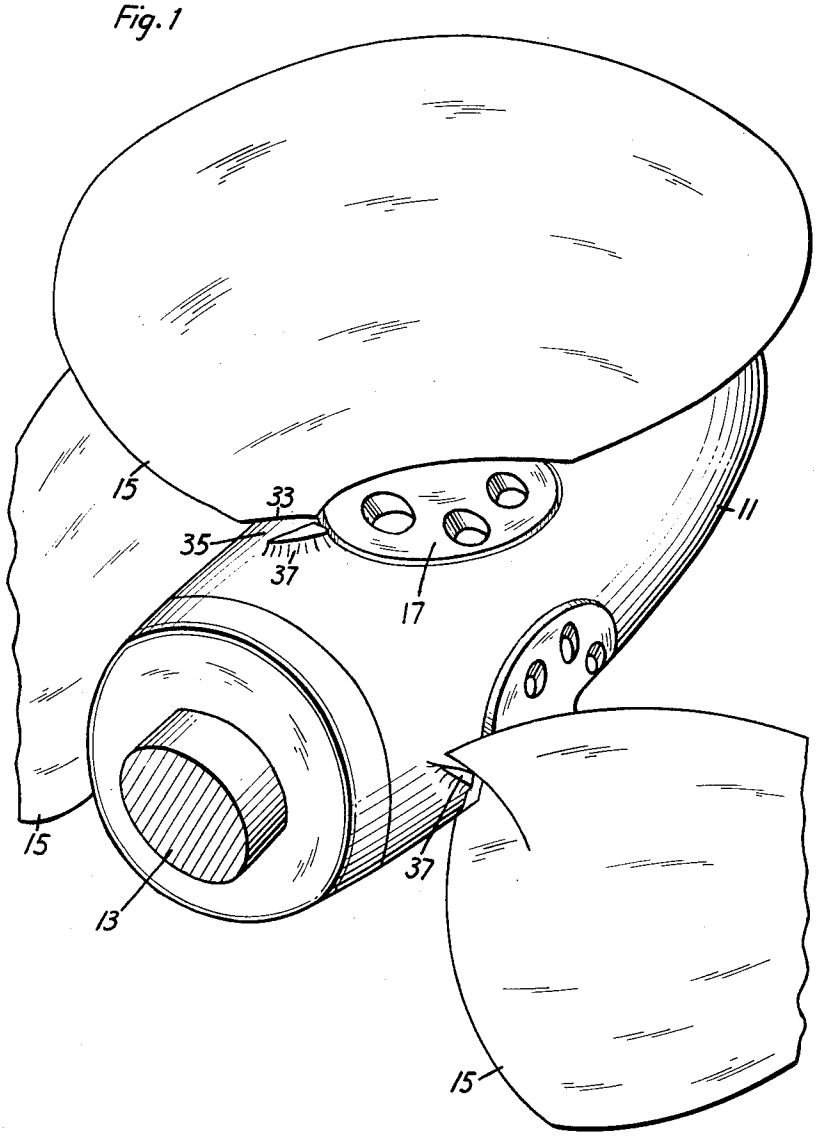
Dec. 19, 1961 L. A. PEHRSSON 3,013,615

VARIABLE PITCH PROPELLERS

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Fig. 1



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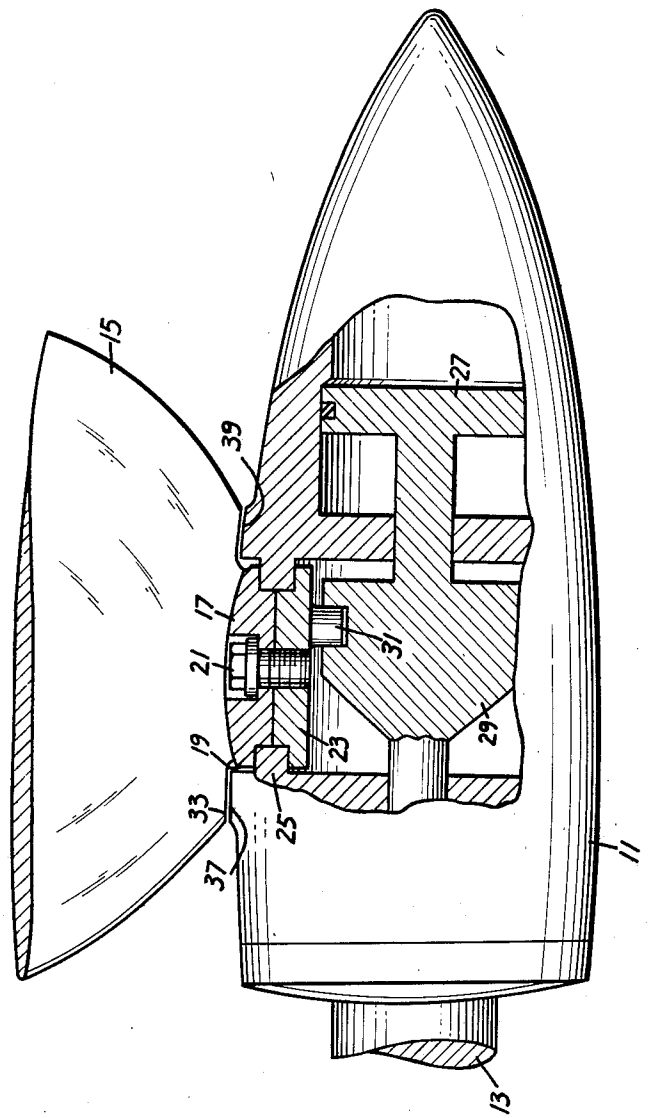


Fig. 2

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VARIABLE PITCH PROPELLERS

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The present invention relates to improvements in propellers for ships and the like, and it relates particularly to improvements in variable pitch propellers.

In certain types of variable pitch propellers, each blade is provided with a generally disc-like flange at its root which is disposed substantially transversely of the blade and is received rotatably in a correspondingly shaped recess in the surface of the propeller hub. In propellers which have blades having relatively wide inner ends or roots, the inner ends of the blades project beyond the flange and etxend along the hub or laterally beyond the hub depending upon the adjusted position of the blade. Such wide root blades have a number of advantages over the more conventional type of propeller which has a relatively narrow root or inner end portion but they are also open to certain disadvantages. Variable pitch propellers with wide base blades have free spaces between the fore and aft ends of the inner edge of the blade and the hub which reduce the efficiency of the propeller because they produce eddies adjacent to the junction of the blades and the hub and cause cavitation.

In accordance with the present invention, I have provided an arrangement whereby the space between such a wide root propeller blade and the hub is reduced to a minimum when the blade is in the position of maximum use (the position of design).

More particularly, in accordance with the present invention, the hub is provided with a ridge or projection with which the blade is aligned when the blade is in the position of design so that the ridge forms a continuation of the blade merging smoothly into the propeller hub thereby eliminating the gap or space therebetween.

In other positions which are less commonly used, a gap or space is present between the blade and the hub but this is of little moment to the overall efficiency of the propeller.

For a better understanding of the invention, reference may be had to the accompanying drawings in which:

FIG. 1 is a perspective view of the propeller; and

FIG. 2 is a side elevational and partial sectional view taken in a plane oblique to the axis of the hub.

The propeller illustrated in the drawings comprises a hub 11 carried and turned by a drive shaft 13. As shown, three blades 15 are rotatably attached to the hub, but more or fewer blades may be provided, as desired. Each blade has at its root a substantially disc-like flange 17 extending transversely of the axis of the blade. The flange is disposed in a circular opening 19 in the hub 11 and is attached by means of bolts 21 to an inner disc 23. The discs 17 and 23 rotatably engage opposite sides of an annular flange 25 integral with the hub to enable the pitch of the blade to be adjusted.

Within the hub is a pitch adjusting mechanism comprising a hydraulically operable piston 27 and a member 29 axially displaceable thereby and having a transverse groove into which a pin 31 upon the disc 23 projects. As the piston 27 is moved by hydraulic pressure, the propeller blades can be turned in either direction toward and away from a zero position in which they are set transversely to the axis of the hub 11. In zero position, the propeller does not exert any propelling force in either direction.

The hub has an outer surface of streamlined contour.

It may be an ogival, elliptical or paraboloid surface of revolution. The portion of the hub at the roots of the blades can be cylindrical in shape. Inasmuch as the surface of the hub is a surface of revolution, it can be finished by a turning operation.

The propeller blades 15 are comparatively wide and short, i.e., the distance between the fore and aft edge, as related to the direction of rotation, is greater than the dimension of the blade radially of the hub. The width of each blade 15 is considerably greater than the diameter of the flange 17. In most of the positions of the blade, a narrow space 35 is present between the hub and the inner edge 33 of the blade adjacent to the flange 17. position of the blade and is greatest when the blade takes The size of the space varies according to the angular position of the blade and is greatest when the blade takes its zero position and smallest when the blade takes its position of maximum pitch. In the maximum pitch position of the blade, the edge 33 may abut against the hub, thus making a further turning motion of the blade impossible.

According to the invention, an elongated projection or ridge 37 is formed on the outside of the hub adjacent to each blade and in a certain angular position of the blade, viz., the so-called "position of design," the ridge is aligned with the edge 33 of the blade. The ridge 37 starts from the edge of the recess 19 and extends forwardly in a direction inclined to the direction of the propeller axis. When the propeller blades are turned from the position of FIG. 1 in such a direction that the pitch assumes the angle for which the propeller blades are designed, the edge 33 will be located exactly above the ridge 37 and the space 35 will be reduced almost to zero. The ridge is of a wedge-like shape so that its top opposes the blade edge with the least possible play and its sides are flush with and form extensions of the blade sides and then smoothly merge into the outer surface of the hub. The ridge can be welded to the hub or attached by means of screws or formed and attached to the hub in any other suitable way.

A similar ridge 39 may be formed on the hub for alignment with the aft end of each blade 15 to eliminate the space between the aft end of the blade and the hub in the design position of the blade. If desired, the ridges 37 and 39 may have a transverse width which is somewhat greater than the thickness of the edge 33 of the propeller blade. In such a case, the blade can be turned somewhat from the position of design before a space is left between the edge 33 and the hub 11.

It will be understood that the invention is applicable to propellers having any desired number of blades and that the shape and dimensions of the ridge can be varied to conform to propeller blades of varying shapes and sizes. Accordingly, the propeller disclosed herein should be considered as illustrative.

I claim:

1. A ship's propeller comprising a hub having an outer surface formed as a surface of revolution, at least one wide root blade rotatably mounted on said hub for movement between substantially a zero pitch position and a position of design, said blade having a disc-like flange rotatably mounted in said hub and an inner root edge having end portions extending outwardly beyond the edge of said flange adjacent to the surface of the hub, said end portions of root edge being spaced substantially from said hub when the blade is in said zero pitch position and said position of design, a projection on the surface of the hub extending along the surface of the hub, said projection having a shape corresponding to the shape of one of said end portions of said root edge of said blade and being in alignment with said blade and opposing said inner edge to substantially fill any space between said one edge portion of said blade and said hub and forming

a continuation thereof in said position of design of the blade relative to said hub.

2. A propeller comprising a hub having its outer surface formed as a surface of revolution, at least one wide root blade rotatably mounted on said hub for adjustment about an axis extending substantially radially of said hub, said blade having an inner root edge opposing said hub and having end portions extending laterally and spaced from said hub in a zero pitch position and separated from said hub by a space in front of and behind said axis when in the position of design of said blade, a ridge on the periphery of said hub and extending radially outwardly therefrom, said ridge opposing one of said end portions of said root edge in front of said axis in the position of design of said blade and forming a continuation of said blade.

3. The propeller set forth in claim 2 comprising a ridge on the periphery of said hub and extending outwardly therefrom behind said axis, said ridge opposing the other free end portion of said root edge behind said axis and forming a continuation of said blade in the position of design of said blade.

4. The propeller set forth in claim 3 in which said ridges conform to the shape of said root edge and merge into the periphery of said hub.

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