

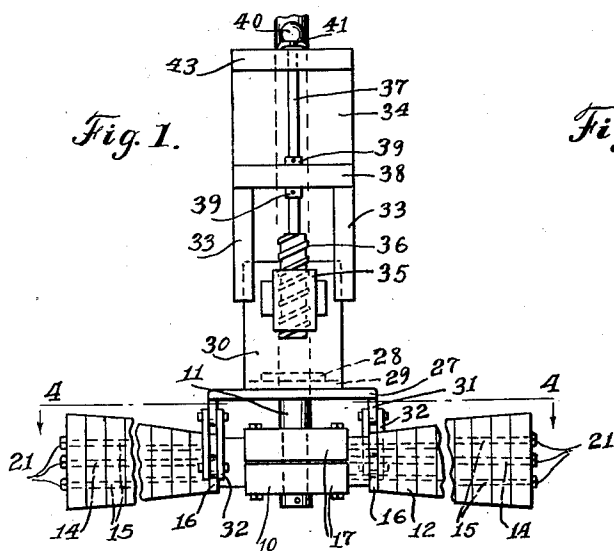
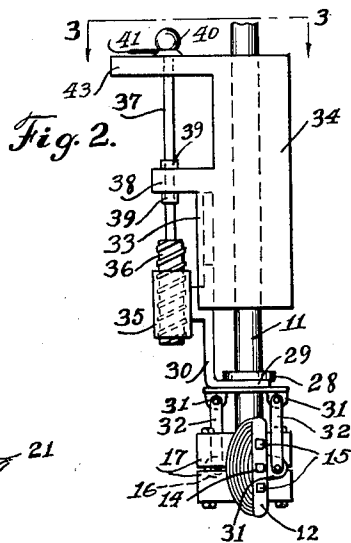
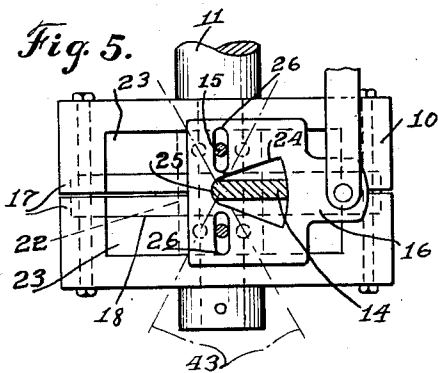
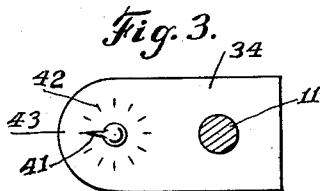
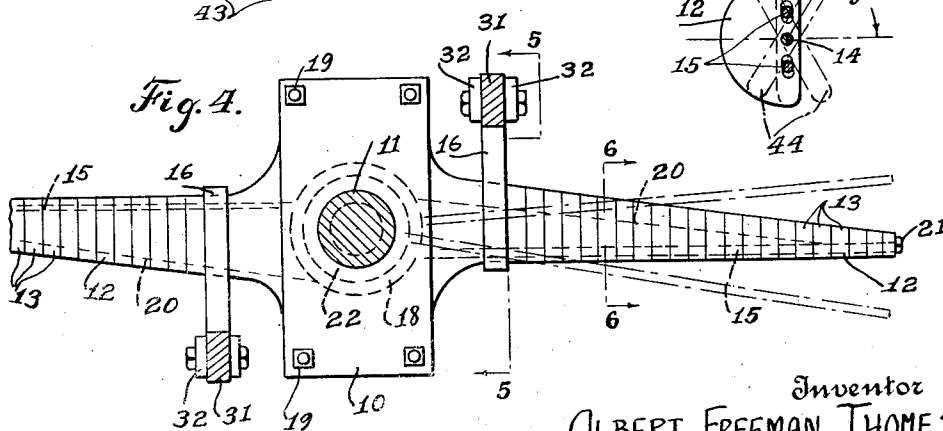
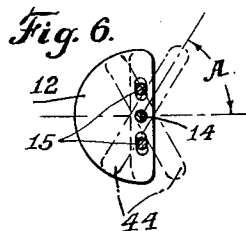
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A. F. THOMES

1,833,059

VARIABLE PITCH PROPELLER

Filed Oct. 20, 1930



Inventor
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UNITED STATES PATENT OFFICE

ALBERT FREEMAN THOMES, OF JACKSONVILLE, FLORIDA

VARIABLE PITCH PROPELLER

Application filed October 20, 1930. Serial No. 489,845.

This invention relates to new and useful improvements in a variable pitch propeller.

The invention has for an object the provision of a propeller with blades which may be adjusted to variable pitches either right or left.

The invention has for a further object the provision of a propeller with blades formed from a plurality of adjacent transverse blade sections, and means for simultaneously adjusting the relative positions of these sections to each other to vary the pitches of the blade.

The invention also proposes the provision of a master rod for determining the pivoting point of the various blade sections and side rods for adjustments to hold the blade sections in various pivoted positions upon the master rod.

This invention has for a further object the provision of a control for holding the side rods in various adjusted positions operable from a remote point.

It is another object of this invention to provide a knob with a pointer acting over a scale to direct the adjustment of the control for the adjustment of the pitch of the blades.

Another object of this invention is to provide a means to move the side bars to adjust the pitch of the blade and said means to include a control plate pivoted on the master rod and engaging the side rods so that upon motion to move the side rods in opposite directions.

It is a further object of this invention to provide a device of the class mentioned which is of simple, durable construction, dependable in use and efficient in action, and which can be manufactured and sold at a reasonable cost.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:—

Fig. 1 is a side elevational view of a variable pitch propeller constructed according to this invention.

Fig. 2 is an edge elevational view of Fig. 1.

Fig. 3 is a fragmentary plan view of Fig. 2 looking in the direction of the line 3—3.

Fig. 4 is a fragmentary horizontal sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a transverse sectional view taken on the line 5—5 of Fig. 4, and

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 4.

The variable pitch propeller comprises a hub 10 for attachment upon the shaft 11 of a motor, not shown on the drawings, blades 12 radially supported on the hub 10 and each consisting of a plurality of adjacent transverse blade sections 13, a master rod 14 for each blade radially and rigidly projecting from the hub 10 and extending through the longitudinal center line of the blade to pivotally support the blade sections, a pair of side rods 15 for each blade and on opposite sides of the master rod 14 and in a plane through said longitudinal center line and diverging from their inner to their outer ends and rotatively supported on the hub 10 to move about the axis of the hub, a control plate 16 pivotally mounted on said master bar 14 and engaging the side rods 15 to pivot and move the side rods simultaneously in opposite directions for changing in degrees the pitch and contour of the blade, and means for simultaneously adjusting said control plates in various pivoted positions.

The hub 10 consists of two cup sections 17 and a central plate 18 between the cup sections, all secured together by bolts 19. The attachment of the hub upon the shaft 11 should be accomplished by a key from the shaft engaging the central plate section 18, but since key connections are old the details are not shown on the drawings. The blade sections 13 are of different outer contours so as to be in the form of a conventional propeller, that is, at the extremities they are narrow and gradually expand until at the base they are of substantial width. An inspection of Figs. 2, 4 and 6 will clearly show this point.

The master rods 14 are integral with and project from the central plate section 18. The cups 17 are open at the sides so that such projection is possible. The outer ends of the master rods are round and extend through circular holes in the blade sections 13 so as to pivotally support them. The middle and inner ends of the master bar 14 broaden out as indicated by reference numeral 20 in Fig. 4, but the blade sections 13 are formed with openings of sufficiently large sizes so that these sections may pivot thereon. The side rods 15 are round along their complete lengths and engage in elongated apertures in the sections 13 to allow relative movements. In Figs. 2 and 6 it will be noticed that the pair of side rods 15 are in a plane which also includes the master rod 14. End caps 21 are attached upon the extremities of the master bar 14 and on the side rods 15 so as to hold the propeller sections in place.

The rotative supporting of the side rods 15 upon the hub is accomplished by the motor shaft 11 being reduced at its end which passes through the hub, as clearly shown in Fig. 5, and supporting collars 22 positioned within the cup sections 17 of the hub on opposite sides of the central section 18 and supporting rings 23 rotative on the collars and within the cup sections 17, and integral with the side rods 15. The control plate 16 is formed with a segmental opening 24 receiving the control bar 14, and so arranged that the apex 25 of the segmental opening engages one of the edges of the master bar 14 and the other edge is adapted to swing in an arc about the apex. The sides of the segmental opening limit the amplitude of motion of the control plate. On opposite sides of the apex of the opening 24, slots 26 are formed which engage the side of the rods 15 so that when the control plate 16 is pivoted, the side rods will be moved.

The means for simultaneously adjusting the control plates 16 to various pivoted positions comprises a plate member 27 slidably mounted upon the shaft 11 and formed with a grooved collar 28 receiving a fork 29 from a slide 30. Lugs 31 project from the plate member 21 and pivotally connect with links 32 connected at their other ends with the control plates 16. These links are arranged on opposite sides of the propeller blades, as illustrated in Fig. 4, so that upon motion the various blades forming the propeller will be adjusted simultaneously. The slide 30 is supported by tracks 33 mounted upon a bracket 34 for attachment upon the casing of the motor having the said shaft 11.

A tubular member 35 is attached upon the slide 30 and is threadedly engaged by a screw member 36 fixed upon a rod 37 rotatively and non-slidably mounted in a projection 38 from the bracket 34. The rotative and non-slidable mounting is accomplished by collars 39

fixed upon the rod 37 on opposite sides of the projection 38. The rod 37 may extend to any point, such as to the vicinity of the operator of the motor. At this point it is provided with a knob 40 having a pointer 41 acting upon a scale 42. As shown on the drawings, the scale is shown formed on a panel 43 projecting from the bracket 34.

The operation of the device may be traced by assuming it in the condition as shown on the drawings. It should be noticed that the side rods 15 are in a vertical plane which also passes through the master bar 14. To change the pitch of the blades of the propeller, the knob 40 should be turned any desirable amount as directed by the pointer 41 and the scale 42. The turning of the knob will be transmitted to rotate the threaded member 36 and move the tubular member 35 upwards or downwards. This allows a change to form a right or left hand propeller. Motion from the tubular member is transmitted to the slide 30 and hence to the slidable plate member 27.

As the plate member 27 moves, this motion will be transmitted to the links 32 and the control plate 16. The control plate of one of the blades will be pivoted in one direction and the other blade in the other direction, as is necessary to maintain the correct form of the propeller. As the control plates pivot, they will move about the apex 24 as a center to positions as indicated by the crossed dot and dash lines 43 in Fig. 5. Consequently, the slots 26 will move the side bars 15 to the positions indicated by the dot and dash circles in Fig. 5. The rings 23 will rotate upon the collars 22 so as to allow the pivoting of the side rods 15. Such motion of the side rods will cause the various blade sections 13 to spread in fan-like fashion as they rotate about master bar 14 and thus the contour of the blade will be changed so that the pitch is varied. Since the side rods 15 diverge from their inner to their outer ends, the outer ends will move through larger distances than the inner ends and cause greater turning of the outer sections 13 than the inner sections, producing a "warp" of different degrees depending upon the degree of adjustment of the propeller. In Fig. 6 dot and dash lines 44 indicate a pivoted position of the flat tips of the blades either towards the right or towards the left. Angle A in this figure indicates the pitch angle which varies according to the adjustments.

While I have illustrated and described my invention with some degree of particularity, I realize that in practice various alterations therein may be made. I therefore reserve the right and privilege of changing the form of the details of construction or otherwise altering the arrangement of the correlated parts without departing from the spirit or the scope of the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:—

1. A variable pitch propeller, comprising
 5 a hub for attachment on the shaft of a motor,
 blades radially supported on said hub and
 each consisting of adjacent transverse sections,
 a master rod for each blade radially and
 10 rigidly projecting from said hub and extending
 through the longitudinal center line of
 the blade to pivotally support the sections, a
 pair of side rods for each blade on opposite
 15 sides of said master bar and in a plane
 through said longitudinal center line and ro-
 tatively supported on the hub to move about
 the axis of the hub, a control plate pivotal on
 said master bar and engaging said side rods
 to pivot and move the side rods simultane-
 20 ously in opposite directions for changing in
 degrees the pitch and contour of the blade,
 and means for simultaneously adjusting said
 control plates in various pivoted positions.

2. A variable pitch propeller, comprising
 25 a hub for attachment on the shaft of a motor,
 blades radially supported on said hub and
 each consisting of adjacent transverse sections,
 a master rod for each blade radially
 and rigidly projecting from said hub and ex-
 30 tending through the longitudinal center line
 of the blade to pivotally support the sections,
 a pair of side rods for each blade on opposite
 sides of said master bar and in a plane
 35 through said longitudinal center line and ro-
 tatively supported on the hub to move about
 the axis of the hub, a control plate pivotal on
 said master bar and engaging said side rods
 to pivot and move the side rods simultane-
 40 ously in opposite directions for changing in
 degrees the pitch and contour of the blade,
 and means for simultaneously adjusting said
 control plates in various pivoted positions,
 45 said transverse blade sections being of dif-
 ferent contours so that the blade may be
 narrow at the outer ends and of substantial
 width at the inner ends as is conventional in
 propeller blade designs.

3. A variable pitch propeller, comprising
 50 a hub for attachment on the shaft of a motor,
 blades radially supported on said hub and
 each consisting of adjacent transverse sections,
 a master rod for each blade radially
 and rigidly projecting from said hub and ex-
 tending through the longitudinal center line
 55 of the blade to pivotally support the sections,
 a pair of side rods for each blade on opposite
 sides of said master bar and in a plane
 through said longitudinal center line and ro-
 tatively supported on the hub to move about
 the axis of the hub, a control plate pivotal
 60 on said master bar and engaging said side
 rods to pivot and move the side rods simultane-
 ously in opposite directions for changing
 in degrees the pitch and contour of the blade,
 65 and means for simultaneously adjusting said
 control plates in various pivoted positions,

said hub comprising cup sections clamped
 against a central plate section, and bolts hold-
 ing these parts together.

4. A variable pitch propeller, comprising
 70 a hub for attachment on the shaft of a motor,
 blades radially supported on said hub and
 each consisting of adjacent transverse sections,
 a master rod for each blade radially
 and rigidly projecting from said hub and
 75 extending through the longitudinal center
 line of the blade to pivotally support the sections,
 a pair of side rods for each blade on
 opposite sides of said master bar and in a
 plane through said longitudinal center line
 80 and rotatively supported on the hub to move
 about the axis of the hub, a control plate
 pivotal on said master bar and engaging
 said side rods to pivot and move the side rods
 simultaneously in opposite directions for
 85 changing in degrees the pitch and contour
 of the blade, and means for simultaneously
 adjusting said control plates in various piv-
 oted positions, said hub comprising cup sec-
 tions clamped against a central plate section,
 90 and bolts holding these parts together, and
 said master rod projecting from said central
 plate section.

5. A variable pitch propeller, comprising a
 hub for attachment on the shaft of a motor,
 blades radially supported on said hub and
 95 each consisting of adjacent transverse sections,
 a master rod for each blade radially
 and rigidly projecting from said hub and
 extending through the longitudinal center
 line of the blade to pivotally support the sections,
 100 a pair of side rods for each blade on
 opposite sides of said master bar and in a
 plane through said longitudinal center line
 and rotatively supported on the hub to move
 about the axis of the hub, a control plate piv-
 105 otal on said master bar and engaging said
 side rods to pivot and move the side rods
 simultaneously in opposite directions for
 changing in degrees the pitch and contour
 of the blade, and means for simultaneously
 110 adjusting said control plates in various piv-
 oted positions, said hub comprising cup sec-
 tions clamped against a central plate sec-
 tion, and bolts holding these parts together,
 and said master rod projecting from said
 115 central plate section, the side rods project-
 ing from rings rotatively mounted on col-
 lars within the cup sections of the hub.

6. A variable pitch propeller, comprising
 120 a hub for attachment on the shaft of a motor,
 blades radially supported on said hub and
 each consisting of adjacent transverse sections,
 a master rod for each blade radially
 and rigidly projecting from said hub and ex-
 125 tending through the longitudinal center
 line of the blade to pivotally support the sections,
 a pair of side rods for each blade on
 opposite sides of said master bar and in a
 plane through said longitudinal center line
 130 and rotatively supported on the hub to move

about the axis of the hub, a control plate pivotal on said master bar and engaging said side rods to pivot and move the side rods simultaneously in opposite directions for changing in degrees the pitch and contour of the blade, and means for simultaneously adjusting said control plates in various pivoted positions, said control plates being formed with segmental openings with apexes engaging against one of the sides of the master rod to constitute pivot points for the plates, and with slots on opposite sides of these apex-members receiving said side bars for moving the side bars in opposite directions upon pivoting the control plates.

7. A variable pitch propeller, comprising a hub for attachment on the shaft of a motor, blades radially supported on said hub and each consisting of adjacent transverse sections, a master rod for each blade radially and rigidly projecting from said hub and extending through the longitudinal center line of the blade to pivotally support the sections, a pair of side rods for each blade on opposite sides of said master bar and in a plane through said longitudinal center line and rotatively supported on the hub to move about the axis of the hub, a control plate pivotal on said master bar and engaging said side rods to pivot and move the side rods simultaneously in opposite directions for changing in degrees the pitch and contour of the blade, and means for simultaneously adjusting said control plates in various pivoted positions comprising a plate slidably supported and provided with lugs pivotally connecting with links pivotally connecting with said control plates, and a means for changing the position of said plate.

8. A variable pitch propeller, comprising a hub for attachment on the shaft of a motor, blades radially supported on said hub and each consisting of adjacent transverse sections, a master rod for each blade radially and rigidly projecting from said hub and extending through the longitudinal center line of the blade to pivotally support the sections, a pair of side rods for each blade on opposite sides of said master bar and in a plane through said longitudinal center line and rotatively supported on the hub to move about the axis of the hub, a control plate pivotal on said master bar and engaging said side rods to pivot and move the side rods simultaneously in opposite directions for changing in degrees the pitch and contour of the blade, and means for simultaneously adjusting said control plates in various pivoted positions comprising a plate slidably supported and provided with lugs pivotally connecting with links pivotally connecting with said control plates, and a means for changing the position of said plate comprising a slide with a forked end engaging a groove formed in a collar connected with said plate, a tubular member

attached to said slide, a threaded member threadedly engaging in said tubular member, a rod non-slidably but rotatively supported and connected with said threaded member, and a knob on said rod for rotation of the rod.

9. A variable pitch propeller, comprising a hub for attachment on the shaft of a motor, blades radially supported on said hub and each consisting of adjacent transverse sections, a master rod for each blade radially and rigidly projecting from said hub and extending through the longitudinal center line of the blade to pivotally support the sections, a pair of side rods for each blade on opposite sides of said master bar and in a plane through said longitudinal center line and rotatively supported on the hub to move about the axis of the hub, a control plate pivotal on said master bar and engaging said side rods to pivot and move the side rods simultaneously in opposite directions for changing in degrees the pitch and contour of the blade, and means for simultaneously adjusting said control plates in various pivoted positions comprising a plate slidably supported and provided with lugs pivotally connecting with links pivotally connecting with said control plates, and a means for changing the position of said plate comprising a slide with a forked end engaging a groove formed in a collar connected with said plate, a tubular member attached to said slide, a threaded member threadedly engaging in said tubular member, a rod non-slidably but rotatively supported and connected with said threaded member, and a knob on said rod for rotation of the rod, said knob being provided with a pointer acting over a scale to direct the adjustments.

Signed at Jacksonville in the county of Duval and State of Florida this 2nd day of October, A. D. 1930.

ALBERT FREEMAN THOMES.