C. K. HENINGTON.

AUTOMATIC PITCH ADJUSTER FOR PROPELLER BLADES.

APPLICATION FILED JAN. 3, 1920.

1,364,755. Patented Jan. 4, 1921.

2 SHEETS—SHEET 2.

Fig. 3.

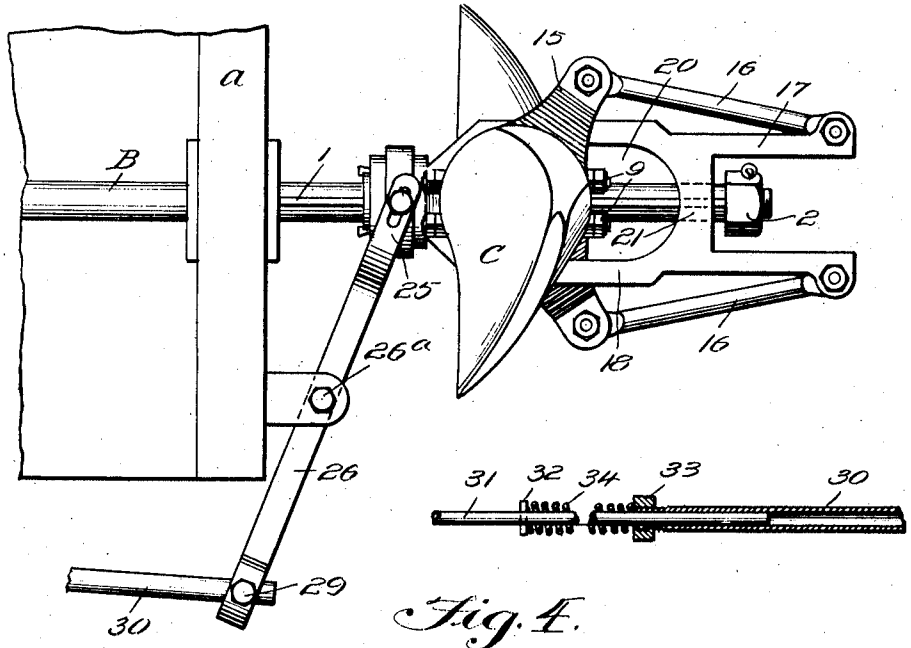
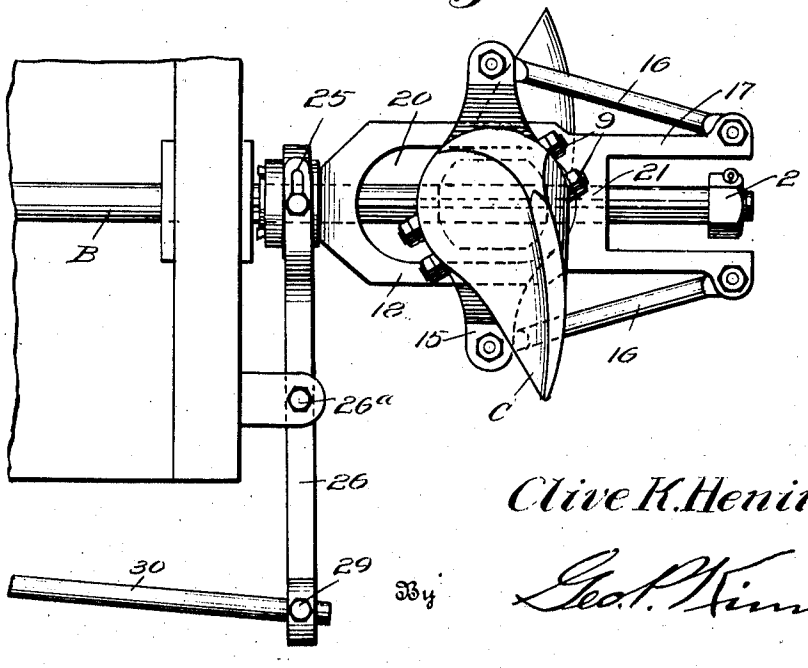


Fig. 4.



Inventor

Clive K. Henington

By Geo. P. Kimmel.

Attorney

C. K. HENINGTON.

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2 SHEETS—SHEET 1.

Fig. 1.

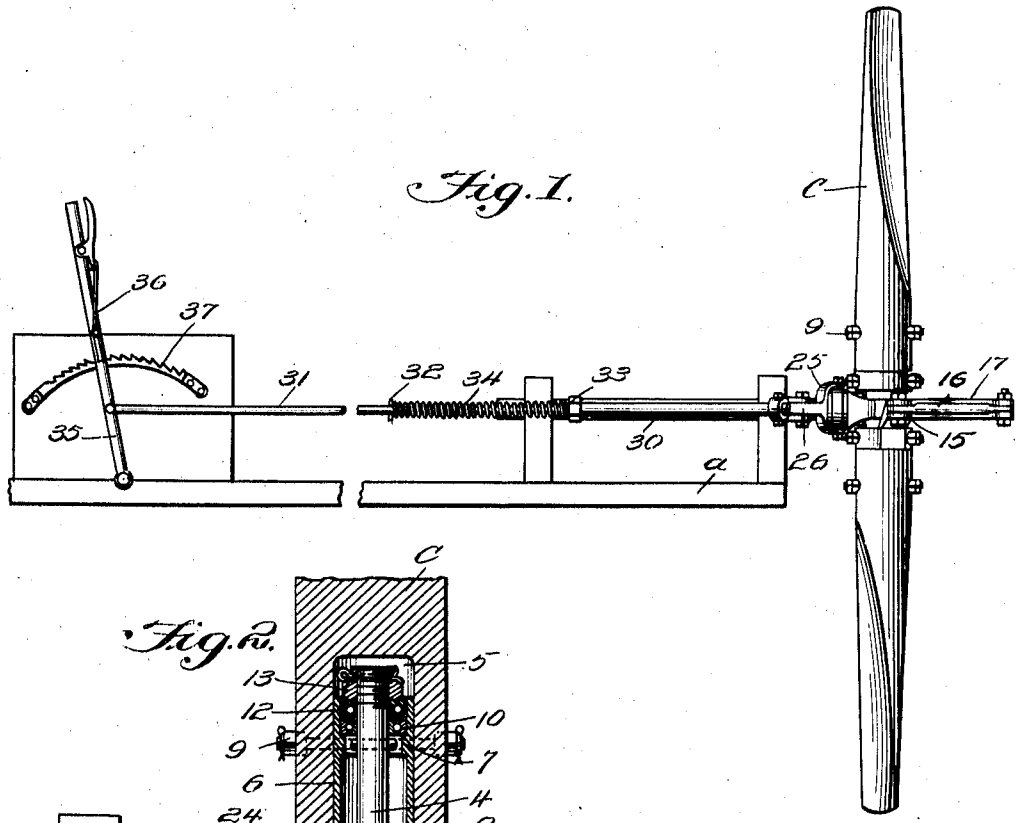


Fig. 2.

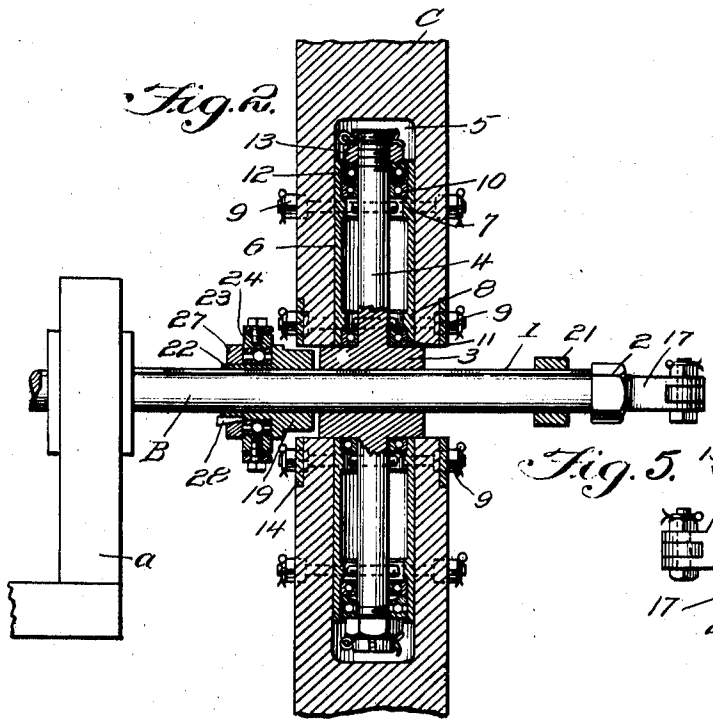
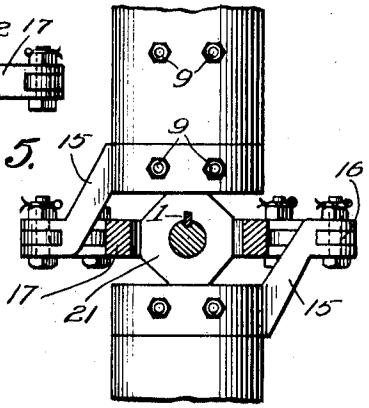


Fig. 5.



Inventor

Clive K. Henington

By Geo. P. Kimmel.

Attorney

UNITED STATES PATENT OFFICE.

CLIVE K. HENINGTON, OF DE SMET, SOUTH DAKOTA.

AUTOMATIC PITCH-ADJUSTER FOR PROPELLER-BLADES.

1,364,755. Specification of Letters Patent. Patented Jan. 4, 1921.

Application filed January 3, 1920. Serial No. 349,307.

To all whom it may concern:

Be it known that I, CLIVE K. HENINGTON, a citizen of the United States, residing at De Smet, in the county of Kingsbury and State of South Dakota, have invented certain new and useful Improvements in an Automatic Pitch-Adjuster for Propeller-Blades, of which the following is a specification.

This invention comprehends certain improvements in means for effecting manual and automatic adjustment of the pitch of propeller blades and has for its primary object to provide in conjunction with manually operable means for effecting such adjustment improved resilient means tensioned against the air pressure for maintaining the propeller blades at an effective pitch.

Other objects of the invention are; to provide an adjusting mechanism which will not appreciably increase head resistance; to provide means for decreasing frictional resistance to the adjustment of the propeller; and to so associate the resilient or automatic adjusting mechanism with the manual adjusting mechanism that it will form a part thereof and will act in conjunction therewith.

More particularly the present invention contemplates improvements in my prior application upon automatic pitch adjusters for propeller blades, filed November 13, 1918, Serial No. 262,368, and in general terms it includes a hub on the drive shaft to which the propeller blades are swivelly connected and are adjusted by operative connection with a slidable and non-rotatable sleeve on the shaft manually operated through a lever and rod which has associated therewith the resilient automatic adjusting mechanism.

Other improvements and novel details in the construction and arrangement of the various parts of the apparatus will be brought out more in detail in the description to follow, which, for a clear understanding of the invention, should be considered in connection with the accompanying drawing, forming a part hereof, and wherein is disclosed, for the purpose of illustration, convenient and satisfactory embodiments of the invention. It is to be understood in this connection, that minor changes in the construction and arrangements of the parts may be made without departing from the spirit of the invention or the principles of operation.

In the drawings wherein the preferred embodiment of the invention is shown:

Figure 1 is a side elevation of a propeller with which the present invention is incorporated.

Fig. 2 is a sectional side elevation through the longitudinal axis of the drive shaft.

Fig. 3 is a detail of the adjusting mechanism in position to effect the greatest pitch.

Fig. 4 is a detail view of the adjusting mechanism in position to effect the least pitch and,

Fig. 5 is a detail of the connection between the blades and the adjusting mechanism.

Like characters of reference indicate like or similar parts throughout the several views in which:—

A designates a base which in actual practice will be the fuselage of an air craft and B is the drive or propeller shaft which is provided with a longitudinal rib 1 and has a castle nut 2 upon its terminal.

Fixed to the shaft B and spaced from the base A and the end carrying the castle nut 2 is a hub 3 having opposed stub shafts 4 upon which are carried the propeller blades C.

As the propeller blades C are identical in construction the description will be limited to one of them. Extending longitudinally in the propeller blade shank is a cylindrical recess or socket 5 within which is mounted a sleeve 6 having annular shoulders 7 and 8 adjacent its ends and secured in place by bolts 9 extending transversely through the shank and to one side of the longitudinal axes thereof.

Extending within the sleeve is the stub shaft 4 between which and the sleeve are mounted ball-races 10 and 11 abutting respectively the shoulders 7 and 8 and reducing frictional resistance upon turning the propeller to a minimum, while stress longitudinally of the propeller is taken up by the thrust bearing 12 mounted between the ball-race 10 and the castle nut 13 on the end of the stub shaft.

Embracing the terminals of the propeller shanks are collars 14 secured thereto by several of the bolts 9 and having inwardly and angularly extending arms 15 pivotally connected to links 16 which in turn are pivoted to the longitudinally extending opposed arms 17 of the frame 18. The frame 18 is

mounted on a slidable but non-rotatable sleeve 19 on the shaft B and is cut away as at 20 to bridge the hub 3 of the propeller and the opposite side of which is journaled on the shaft B as at 21 and outward movement thereof is limited by the castle nut 2 before referred to.

The sleeve 19 is reduced as at 22 and has mounted thereon a ball-race 23 surmounted by a ring 24 to which is pivotally secured the arms 25 formed by the bifurcated end of the operating lever 26 pivoted to the base A as at 26ª. A collar 27 pinned to the reduced portion 22 as at 28 prevents displacement of the ring and ball-race and allows the sleeve 19 to rotate therewithin although the same may be slid longitudinally of the shaft B to adjust the propeller blades.

Pivoted to the lever 26 as at 29 is a hollow operating rod 30 within which is received a second operating rod 31 carrying a stop 32 between which and the nut 33 on the rod 30 and embracing the rod 31 is a contractile coil spring 34 for resiliently adjusting the pitch of the propeller blades in coöperation with manual adjustment thereof through movement of the rods to slide the sleeve 19 along the drive shaft. In this connection reference is to be had to my copending application, filed November 13, 1918, Serial No. 262,368.

A suitable operating lever 35 connected with the rod 31 has a manually operated pawl 36 engaging a segmental rack 37 for effecting manual and positive adjustment of the pitch of the propeller blades.

In operation when it is desired to increase the pitch of the propeller blades the pawl 36 is disengaged from the segmental rack 37 and the lever 35 moved to the rear whereupon the rod 31 will expand the coil spring 34 to move the hollow operating rod 30 rearwardly. As the operating lever 26 is pivoted to the sleeve 19 the frame 18 will be moved forwardly and the blades will be rotated through the medium of links 16, but as the adjustment is resilient (through coil springs) the blades will automatically adjust themselves to the angle of most effective pitch.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matters contained in the above description or shown in the accompanying drawings shall be interpreted, as illustrative and not in a limiting sense. It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What I claim is:

1. A device of the character described comprising a shaft, a hub secured thereon provided with opposed radiating spokes, blades mounted for turning movement on the spokes whereby to vary the pitch thereof, a frame slidably mounted upon the shaft having a longitudinal slot accommodating the hub, a sleeve slidably mounted on the shaft and supporting one terminal of the frame, the opposite end of the frame being secured upon the shaft, a pivoted lever having a bifurcated terminal engaging the sleeve for moving the latter together with the frame longitudinally of the shaft, and means connecting the last mentioned terminal of the frame with the blades for varying the pitch thereof.

2. A device of the character described comprising a shaft, a hub secured thereon provided with opposed radial spokes, blades pivotally mounted on the spokes and adapted for pivotal movement to vary the pitch thereof, a frame slidably mounted upon the shaft having a longitudinal slot accommodating the hub, a sleeve slidably mounted upon the shaft supporting one terminal of the frame, the opposite terminal of the frame being mounted directly upon the shaft, a lever having a bifurcated extremity connected with the sleeve for adjusting the latter longitudinally of the shaft, longitudinally extending arms carried by the frame, and link connections between the arms and the blades for varying the pitch of the latter incident to the longitudinal movement of the frame with relation to the shaft.

3. A device of the character described comprising a shaft, a hub mounted thereon, radially projecting spokes carried by the hub, blades mounted upon the spokes and adapted for pivotal movement thereon to vary their pitch, a frame slidably mounted upon the shaft at one terminal, a sleeve slidably mounted upon the shaft for supporting the opposite terminal of the frame, said frame having a longitudinal slot accommodating the hub, link connections between the frame and the blades for varying the pitch of the latter incident to the longitudinal movement of the frame with relation to the shaft, a manually operable lever, and yieldable connections between the manually operable lever and the first mentioned lever for adjusting the latter.

In testimony whereof I affix my signature hereto.

CLIVE K. HENINGTON.