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CONTROLLABLE PITCH PROPELLERS

Filed Oct. 17, 1966

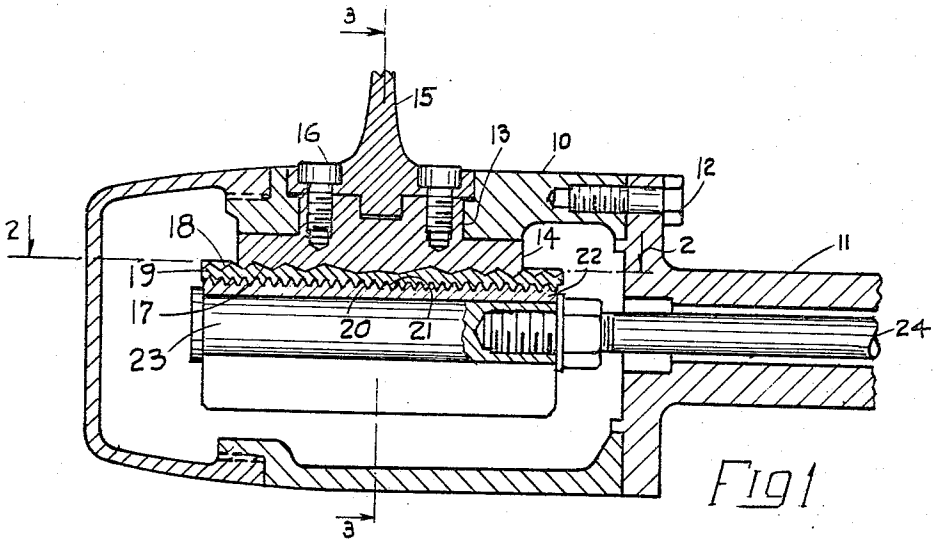


Fig 1

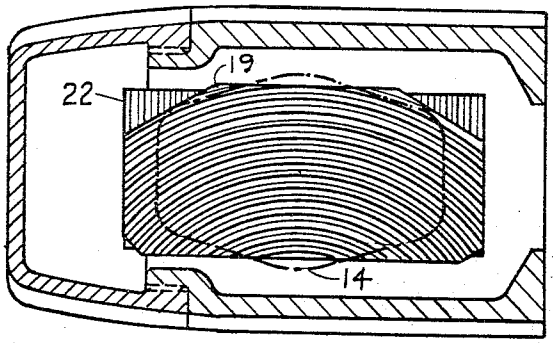


Fig 2

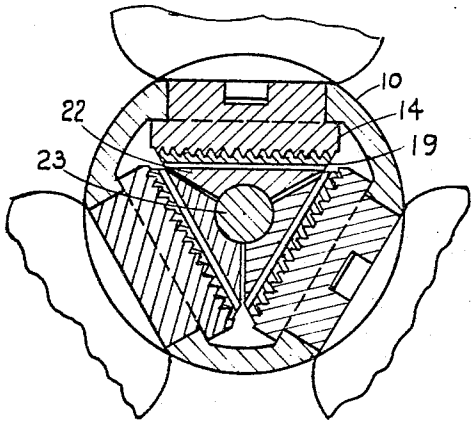


Fig 3

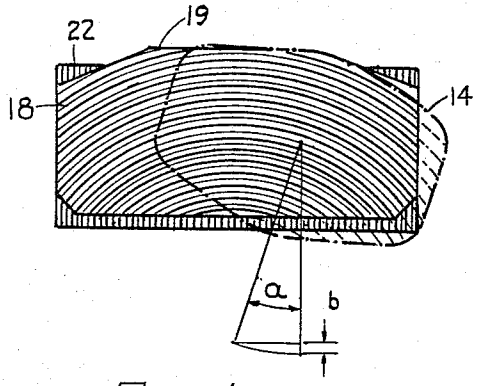


Fig 4

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CONTROLLABLE PITCH PROPELLERS

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ABSTRACT OF THE DISCLOSURE

In a controllable pitch propeller, a set of floating plates having straight serrations on one side and circular-arc serrations on the other side, the serrations meshing with corresponding serrations on the propeller blade flanges and on the axially movable control member.

This invention relates to controllable pitch propellers and more particularly to an improved mechanism for rotating the propeller blades to control their pitch to any desired position, forward, neutral, or reverse.

In a controllable pitch propeller the several blades are each provided with a flange carried by the propeller hub, and means are provided for rotating the flanges and blades to vary the pitch of the propeller. It is known to provide a control rod, axially movable in the propeller shaft and connected to an axially movable control member in the propeller hub and operably connected to the blade flanges by a combination of pins and sliding blocks, or by various other pin and linkage arrangements. The load carrying areas in such structures are never larger than the bearing areas of the pins.

An object of this invention is to provide a practical, compact, and durable hub construction for controllable pitch propellers, in which the specific loadings on the bearing parts will be much lower than those in known constructions. Another object is to provide an operable connection between an axially movable control member and each blade flange, and comprising a serrated coupling plate between the control member and each blade flange, the serrations on one side of the coupling plate being straight and transverse to the control member, the serrations on the other side of the coupling plate being circular arcs, and with corresponding straight and circular-arc serrations on the control member and on each blade flange, the bearing areas of the serrations being much larger than those in known controllable pitch propeller mechanisms.

Other objects are to provide an actuating mechanism for controllable pitch propellers which will permit a short propeller hub; to provide a mechanism which may be easy to assemble and inexpensive to manufacture, and which may be easily adjusted for wear.

These and other objects of the invention will be apparent from the following description in connection with the drawings in which: FIG. 1 is a longitudinal section of the propeller hub; FIG. 2 is a plan view partly in section on line 2—2 of FIG. 1; FIG. 3 is a transverse section on line 3—3 of FIG. 1; and FIG. 4 is a partial plan view on line 2—2 of FIG. 1 showing the movable parts in their extreme positions.

Referring to the drawings, propeller hub **10** is bolted to shaft **11** by capscrews **12**. Propeller hub **10** is provided with sockets **13** each of which may receive flange **14** bolted to propeller blade **15** by capscrews **16**. Flange **14** is provided with serrations **17** on its inner surface, the serrations engaging and meshing with similar serrations **18** on coupling plate **19**. The pitch lines of serrations **17** and **18** may be circular arcs as shown in FIGS. 2 and 4.

Coupling plate **19** is also provided with straight serrations **20** which mesh with similar straight serrations **21** on control member plate **22**. Serrations **20** and **21** are straight with alignment in a direction normal to the propeller shaft **11**. Block **22** is held in place radially toward coupling plate **19** and blade flange **14** by cylindrical center block **23** connected to control rod **24** coaxial with shaft **11**.

In operation, axial movement of control rod **24**, center block **23**, and control member block **22**, from the neutral position shown in FIG. 1, will also move coupling plate **19** in an axial direction. Circular-arc serrations **18** on coupling plate **19** will slide within their respective meshing serrations **17** on flange **14** causing flange **14** and its blade **15** to rotate, changing the pitch. Due to the circular-arc serrations **17** and **18**, coupling plate **19** will be transversely displaced from its neutral position by distance *b*, FIG. 4, during its axial movement, and will slide transversely with its straight serrations **20** in mesh with serrations **21** of control member block **22**.

Coupling plate **19** is a floating connection between the pair of intermeshing straight serrations transverse to and associated with control member block **22** and the pair of intermeshing circular-arc serrations of flange **14**. It is obvious to one skilled in the art that the pairs of serrations may be interchanged, the circular-arc serrations being the inner pair of control member block **22** and the straight serrations being the outer pair of flange **14**.

The effective bearing area of the load carrying parts is one-half the surface area of the intermeshing serrations. This load carrying area is much greater than the bearing areas of the pins in any pin-sliding-block or other known linkage. Consequently, low specific bearing loads are attained and the durability of the mechanism is increased.

Wear on the sliding parts, leading to slack and backlash, may be taken up by installing a new center block **23** of slightly larger diameter.

It is obvious that the invention is simple and inexpensive to manufacture. No special tools are required to assemble it; all parts may be manually inserted from the end of the hub.

Having described the invention, it is obvious that the objects stated have been attained in a practical manner. While certain specific embodiments of the invention have been shown and described, it is understood that changes may be made in the construction and arrangement of the various parts without departing from the spirit or scope of the invention as expressed in the following claims.

I claim:

1. In a controllable pitch propeller having a hub and blades radial thereto: a flange on each of said blades, serrations on the inner face of each flange, and mechanism for rotating said flanges and blades to control the pitch to any desired position, forward, neutral, or reverse; said mechanism including an axially movable control member, a set of blocks axially movable with said control member, serrations on the outer face of each of said blocks, a set of floating plates, circular-arc serrations on one side of each floating plate and straight serrations on the other side of each floating plate, the floating-plate serrations operably meshing with the corresponding serrations on said blade flanges and on said axially movable blocks.

2. Structure as claimed in claim **1**, the inner pair of intermeshing serrations being straight and transverse to the axial movement of said control member and the outer

pair of intermeshing serrations being circular arcs, the two pairs of serrations coacting to permit said coupling plate to float transversely in its plane as it is moved by axial movement of said control member.

3. Structure as claimed in claim 1 with means within said blocks for holding them in operable contact with said floating plates.

4. Structure as claimed in claim 1 with cylindrical means within said blocks for holding them in operable contact with said floating plates and the latter in operable contact with said blade flanges.

References Cited

UNITED STATES PATENTS

1,293,884	2/1919	Nilsson	170—160.47 X
2,763,329	9/1956	Feroy	170—160.47

FOREIGN PATENTS

61,242	10/1954	France.

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