C. K. HENINGTON.

AUTOMATIC PITCH ADJUSTER FOR PROPELLER BLADES.

APPLICATION FILED NOV. 13, 1918.

1,388,038. Patented Aug. 16, 1921.

Fig. 1.

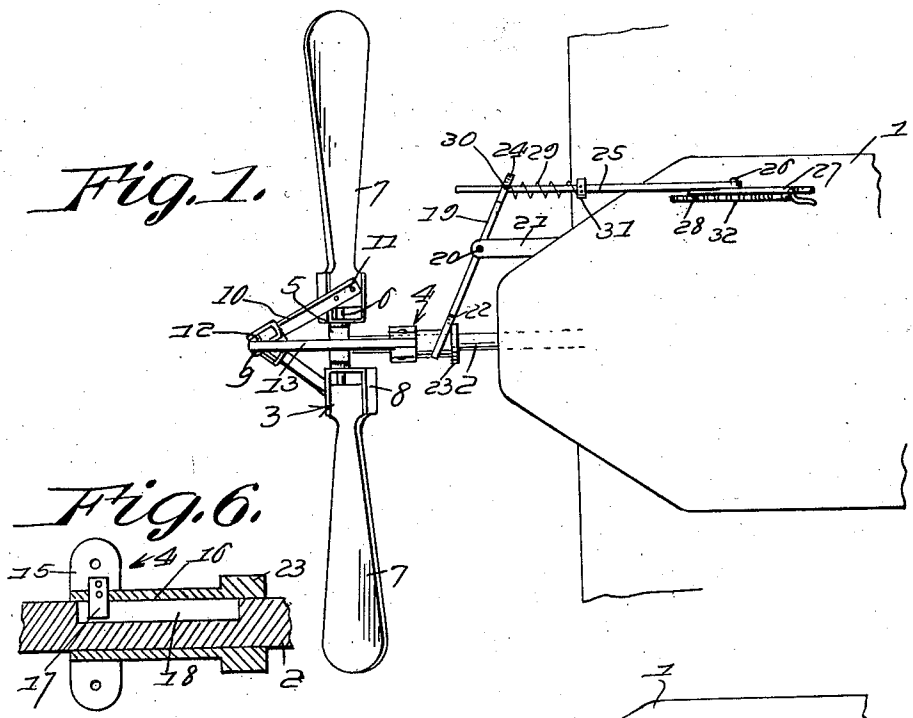


Fig. 6.

Fig. 2.

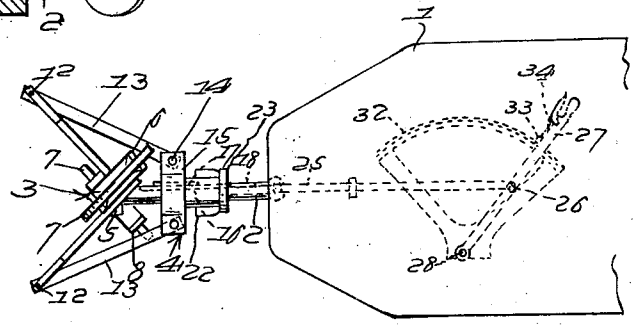
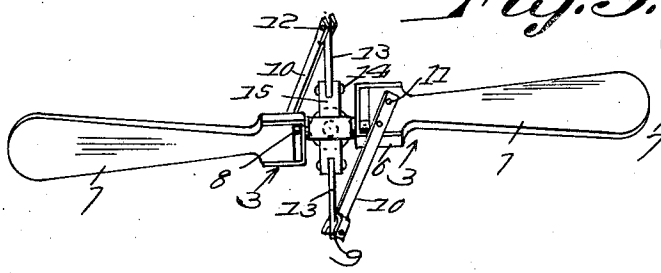


Fig. 3.



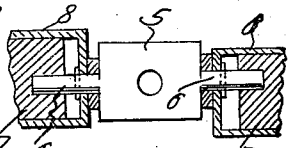


Fig. 5.

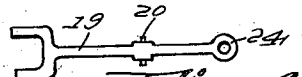


Fig. 4.

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AUTOMATIC PITCH-ADJUSTER FOR PROPELLER-BLADES.

1,388,038. Specification of Letters Patent. Patented Aug. 16, 1921.

Application filed November 13, 1918. Serial No. 262,368.

To all whom it may concern:

Be it known that I, CLIVE K. HENINGTON, a citizen of the United States, residing at Davis, in the county of Murray and State of Oklahoma, have invented certain new and useful Improvements in Automatic Pitch-Adjusters for Propeller-Blades, of which the following is a specification.

This invention comprehends generally improvements in that class of inventions known as aeronautics and more particularly relates to an automatic pitch adjuster for propeller blades.

It is the primary aim and object of the present invention to provide a device of the above mentioned character wherein improved manually operable means is employed for adjusting the pitch of the blades of a propeller while acting in conjunction therewith is improved resilient means tensioned against the air pressure for maintaining the propeller blades at an effective pitch.

More particularly this invention contemplates the provision of a device of the above mentioned character wherein the propeller embodies a rigid hub having the blades swivelly connected thereto at or near their leading edges and these blades are also operably connected to a slidable and non-rotatable sleeve on the propeller shaft while operably connected to the sleeve is the adjusting means, which latter is designed to embody the coacting resilient means.

The invention also embraces the provision of a device of the above mentioned character wherein the manually operable adjusting means is of novel construction and may be said to consist generally of a pivoted main lever and a pivoted sleeve engaging lever yieldingly connected to the main lever.

It is a more specific object of this invention to provide a device of the above mentioned character wherein the resilient means in addition to acting to yieldingly maintain the blades at a certain pitch is also designed to form a part of the operating means.

Among the other aims and objects of this invention may be recited the provision of a device of the above mentioned character wherein the number of parts are comparatively few, the construction simple, the cost of production low, and the efficiency high.

The improvements in the details and arrangement of parts will be apparent from an inspection of the accompanying drawings, in connection with the specific description hereinafter contained, and wherein the preferred embodiment of the invention is disclosed for the purpose of imparting a full understanding of the invention.

The invention is clearly illustrated in the accompanying drawings, in which:

Figure 1 is a top plan view of the device applied on a portion of an aeroplane,

Fig. 2 is a side elevation of the same,

Fig. 3 is an end elevation of the propeller,

Fig. 4 is a detail of the pivoted sleeve engaging lever,

Fig. 5 is a fragmentary sectional view of the pivotal mounting for the propeller blades, and

Fig. 6 is a detail sectional view of the splined adjusting sleeve.

Similar characters of reference are employed in all of the above described views, to indicate corresponding parts.

Referring now, more particularly, to the accompanying drawings, there is illustrated a portion of an aeroplane, in the body 1 of which is rotatably mounted a propeller shaft 2 on the projecting end of which is mounted the improved propeller generally designated by the numeral 3 while operably arranged on the shaft, propeller and body is the improved pitch adjusting means generally designated by the numeral 4.

In the present instance the propeller may be said to consist of a hub 5 rigidly mounted on the projecting end of the shaft 2 and from which project oppositely positioned studs 6 while connected to the inner end of the oppositely disposed blades 7 are bearing brackets 8 desirably of U-shaped configuration, the intermediate portion being formed with openings which aline with sockets 9 in turn formed in the inner end and near the leading edges of the blades 7. It is through these openings and in these sockets 9 that the studs are arranged for the swiveling of the blades to the hub, the brackets 8 serving as bearings. Angularly projecting arms are carried by and project from the inner ends of the blades being preferably secured to the side faces by fasteners 11. The outer ends of the arms are bifurcated to provide spaced

ears 12 between which are pivoted the ends of opposed links 13, the opposite ends of which are in turn pivotally mounted as at 14 between the opposed pairs of ears 15 carried by one end of a sleeve 16. This sleeve is slidably and non-rotatably mounted on the shaft preferably by means of a key 17 which operates a longitudinal key-way 18 provided in the shaft. By the arrangement of the key 17 and key-way 18, the pitch of the blades 7 of the propeller is regulated or limited, that is, when the key is at the outer end of the slot the blades are at their greatest pitch and likewise when the key is positioned at the inner end of the slot or keyway, the blades are at their minimum pitch.

With a view toward providing the improved means for adjusting the pitch of the propeller blades, and at the same time, yieldingly maintain the blades at an adjusted pitch, a sleeve adjusting lever 19 is swingably mounted medially of the ends as at 20 to a bracket arm 21 which projects from the body 1 of the aeroplane, one end of the lever being forked as at 22 for disposition about the sleeve between the ears 15 and an integral collar 23 at the inner end of the sleeve. The opposite end of the lever 19 is formed with an eye 24 through which is slidably disposed the outer portion of a connecting rod 25, the inner end of which is pivoted as at 26 medially of the ends of an adjusting or operating lever 27 which is preferably pivotally mounted at 28 in the body 1 so that the handle portion will be positioned in proximity to the driver. The resilient means which serves to yieldingly maintain the blades at a predetermined pitch and at the same time form a part of the adjusting means for the blades in the present instance may be said to consist of a coiled compression spring 29 disposed about the connecting rod 25 and having one end rigidly connected as at 30 to the eye 24 on the lever 19 and its opposite end connected to a collar 31 carried by the rod between the two levers 19 and 27. A segmental rack 32 is mounted in the body 1 near the lever 27, the teeth of the rack being engageable by a manually operable pawl 33 operatively connected as at 34 on the lever 27. By the provision of this construction and arrangement, it is apparent that when the lever 27 is engaged and swung rearwardly the rod 25 will move therewith and as this rod is connected with the lever 19 by the compression springs, the lever 19 will be swung about its pivot, the forked end 22 thereof serving to slide the sleeve forwardly or outwardly on the shaft and as the links 13 are connected to the sleeve and also to the outer ends of the arms 10, a pressure will be exerted on these arms to swing or adjust the blades to the corresponding or desired pitch. When this has been accomplished the lever 27 is locked by the releasing of the pawl 33 which engages the segmental rack 32. The adjustment of the propeller blades may occur either before starting the aeroplane or while it is in flight. When the parts are in the position described, the compression of contractile spring 29 which is of sufficient strength to meet the requirements, serves to yieldingly hold the sleeve 16 forwardly and consequently yieldingly maintain the blades 7 at the adjusted pitch.

In use, assuming that the parts have been constructed and assembled in the manner described subsequent to the setting of the lever to consequently adjust the blades at such pitch as to tax the motor's power, the machine is started. When in flight, the spring 29 serves to yieldingly maintain the blades at the adjusted pitch and this spring is tensioned so as to act against the air pressure on the inside of the propeller blades, for insuring of the proper position of the propeller blades as is apparent. When the air pressure is increased or becomes greater than the required tension of the spring 29, this pressure is exerted on the links 13 for sliding the sleeve 16 rearwardly, causing an expansion of the spring 29. Just as soon, however, as the air pressure decreases the spring will contract to return the blades to their previously adjusted positions.

It is believed in view of the foregoing description that a further detailed description of the operation of the invention is entirely unnecessary. Likewise it is believed that the advantages of the invention will be readily apparent.

Still further embodiments of the invention than those herein especially defined may be resorted to as conditions or preference may dictate, as may be in keeping with the hereto appended claim.

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

In a device of the character described in combination with a rotatable shaft, a propeller having a rigidly mounted hub on the end of said shaft, oppositely positioned studs formed on said hub, offset U-shaped bearing brackets and propeller blades swivelly mounted on said studs, angularly extending arms connected to the side faces of the said blades, said arms having their outer terminals bifurcated providing spaced ears, links pivotally connected to said ears, a longitudinally adjustable sleeve splined to said rotatable shaft, having opposed ears connected to said links and a sleeve adjusting angularly extending lever pivoted medially to a bracket support, a connecting rod yieldingly secured to the end of said sleeve adjusting lever, an adjustable collar carried

by said connecting rod, a rack and lever mechanism offset from the axis of the hub and rotatable shaft, and a compression spring interposed between the said collar and an attaching eye on the upper end of the sleeve adjusting lever for yieldingly maintaining the blades at a predetermined pitch and also maintaining the connecting rod and sleeve adjusting lever in adjusted position relative to said rack and lever mechanism.

In testimony whereof, I affix my signature hereto.

CLIVE K. HENINGTON.