June 7, 1932. H. P. MORRIS 1,862,235

PROPELLER

Filed July 25, 1930 2 Sheets-Sheet 1

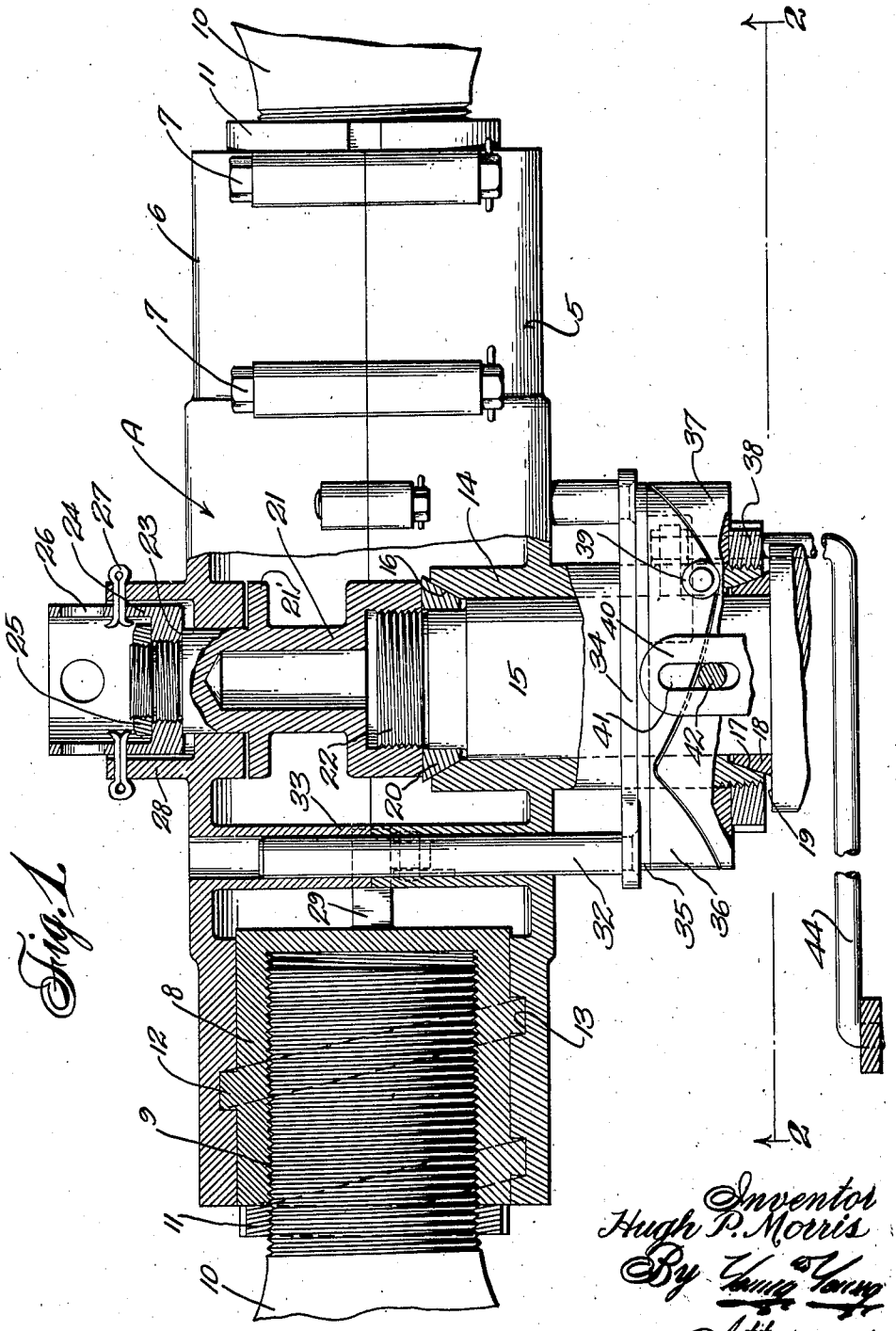


Fig. 1

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Fig. 2.

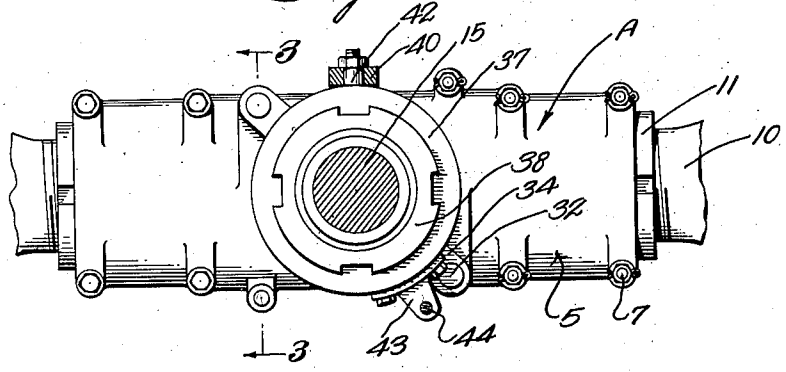
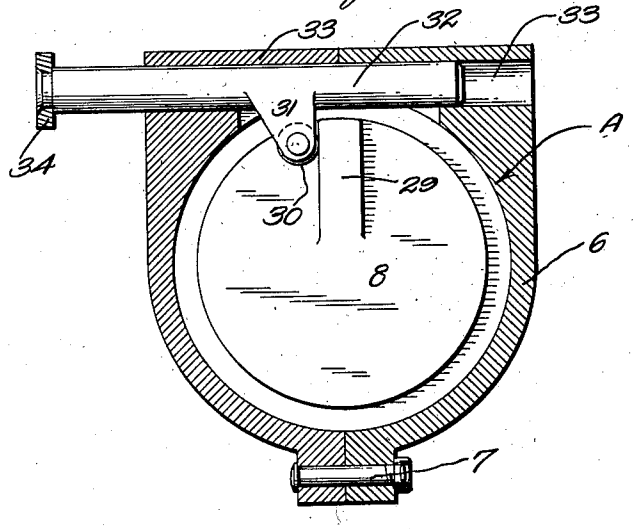


Fig. 3.



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Patented June 7, 1932 1,862,235

UNITED STATES PATENT OFFICE

HUGH PAUL MORRIS, OF MILWAUKEE, WISCONSIN, ASSIGNOR OF ONE-HALF TO SIMON DEUTSCH, OF MILWAUKEE, WISCONSIN; EUDORA MORRIS ADMINISTRATRIX OF SAID HUGH PAUL MORRIS, DECEASED

PROPELLER

Application filed July 25, 1930. Serial No. 470,665.

This invention relates to propellers and more particularly to propellers of the type employed for aeroplane propulsion.

One of the primary objects of my invention is to provide a propeller in which the angle of the blades can be readily changed either during the rotation of the propeller or while the propeller is at rest.

Another prime object of my invention is the provision of novel means for supporting the blades in the propeller hub with novel means for actuating said supporting means whereby the angle of the blades can be easily and quickly changed to suit varying conditions.

A further object of my invention is the provision of a propeller embodying a hub having rotatable sockets receiving the propeller blades with novel means for rotating these sockets to change the angle of the blades, said means embodying pusher pins slidably carried by the hub having operative connection with the sockets, with novel cam members rotatable relative to the hub for actuating said pins.

A still further object of my invention is to provide an improved propeller of the above character, which will be durable and efficient in use, one that will be simple and easy to manufacture and one which can be placed upon the market at a reasonable cost.

With these and other objects in view the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described, claimed and illustrated in the accompanying drawings, in which:

Figure 1 is a fragmentary plan view of my improved propeller showing the same attached to an engine drive shaft, parts of the propeller being shown broken away and in section.

Figure 2 is a section taken on the line 2—2 of Figure 1 looking in the direction of the arrows and

Figure 3 is a detailed transverse section through the hub of the propeller taken on the line 3—3 of Figure 2 looking in the direction of the arrows illustrating the operative connection between one of the pusher pins and one of the sockets for the blades.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views the letter A generally indicates my improved propeller which comprises a hub 5 including a two part sectional casing 6, the sections of the casing being connected together by the use of suitable bolts or other fastening elements 7. The opposite ends of the sectional casing 6 receive sockets 8 for the shanks 9 of the propeller blades 10. As shown the sockets 8 are internally threaded and the shanks 9 of the propeller blades are threaded therein and held against movement relative thereto by use of suitable locking rings 11. The outer faces of the sockets 8 are provided with spiral ribs 12 which are fitted in spiral ways 13 formed on the inner faces of the ends of the hub casing 6. By this construction the propeller blades 10 are rigidly connected to the sockets 8 while the sockets are rotatable in the hub.

Formed on the hub casing 6 at the axial center thereof is a hub sleeve 14 which receives the drive or propeller shaft 15 and is splined thereon. This shaft 15 maybe the crank shaft of an internal combustion engine or other prime mover. The opposite ends of the hub sleeve 14 are preferably tapered or bevelled as at 16 and 17. The bevelled end 17 of the hub sleeve 14 fits against a tapered ring 18 fitted against a shoulder 19 formed on the shaft. A similar tapered ring 20 fits against the bevelled end 16 of the hub sleeve 14 and this ring 20 has bearing against the same a threaded head 21. This head 21 is threaded on the threaded end 22 of the shaft 15 and a portion of the head 21 protrudes through the outer section of the sec-

tional hub casting 6. The outer end of the head 21 is reduced in diameter to provide a shoulder 23 and the reduced end is provided with right hand threads on which is threaded the socket 24. This socket is threaded into binding contact with the shoulder 23 and the head beyond the socket is provided with left hand threads for the reception of a lock nut 25, which is threaded into binding contact with the socket.

After the socket 24 has been threaded on the head 21, it is obvious that the head 21 can be readily threaded on the shaft 15 for holding the hub 5 of the propeller on said shaft for rotation therewith. The socket 24 can be provided with suitable openings 26 for receiving any preferred type of tool for facilitating the rotation of the socket. In order to prevent rotation of the socket 24 relative to the hub 5 and the loosening of the head 21 and the propeller after the final adjustment of the head 21, suitable cotter or lock pins 29 are passed through the socket 24 and a hollow lock nut boss 28 integrally formed on a hub casting 6, which boss 28 receives the socket 24.

By the means just described the sectional hub casting 6 can be quickly and readily connected to the propeller shaft and positively held thereon against working loose. The head 21 is provided with a flange 21′ for engaging the inner face of the hub, whereby the head 21 can be used to pull the propeller from off of the shaft after the loosening of said head.

The inner ends of the sockets 8 for the propeller blades 10 are provided with radially extending arms or projections 29 which have bearing against the same anti-friction rollers 30 carried by ears 31 formed on pusher pins 32. These pusher pins 32 are slidably mounted in suitable guide sleeves 33 formed on the hub casting 6.

The inner ends of the pins 32 are suitably connected to a pusher ring 34 carried by the hub sleeve 14. This pusher ring bears against a suitable anti-friction washer 35 and this washer in turn bears against an actuator cam 36 rotatably mounted on the hub sleeve. This actuator cam 36 bears against a similar cam 37 likewise rotatably mounted on the hub sleeve. The cams 36 and 37 are held on the hub sleeve by the use of a suitable lock ring 38 threaded on the hub sleeve, as clearly shown in Figure 1 of the drawings. The points of the cams 36 and 37 are arranged in facial relation and the cam 36 preferably carries anti-friction rollers 39 for bearing against the points of the cam 37. The cam 37 is held against rotation on the hub sleeve by the use of stationary brackets 40 which may be secured to any stationary part, such as the crank case of the engine. The brackets 40 are provided with longitudinal slots 41 through which extend pins 42 carried by said cam 37 which pins keep the cam from turning.

Means are provided for rotating the cam 36 relative to the cam 37 so as to slide the cam 36 longitudinally on the hub sleeve and thus bring about the desired movement of the pusher ring 34 and its pusher pins 32. As shown the cam 36 is provided with a radially extending ear 43 to which is connected an operating link 44 which can be actuated in any desired way from the cock-pit of an aeroplane.

When it is desired to change the angle of the propeller blades 10, the operating link 44 is operated so as to bring about the turning of the cam 36 relative to the cam 37, so that the rollers 39 of the cam 36 will ride up on the high points of the cam 37 thereof bringing about the sliding of the cam 36 on the hub sleeve toward the hub casting 6. This movement of the cam 36 will be transmitted to the pusher pins 32 and the rollers 30 carried by the ears 31 of the pins pushing against the radial arms or projections 29 of the sockets 8 will turn the socket and consequently change the angle of the blades.

The air thrust on the blades and centrifugal action on the blades will tend to normally hold the arms or projections 29 of the sockets 8 against the ears of the pusher pins and consequently when it is desired to restore the blades to their initial position the cam 36 is rotated in a retrograde direction and the arms or projections 29 bearing against the pusher pins will push the pins 32 and the pusher ring 34 against the cam 36.

While I have shown the pusher pins 32 arranged in one position on opposite sides of the hub casting it is obvious that the pushing pins can be placed on the other side of the hub casting, to suit different conditions.

From the foregoing description it can be seen that I have provided an exceptionally simple and highly efficient means for changing the angle of propeller blades during rotation of the propeller.

Changes in details may be made without departing from the spirit or the scope of this invention but what I claim as new is:

1. A propeller comprising a hub, propeller blades rotatably mounted in the hub, radially extending arms carried by the inner ends of the blades, push pins slidable in the hub having means engaging the arms, a pusher ring connected with said pins, a pair of facing cam members rotatably mounted relative to the hub, means for holding one of said cam members against rotation, and means for turning the other cam member relative to the first mentioned cam member.

2. A propeller comprising a hub including a hub casting, an axially disposed sleeve carried by the hub casting, propeller blades rotatably mounted in the hub casting and ar-

ranged radially of the hub sleeve, radially extending arms formed on the inner ends of the blades, guide sleeves formed on the hub casting on opposite sides of the hub sleeve, push pins slidably mounted in the guide sleeves, ears carried by the push pins, anti-friction rollers on the ears engaging said arms, a pair of facing cam members rotatably receiving the hub sleeve, a bearing washer interposed between the pusher ring and one of said members, means for holding one of said cam members against rotation, and manual means for rotating the other of said cam members.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee, in the county of Milwaukee and State of Wisconsin.

HUGH PAUL MORRIS.