

Jan. 3, 1967

R. FRIAS

3,295,610

AUTOMATIC PROPELLER PITCH CONTROL AND ADAPTOR

Filed Oct. 24, 1965

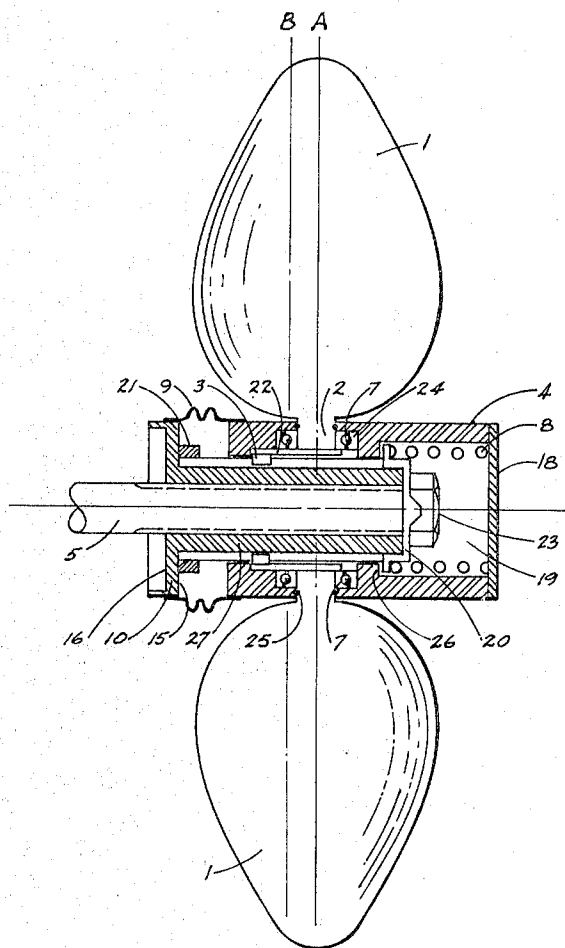


Fig. 1

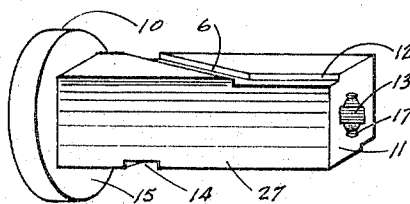


Fig. 2

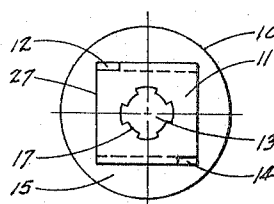


Fig. 3

INVENTOR
ROBERT FRIAS
BY MARCUS L. BATES

1

3,295,610

AUTOMATIC PROPELLER PITCH CONTROL AND ADAPTOR

Robert Frias, 2512 Redbud, Odessa, Tex. 79762

Filed Oct. 24, 1965, Ser. No. 504,649

5 Claims. (Cl. 170-160.49)

This invention relates to an automatically controlled propeller in which the pitch of the blades will always be at the most optimum position to effect maximum axial thrust when applied to propulsion and maximum fluid delivery when applied to fluid conveyors.

A general object of this invention is the provision of an improved propeller system of the character described in which the effective pitch of the propeller blade will be automatically varied in accordance to the axial loads imposed upon the blades.

Another object of this invention is to provide an improved and simplified automatic propeller assembly for outboard motorboat motors that can be readily substituted for any fixed pitch outboard motorboat motor propeller.

Still another object of this invention is to provide a multipurpose cam block and adaptor combination, and a spring retaining means that also serves as a washer and additionally provides a locking means to prevent disassembly of the apparatus.

A still further object of this invention is to provide an automatically adjustable propeller that depends upon the axial applied load of the motor and the load provided by the fluid medium in which it is operating to determine its most effective pitch angle.

Still further objects and advantages will result from this novel construction as will become apparent to those skilled in the art as the invention is hereinafter more fully disclosed.

In carrying this invention into effect, I may adopt the following below described arrangement and construction of parts and relate these parts to an outboard motorboat motor by way of example so as to enable others to better understand my invention, wherein;

FIGURE 1 of the drawing discloses a side elevational view with certain parts shown in section so as to divulge the interior of this device.

FIGURE 2 is a perspective view of one of the parts seen in FIGURE 1.

FIGURE 3 is a side view of the item seen in FIGURE 2, with some detail indicated by dotted lines.

Similar characters of the reference indicate similar parts of the several figures of the drawings, which will now be described in greater detail.

The propeller depicted in FIGURE 1 has blades 1 rigidly attached to propeller shaft 2 which is rotatably mounted by propeller shaft bearing 7 inside aperture 24 which is counterbored into propeller hub 4. An opposite end of the propeller shaft 2 has rigidly attached thereon cam follower link 22 which is actuated by cam follower 3. The propeller hub 4 is preferably a cylindrical steel hub having an axial bore forming a box 19 formed by removable cover plate 18 and shoulder 26. The propeller shaft bearings 7 fit in radial counterbores or bearing apertures 24. The hub is longitudinally slidable on adaptor 27 between stops 21 and 20. The stop 20 is affixed to the motor drive shaft and adaptor by motor drive propeller shaft nut 23, which nut also retains the splined adaptor 27 fixed relative to splined motor drive shaft 5. The stop 20 additionally provides an annular shoulder for spring 8 which depends or is compressed against hub cover plate 18. A bellows type seal is provided between adaptor flange 10 and the propeller hub 4, and a second seal is provided at the point indicated by numeral 25 (the details of which are not shown) on each propeller blade shaft.

2

The spring 8 is a variable constant spring, the details of such a spring being known to those skilled in the art.

A metered hydraulic cylinder with variable hydraulic characteristics may be used in lieu of the spring 8 as an alternative embodiment of this invention.

The details of the adaptor 27 are best seen in FIGURES 2 and 3 wherein like numerals refer to like elements. The adaptor 27 includes a flange 10 having face 15 and a cam guide 6 formed at an angle with cam guide 12 on the main adapter body. The purpose of cam 12 is to permit the cam follower to enter the cam way upon initial assembly. Numeral 14 indicates a like cam guide on the opposite face of the square adaptor body. The square adaptor body may also be made round while still retaining the same operative relationship with the remaining elements of the combination. Only four splines 17 are shown as being machined into the motor drive shaft receiving aperture 13, for clarity.

An important feature of the adaptor 27 is that it enables the entire apparatus to be substituted for any fixed pitch propeller on any outboard motor merely by changing the design of the adaptor to correspond with the motor drive shaft 5 of the particular type of motor under consideration.

After studying the drawings in light of the above description thereof, it may be readily seen that this novel automatic propeller will automatically adjust itself in accordance to the power output of motor drive shaft 5, the force against the blades 1, and the tension of spring 8. Should it be desired to change the characteristics of the blade at a certain velocity of the boat, the spring tension of 8 may be changed either by placing shims or the like between the spring and the hub cover 18, or by replacing the spring. The selection of the angle of groove 6 will also determine the thrust characteristics versus power output, and since this angle is fixed, it must be predetermined before the adaptor is milled in order to obtain optimum results.

The seal at 9 and 25 may find its maximum utility in fluids that are apt to have deleterious effects upon the inside parts of the apparatus, and in some instances, it may be desirable to dispose of these seals, especially where a sealed bearing 7 is employed.

The novel combination of spring 8, spring retainer means or stop 20, and the adaptor 27 cooperate with hub 4 to produce a highly effective automatic propeller pitch control mechanism. The multi-purpose stop or washer 20 is of particular interest since it provides the normal function of a washer between the fastening means or nut 23 and adaptor 27, acts as a stop or limit to the travel of hub 4, provides a locking or safety means to retain nut 23 in tightened relationship with respect to motor drive shaft 5 and adaptor 27, while at the same time provides an annular recess or aligning and retaining means for the spring 8, as shown in the drawing.

The adaptor 27 furthermore permits a very economical means for providing a cam way 6 and 12 since the device is square and thereby provides a flat surface into which the cam ways may easily and economically be accurately milled into the device. This design further permits equal cam pressures at all positions of the cam followers, i.e.; at both the beginning and end of the stroke of hub 4. The adaptor also provides the dual purpose of providing both a spline system and an adaptor, as previously mentioned.

This invention may be developed within the scope of the following claims without departing from the essence of patentee's novel device. It is therefore essential that the specification and drawings be read as being merely illustrative of a single practical embodiment of the invention, and that the intellectual property that is deemed

to be within the metes and bounds of patentee's invention be considered only from the following claims.

I claim:

1. In an automatic propeller pitch control mechanism, a shaft having a threaded end and an adaptor removably affixed thereto, a propeller hub slidably carried on said adaptor, a fastener means and a washer on the threaded end of said shaft with said washer being held tightly against said adaptor by said fastening means, said washer having a detent therein to provide a locking means for said fastening means, a resilient spring, a cover plate located on one end of said hub in spaced apart aligned relationship to shaft, said washer further forming a toroidal cup-like receptacle for receiving one end of said resilient spring in compressed relationship between said cup-like receptacle and said cover plate, and said washer further providing a stop means to limit the travel of said hub in one direction.

2. The mechanism of claim 1 wherein said adaptor is provided with attachment means to enable the adaptor to be rigidly affixed to the power drive shaft of a prime mover,

said adaptor being of rectangular configuration and having cam ways formed on opposite faces thereof, a cam follower adapted to be received within said cam ways, for imparting a rotational force to and for controlling the pitch of a propeller blade.

3. The device of claim 2 wherein said cam ways of said adaptor are milled in a longitudinal direction with respect to the power drive shaft, followed by and communicating with a second milled portion located so as to form an included angle of more than ninety degrees with respect to the first recited milled portion.

4. The device of claim 2 wherein the adaptor is provided with a flange on the depending end oppositely located to said fastening means, and said hub being slidably received about said adaptor so as to reciprocate thereon in close tolerance relationship therewith, said spring being adapted to bias said hub in a direction away from said shaft, and said cams being adapted to ride in said second cam way portion when movement is imparted to the hub with respect to said adaptor so as to effectively change the pitch of the propeller blade.

5. In an automatically adjusting marine propeller de-

vice adapted to be suitably mounted on a propeller shaft, the improvement comprising; an adaptor removably and rigidly attached to the shaft by a nut, a washer having an annular shoulder about its outer periphery and being rigidly and removably located between said nut and said adaptor, first cam guide means located in said adaptor and parallel to the longitudinal axis of said shaft, second cam guide means forming an extension of said first cam guide means and forming an angle with said first cam guide means, a propeller hub axially aligned in telescoping relationship to said adaptor and being longitudinally slidable thereon in close tolerance therewith, said hub having a removable cover thereon, spring loaded means applying a predetermined force between said adaptor and said hub in a direction tending to displace said hub in a longitudinal direction, said spring loaded means including a coil spring located within said hub and having one end cooperating with the annular shoulder of said washer and the opposite end abutting said cover, bearing means located radially from said shaft and symmetrically spaced about said hub, propeller blades having a shaft rotatably fixed in said bearing means, cam means in cooperative relationship with and actuated by said cam guide means and operatively affixed to said propeller shaft, whereby, when said propeller shaft is rotated in a fluid medium, said blades tend to rotate in said bearing in a direction that is in opposition to the force of said spring and in an amount that is proportional to the force of the fluid and the force delivered by said shaft that acts on said propeller, so as to assume an efficient pitch angle of said propeller blades.

References Cited by the Examiner

UNITED STATES PATENTS

1,864,045	6/1932	Kellogg et al.	170—160.49
2,292,147	8/1942	Miller	170—160.49
2,352,186	6/1944	Corrigan	170—160.49
2,468,004	4/1949	Walker	170—160.49
2,593,290	4/1952	Gansert	170—160.49 X
2,640,680	6/1953	Altheide	170—160.49 X

MARTIN P. SCHWADRON, *Primary Examiner.*

E. A. POWELL, Jr., *Assistant Examiner.*