Aug. 9, 1932. T. F. HAMILTON 1,870,361

PROPELLER HUB AND BLADE MOUNTING

Filed Nov. 8, 1928 2 Sheets-Sheet 1

Fig. 1.

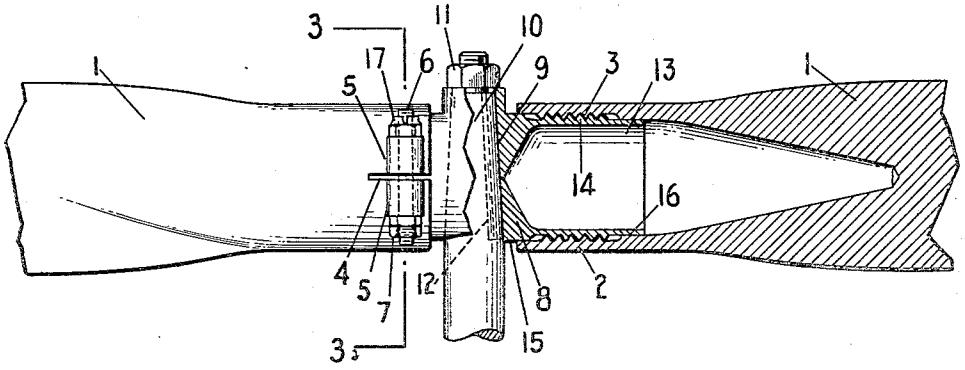


Fig. 2

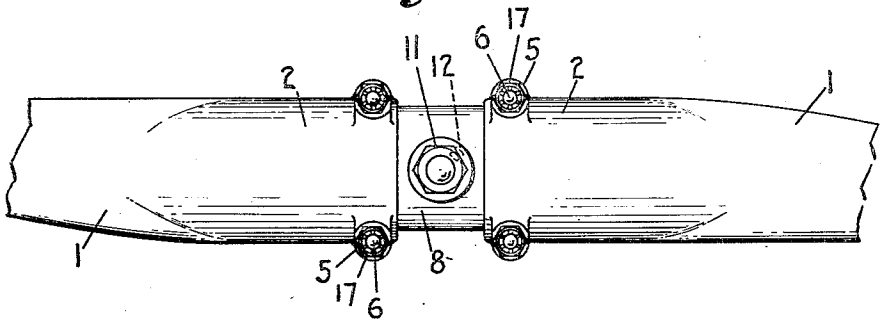
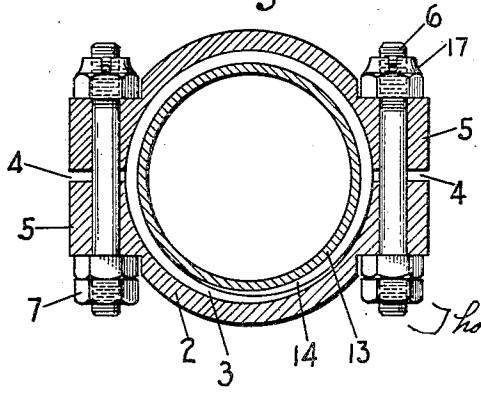


Fig. 3



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Fig. 4

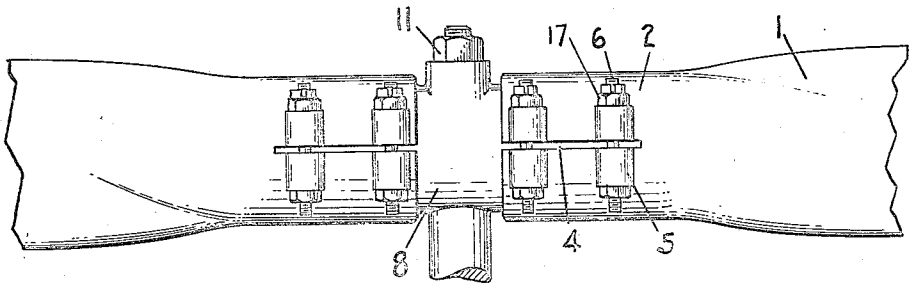


Fig. 5

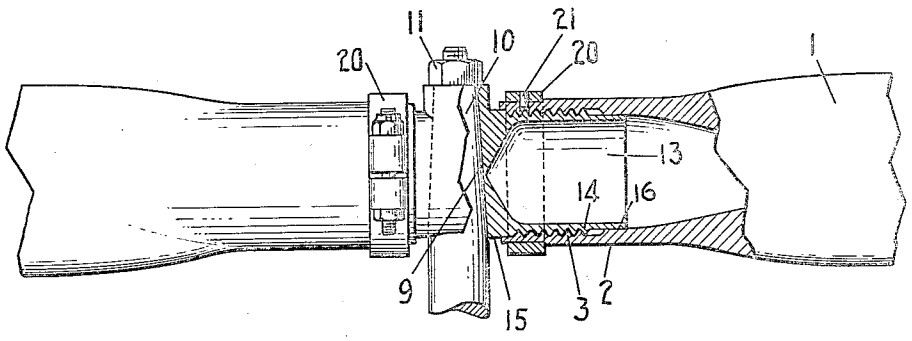


Fig. 6

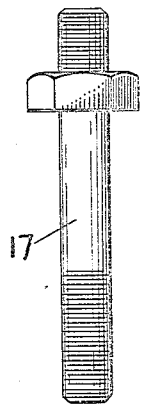
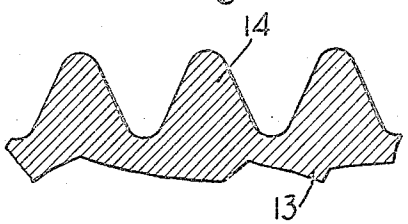


Fig. 7



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Patented Aug. 9, 1932

1,870,361

UNITED STATES PATENT OFFICE

THOMAS F. HAMILTON, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HAMILTON STANDARD PROPELLER COMPANY, OF WEST HOMESTEAD, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

PROPELLER HUB AND BLADE MOUNTING

Application filed November 8, 1928. Serial No. 317,895.

My invention relates to propellers for air craft and more specifically to providing an improved means of mounting such blades so that though held with perfect security yet they may be quickly and easily interchangeable.

My invention has for its object to provide a novel form for the inner end of the propeller blade which will not only be available for securing the blades to the hub but may also be used to balance the propeller blades.

My invention has for its further object to provide a mounting whereby the propeller blades may be adjusted longitudinally of their axis.

My means of accomplishing this object may be more readily understood by having reference to the accompanying drawings, which are hereto annexed and are a part of this specification, in which

Fig. 1 is a view partly in elevation and partly in section showing the propeller hub and blade end assembly;

Fig. 2 is a plan view of the device as shown in Fig. 1;

Fig. 3 is a section taken on the line 3—3 in Fig. 1;

Fig. 4 is a modified form of my clamping and balancing mechanism;

Fig. 5 is a different form of clamp;

Fig. 6 is a detail of one of the bolts; and

Fig. 7 is an enlarged detail of the threads on the hub.

Similar reference numerals refer to similar parts throughout the entire description.

As shown in the drawings the propeller blades 1 are formed with hollow ends 2 which are provided with internal threads 3. Slots 4 are formed in the walls of the hollow ends 2, diametrically opposite to each other as clearly seen in Fig. 3. Bosses 5 are formed on the exterior of the walls of the hollow ends 2 adjacent the slots 4 through which bolts 6 are passed. These bolts are preferably formed as shown in Fig. 7 with extensions so that additional nuts 7 may be mounted thereon and may be used for balancing purposes. The hub 8 is constructed of a single forging which is provided with a central bore 9 which is preferably tapered and fitted to the outer end 10 of the engine crank shaft being secured thereon in any of the standard ways by which propeller hubs are mounted. As illustrated, a nut 11 serves to draw the tapered bore 9 tightly on to the end 10 of the shaft. A key 12 is also inserted in a key way or slot as is usual in such construction.

Two arms 13 (or more if desired) extend from the hub 8. In practice I have found it desirable to make the arms 13 hollow as illustrated, thus attaining lightness without sacrificing needed strength. They are provided with external threads 14 which are fitted to and coincide with the internal threads 3 cut on the hollow ends 2 of the propeller blades 1. The surface 15, of the arms 13, adjacent the shaft mounting, is smooth, as is also the end 16 of the arm 13, these smooth surfaces fitting to similar surfaces formed upon the inside of the hollow ends 2 of the propeller blades 1.

In mounting the blades 1, they are screwed on to the arms 13 and adjusted until they reach the desired longitudinal and angular positions, when the nuts 17 are tightened on the bolts 6, and since the threads are cut as shown in Fig. 7 it will be apparent that they provide uniform tapered surfaces so that the ends 2 will be drawn down and clamp the ends 2 of the blade 1 tightly upon the arms 13 of the hub 8.

It may in some cases be deemed desirable to form more than one pair of bosses on the blade ends, and to extend the slots 4 as shown in Fig. 4, although I have found in practice that a single clamp at the inner end of the blade holds it rigidly and satisfactorily in use.

As shown in Fig. 5, instead of providing the bosses 5 I employ a split ring 20, which is secured in place by a dowel 21. In the split ring the bolts used are similar to those employed in my preferred construction shown in Fig. 1, which is obviously very much cheaper as it does away with one additional part. When this type of clamping means is employed, if a proper fit is made between the propeller butt and the hub, it has been found in practice that it is not necessary to provide the slots 4 nor even to split

the end of the propeller, as the metal of which the blades are cast or formed is sufficiently ductile to be compressed by the pressure exerted through the bolts 6 upon the split ring 20 and, in turn, upon the inner end of the propeller blade.

Although I have described a specific form of construction, it is not to be understood that I am limited thereby, as the showing is merely to disclose a preferred form, and many changes may be made in the details without departing from the scope of my invention, and I therefore do not desire to be limited except as such limitations may appear in the hereinafter contained claims.

Having described my invention, what I regard as new, and desire to secure by Letters Patent of the United States, is:

1. An aeronautical propeller blade mounting comprising a hub adapted to be mounted on an engine shaft, a plurality of radial integral arms extending from the hub, external threads on said arms, propeller blades having hollow internally threaded ends adapted to engage the threads on said arms, the hollow blade ends having diametrically disposed slots, bosses on the blade ends on each side of each of said slots, and bolts in said bosses to clamp the blade ends on the hub arms.

2. An aeronautical propeller blade mounting comprising a hub adapted to be mounted on an engine shaft, a plurality of radial integral arms extending from the hub, external threads on said arms, propeller blades having hollow internally threaded ends adapted to engage the projections on said arms, the blade ends having a pair of diametrically disposed slots, and means to clamp the slotted blade ends on the hub arms.

3. An aeronautical propeller having ductile blades with hollow ends and a hub with radial arms, wherein the hollow ends of the blades are screwed directly onto the arms of the hub and clamped to said arms by tension bolts acting to contract the hollow blade ends on said arms, said bolts being provided with extra threads on their ends, and extra nuts mounted on said threads for balancing the blades.

4. An aeronautical propeller having ductile blades with hollow ends and a hub with radial arms, wherein the hollow ends of the blades are screwed directly onto the arms of the hub and firmly clamped to said arms by split ring clamps placed around the hollow blade ends, the ends of the said clamps being connected by tension bolts, said bolts having extra screw threads on their ends, and extra nuts mounted on said bolts for balancing the blades.

THOMAS F. HAMILTON.