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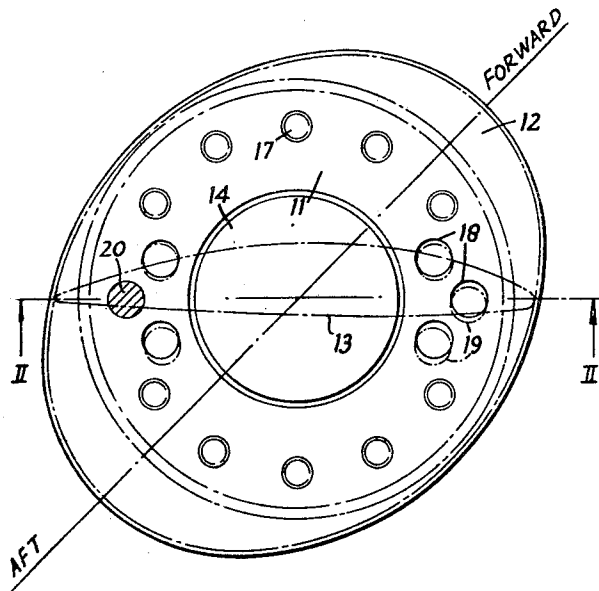
[56] **References Cited**  
**UNITED STATES PATENTS**  
 794,010 7/1905 Hayden ..... 416/207  
 3,123,145 3/1964 Byrd ..... 416/207  
 3,231,022 1/1966 Schroeter et al. .... 416/207 (UX)  
 3,324,953 6/1967 Greenhill ..... 416/207 (UX)  
 3,357,496 12/1967 Petersen ..... 416/219 (UX)  
**FOREIGN PATENTS**  
 367,265 2/1932 Great Britain ..... 416/207

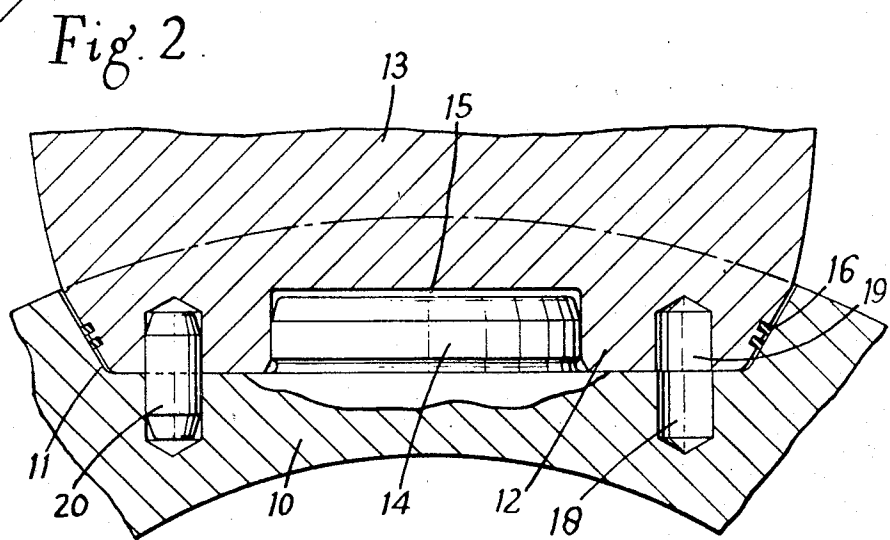
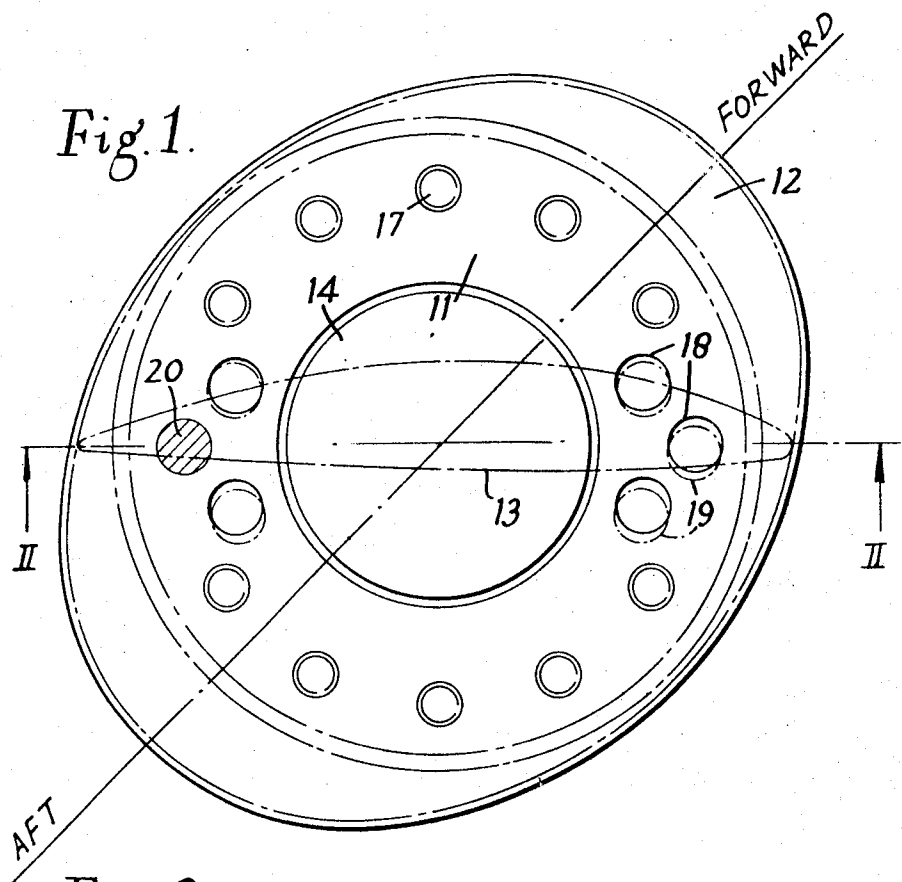
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[54] **PITCH ADJUSTMENT IN SCREW-BLADED DEVICES, SUCH AS PROPELLERS**  
**3 Claims, 2 Drawing Figs.**

[52] U.S. Cl. .... 416/207,  
 416/61  
 [51] Int. Cl. .... B63h 3/12  
 [50] Field of Search ..... 416/205-  
 —207, 61

**ABSTRACT:** A propeller having a boss to which are bolted fixed blades which can be located at the required pitch by means of dowels engaging in pairs of registering holes in the boss and the blade root, a number of different sets of holes being provided to give different pitch settings.





# **PITCH ADJUSTMENT IN SCREW-BLADED DEVICES, SUCH AS PROPELLERS**

The present invention relates to screw-bladed devices such as propellers, propeller fans and bladed screw pumps and especially to marine propellers.

With marine propellers the pitch is selected during the design stage and is determined, amongst other factors, by a prediction of the actual speed of the water flowing to the propeller. This latter is estimated from the performance of similar vessels or from the results of model experiments, and errors in the value selected can occur which lead to the propeller pitch being slightly inaccurate. Such slight variations can effect the ability of the propeller to absorb its designed delivered horsepower at the correct revolutions and result in less than optimum performance.

With ships in service the shell plating may become roughened with age to the extent that the maximum speed of the vessel is reduced and in such an event it is advantageous to make some slight reduction in propeller pitch.

Again there exists the possibility that engine developments or modifications in any particular ship can enable power ratings to be increased slightly or in a new engine type it is not always found in practice that the original designed output gives the best operational result in service.

In all cases it is beneficial to make small adjustments in pitch to accommodate the variables involved and thus maintain the optimum performance.

With controllable pitch propellers these changes can be readily accommodated but with solid propellers such as normally used in association with reversing engines there are no facilities for such adjustment. It is, of course, well known that propellers of nominally fixed pitch type can be manufactured with separately attached blades provided with flanges at their roots for attachment to the propeller boss by means of bolts and in such propellers it is common to elongate the holes in the blade root flanges so that the pitch may be adjusted by slackening the bolts and rotating the blades slightly in relation to the propeller boss.

In accordance with the present invention there is provided a screw-bladed device having blades detachably attached to a boss wherein for adjustment of the pitch of a blade a plurality of pairs of holes are provided in contacting faces of the blade and boss, the holes of the various pairs being arranged to be in register at different angular positions of the blade and a dowel being fitted in a registering pair of holes to establish the pitch of the blade.

For each pitch position there may be a number of pairs of registering holes each fitted with a dowel. The dowel or dowels resist rotation of the blade from the required pitch position and are assisted in this by the friction between the contacting faces resulting from the pressure due to the bolts or other devices securing the blade to the boss.

In a preferred construction each blade has an annular flange at its root which is bolted to a mounting flange on the propeller boss. The dowel holes are located in the required angular relationships in the blade root flange and the propeller

boss flange.

By way of example, an embodiment of the invention as applied to the propeller boss arrangement described in copending application Ser. No. 783,031, issued Jan. 26, 1971 as U.S. Pat. No. 3,557,744, will now be described in more detail with reference to the accompanying drawing, in which:

FIG. 1 is a plan view of a recess in the propeller boss with the propeller blade flange superimposed, and

FIG. 2 is a section on the line A-A of FIG. 1.

A propeller boss 10 has a recess 11 for the reception of a flange 12 of a blade 13. As described in copending Ser. No. 783,031, now U.S. Pat. No. 3,557,744, the recess 11 has a central spigot 14 engaging a recess 15 in the blade root. Seals 16 are located around the periphery of the blade flange 12.

The blade flange 12 is secured to the boss by bolts received in boltholes 17 in the boss 10. The holes in the blade flange through which the securing bolts pass (which are not shown in the drawing) are elongated to allow limited rotation of the blade for pitch adjustment.

The possible pitch positions are determined by six holes 18 in the propeller boss 10 and six associated holes 19 in the blade flange 12. Each pair of holes 18 and 19 requires a different angular position of the blade 13 to bring the two holes into register. When the holes of the selected pair are in register a dowel 20 is inserted to establish that pitch position. Subsequent tightening of the securing bolts produces a functional resistance to rotation of the blade due to the pressure between the contacting faces of the blade flange 12 and the recess 11.

An appropriate arrangement of numbered marks on the outer surfaces of the boss and blade root flange respectively, or alternative gauging arrangement, may be incorporated to facilitate visual confirmation of the pitch location when the parts are assembled.

I claim:

1. A screw-bladed device comprising a boss, a plurality of blades, contacting faces on each of said blades and said boss, means detachably securing each of said blades to said boss with said contacting faces of said blades and said boss in engagement, a plurality of holes in each of said contacting faces, said holes being arranged in pairs in said contacting faces, one hole of each pair being in one set of said blades and the other hole of each pair being in said boss, the holes of the various pairs being arranged to be in register at different angular positions of the blade, and a plurality of dowels corresponding in number to said blades, one of said dowels being fitted in a registering pair of holes of each of said contacting faces of said blades and said boss to establish the pitch of each of the blades.

2. A device as claimed in claim 1 having for each pitch position of each blade at least one further pair of registering holes, and having a further dowel fitted in the further registering pair of holes corresponding to the established pitch of each blade.

3. A device as claimed in claim 2 in which each blade has an annular flange at its root and the boss has a mounting flange for each blade flange, said securing means comprising bolts fixing said blade flanges to said mounting flanges on said boss.