. This downward movement of the core 48 and coil 49 drags the disc 45 around a corresponding amount due to the attraction of the metal rim of the disc to the energized core.

The contact 38 is broken due to the continued rotation of the screw and the spring 51 moves the plate 46 and corresponding core 48 upwardly, and during this upward movement the core is deenergized since there is no current flowing through the coil 49, and consequently there will be no retraction of the disc 45. Therefore, as the disc is rotated step by step the finger 44 will indicate on the dial 42 the amount of pitch given to the blades of the propeller. The operator must hold his finger on the switch 35 until the desirable pitch is obtained and upon releasing the switch the contact is broken and the motor 17 ceases to rotate. As previously stated the rotation of the motor 17 will rotate the gears 14, 15 and the screws 12, 13, thus moving the travellers 19, 20 and swinging the arms 25, 26 to rotate the blades the required amount.

Having described my invention, I claim:

1. An electrically adjustable propeller comprising a hub, a blades journaled in said hub, a motor secured to said hub, a screw journaled in the hub adjacent the inner end of each of the blades, gear means connecting the motor and the screw, a traveller threaded onto the screw, a lever plate secured to the blade, and means coupling the lever plate and the traveller whereby said plate is swung as the traveller moves back and forth along the screw.

2. An electrically adjustable propeller comprising a hub, blades journaled in said hub, a motor secured to said hub, a screw journaled in the hub adjacent the inner end of each of the blades, gear means connecting the motor and the screw, a traveller threaded onto the screw, a lever plate secured to the blade, said traveller having a slot formed therein, a block slidable in the slot, and a pin extending from the lever plate into said block, whereby the lever plate is swung as the traveller moves back and forth along the screw.

3. An electrically adjustable propeller comprising a hollow hub, blades journaled in said hub, a sleeve secured to the hub adapted to receive the drive shaft of the motor, an electric motor secured to the front face of the hub, a threaded screw journaled in the hub adjacent the inner end of each blade, gear means connecting the electric motor and the screws, a traveller on each screw, said traveller having a slot formed therein, a lever plate secured to the inner ends of each blade, a block in the slot, and a pin extending from the lever plate into the block whereby the lever plate is swung to adjust the blades as the traveller moves along the screw, and contact rings secured to the hub whereby current is fed to the electric motor.

In testimony whereof, I affix my signature.

THOMAS DUPREY.