

[54] MANUALLY CONTROLLED VARIABLE
PITCH PROPELLER

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[58] Field of Search 416/164, 167, 208, 147,
416/159, 161, 166, 168

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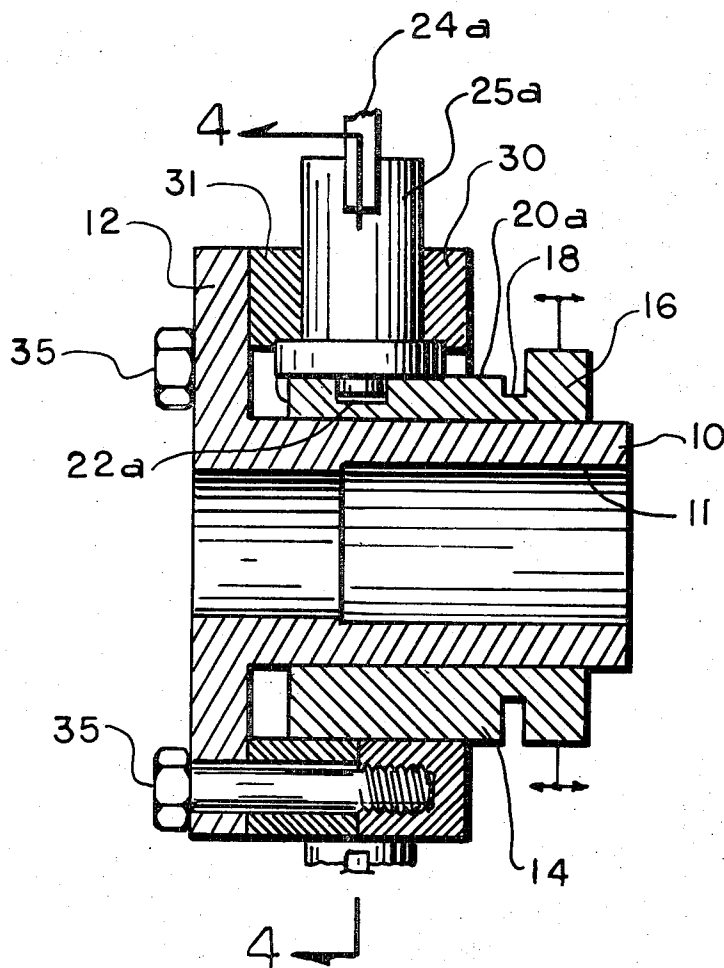
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[57] ABSTRACT

A variable pitch propeller, having rotatable blades, includes a hollow hub rotatably supporting the blades and a reciprocal tube telescoped in the hub. Eccentric projections on the blade shafts mount in slots in the reciprocable tube, turn the blades on reciprocation of the tube. Lever means manually controlled, reciprocates the tube for all blade positions between full forward and full reverse position.

4 Claims, 6 Drawing Figures



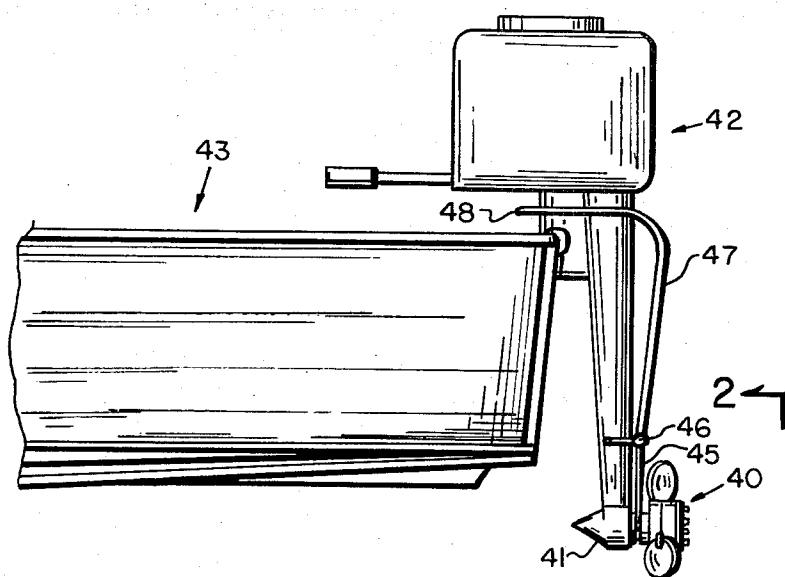


Fig. 1

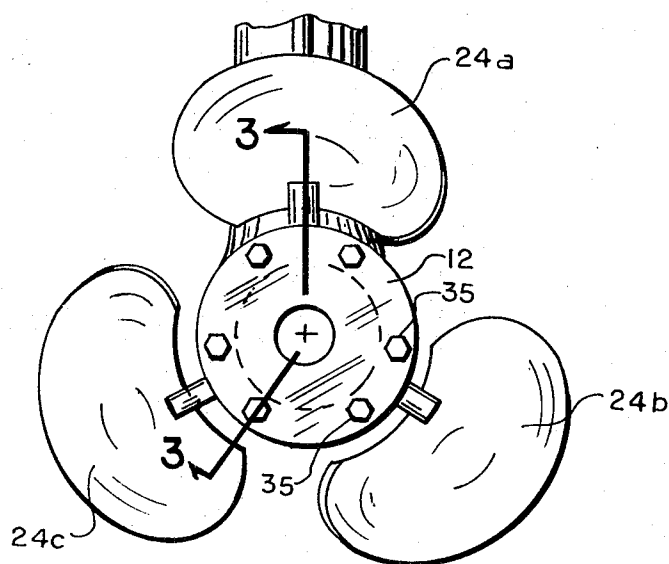
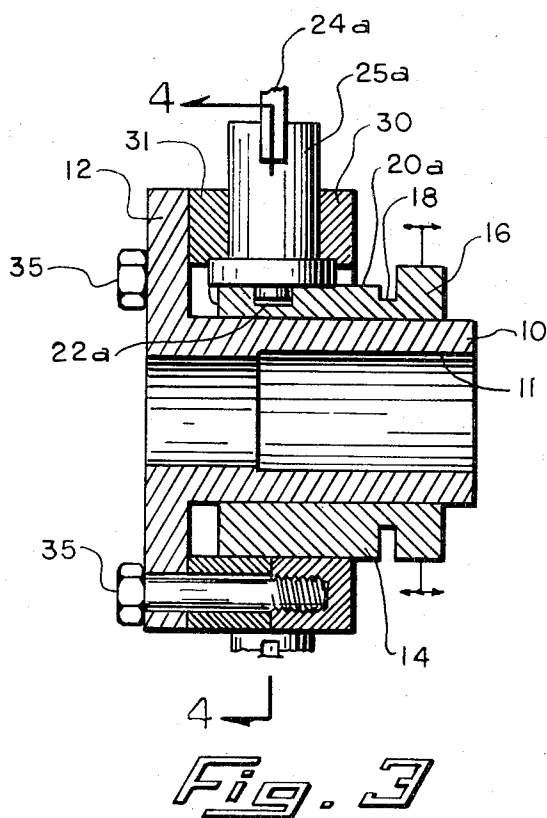
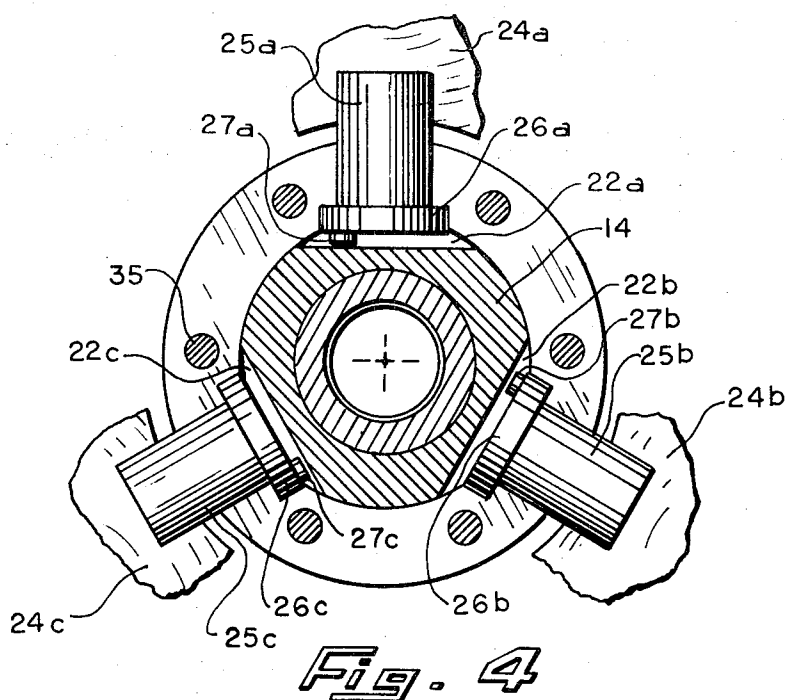


Fig. 2



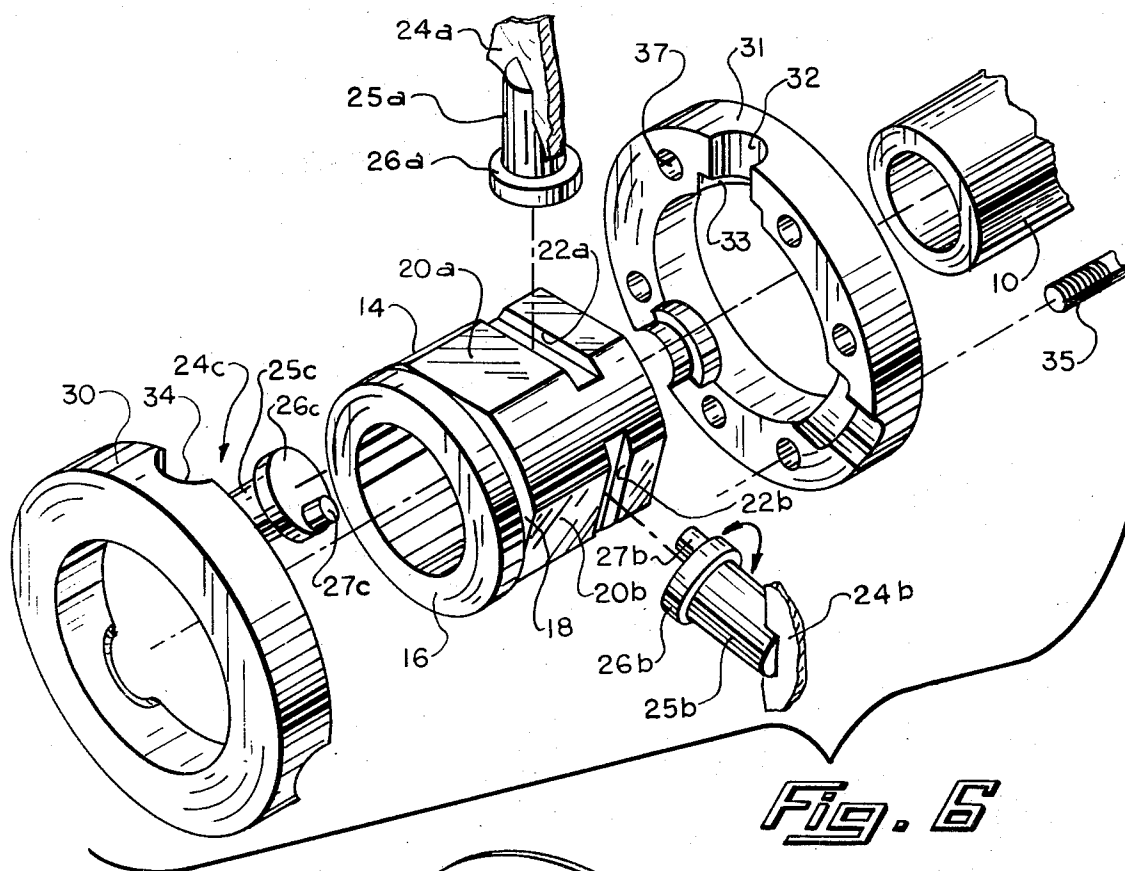


Fig. 6

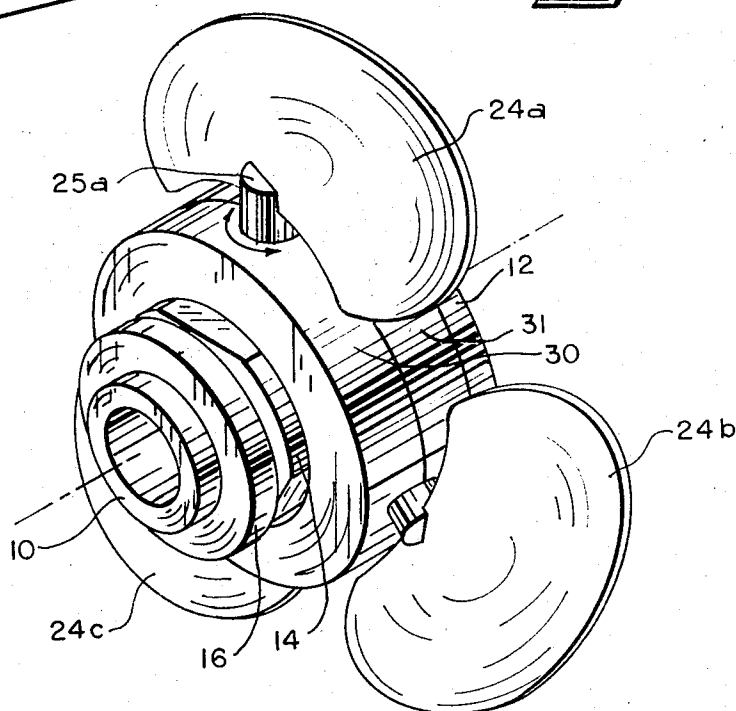


Fig. 5

MANUALLY CONTROLLED VARIABLE PITCH PROPELLER

This invention relates to variable pitch propellers for boats, etc., arranged to permit the propeller blades to be moved from a full forward pitch to a full reverse pitch. The invention is particularly adaptable to outboard motors for small marine craft. The arrangement is preferably manually activated, for simply controlling blade pitch of propeller.

Included among the objects and advantages of the present invention is a variable pitch propeller mechanism arranged for manual control of the pitch of the blades.

Another object of the invention is to provide a simple and strong mechanism for rotating the blades of a propeller, varying the pitch thereof.

Yet another object of the invention is to provide a variable pitch propeller mechanism arranged to be mounted on a solid or tubular propeller shaft, and a simple manual lever system changes the pitch of the blades.

Still another object of the invention is to provide a variable pitch propeller mounted on a solid or tubular propeller shaft arranged to manually move the propeller blades from full forward through all angles to full reverse pitch at any propeller speed.

An additional object of the invention is to provide a manually controlled variable pitch propeller mechanism arranged for easy mounting on existing outboard motor shafts or on new equipment.

These and other objects and advantages of the invention may be readily ascertained by referring to the following description and appended illustrations in which:

FIG. 1 is a partial, side elevational view of a boat and mounted outboard motor, utilizing the variable pitch propeller of the invention;

FIG. 2 is an enlarged detail view of a variable pitch propeller taken along view lines 2—2 of FIG. 1;

FIG. 3 is a cross sectional view of a portion of the propeller of FIG. 2 taken along section lines 3—3;

FIG. 4 is a cross sectional view of a propeller hub utilizing the pitch varying mechanism of the invention taken along section lines 4—4 of FIG. 3;

FIG. 5 is a perspective view of the assembled unit according to the invention; and

FIG. 6 is an exploded view of the parts of the hub of the variable pitch propeller of the invention.

The variable pitch mechanism of the present invention is suitable for use with propellers having two, three, four or more propeller blades, and it comprises, in the main, a hub arranged to seat over the end of a propeller shaft and be secured thereon. A reciprocable tube in the hub is arranged to reciprocate on the hub portion telescoped over the shaft. A reciprocating tube mounted on the hub is arranged to turn, by means of eccentrics on the blade shafts and a slot on the reciprocable tube, the propeller blades. The pitch thereof is changed on reciprocation of the tube. A simple pivoted yoke mounted in a groove in the reciprocating tube, provides easy means for manually moving the tube in relation to the hub for changing the pitch of the propeller.

In the device illustrated in FIGS. 2 through 6, a three bladed propeller is shown, however, with minor modifi-

cations it is easily adaptable to two, four or more propeller blades.

The unit consists of a tubular hub 10 having a flange 12 depending thereto. The hub 10 is arranged to be telescoped over a solid shaft, or a tubular shaft if the outboard motor is so equipped, and the tube 10 is arranged to be secured to the shaft for concurrent rotation therewith. The tube 10 may be splined, keyed, secured with a set screw, or the like to the shaft for rotation therewith. The tube 10 is illustrated with a shouldered bore 11, however this may be changed to suit the particular application depending on the configuration of the shaft of the outboard motor. A reciprocate slide member or tube 14 is arranged for movement on the tube 10, and it includes a flange 16 adjacent an annular groove 18. The tubular slide 14 is arranged with three flattened areas 20a, 20b, and 20c, spaced at 120° apart around the outside periphery of the tube 14. A lateral groove is formed in the tube across each flattened area spaced from the groove 18. Thus, a groove 22a is arranged in the tube across the flat area 20a, a groove 22b is formed in the tube laterally of the flattened area 20b, and a similar groove 22c is formed in the flattened area 20c. Propeller blades 24a, 24b, and 24c are provided with shafts 25a, 25b, and 25c respectively, forming the propulsion force for the propeller. Each shaft includes an end mounted disc or flange with an eccentric stud extending axially but off-center therefrom. Thus the disc or flange 26a is provided with a stud 27a, shaft 25b is provided with a disc or flange 26b and an eccentric stud 27b and shaft 25c is provided with a disc or flange 26c and an eccentric stud 27c. The studs are arranged to mount in the grooves and the discs ride on the flattened surfaces of the tube 14. The blade shafts are secured in rotative position by a joining ring which includes ring half 30 and ring half 31. The joining ring is split on a plane perpendicular to its axis. Each ring half includes a half of a bore for containing a blade shaft, and a shouldered portion for containing the disc of the blade, thereby securing the shaft in the assembly. Thus ring half 31 includes a half a bore 32 and a shouldered bore portion 33 which mates with a similar opening 34 in the split ring half 30. When the two rings are together, the half openings 32 and 34 encompass the shaft 25a of the blade 24a and permit it to rotate, but securely holds it in position. In similar fashion the other blades are rotatively held. A plurality of bolts 35 extend through the flange 16 and through mating bores 37 in the ring half 31 to the threaded bores, not shown, in the ring half 30. The unit may, thereby, be secured together with the three blades extending outwardly from the hub.

With the unit assembled the shafts of the blades are secured between the split rings which are in turn secured to the flange of the hub tube 10. Reciprocating movement of the tube 14 of course, causes reciprocation of the lateral grooves therein and rotary movement of the eccentric studs in the grooves causing a turning of the blades. By adjusting the width of the split rings and the length of the reciprocal tubular member 14, the blades may be turned from full forward pitch to a full reverse pitch, or may be stopped at any intermediate pitch angle desired.

As illustrated in FIG. 1, the variable pitch propeller unit, shown in general by numeral 40, is mounted in conventional location on the angled stanchion 41 of an outboard motor, shown in general by numeral 42,

which in turn is mounted on a boat shown in general by numeral 43. A yoke 45 with its bifurcated end mounted in the groove 18 extends upwardly to a pivot point 46 and a lever rod 47 extends therebeyond. A handle 48 extending toward the boat side of the outboard motor permits a user to pull or push the lever to thereby change the pitch of the blade of the propeller by reciprocating the tube 14 on the hub tube 10.

The variable pitch propeller is valuable for outboard motors to permit the use of higher speeds of the reciprocating engine without moving the boat too fast for such purposes as trolling, docking, short turn maneuvering, etc. Thus a high performance outboard motor (engine) may be operated at higher rpms to prevent loading up the engine, but control of the speed of the boat is obtained by changing the pitch of the propeller. Furthermore, the pitch of the propeller may be changed from full forward to full reverse pitch without changing the speed of the motor. This provides a very positive control on the motor and the speed of the boat itself. Various linkages may be provided on the unit for reciprocating the tube 14 in relation to the hub 10 depending on the configuration of the outboard motor, the drive, etc. of the boat. The pivoted yoke, however, provides a simple mechanical means for the changing of the pitch of the propeller blades.

The propeller blades of the propeller of the unit are kidney shaped propellers, for example, the blade 24a is kidney shaped with its shaft 25a extending downwardly from the concave portion of the kidney shape. The blades are cupped from the center toward each side and the cup extends towards the direction of movement of the propeller. This arrangement provides for equal efficiency in forward or reverse pitch of the propeller.

I claim:

1. A variable pitch propeller assembly for mounting on the drive shaft of a marine engine comprising:
 - a. a tubular hub means arranged for securing on the drive shaft for rotation therewith,
 - b. said hub means having a radially depending flange at one end thereof,
 - c. a plurality of propeller blades, each blade having a mounting shaft and a flange at the end of said shaft opposite said blade,
 - d. the outer surface of said flange having a stud extending outwardly therefrom which is arranged eccentric to the rotative axis of said blade shaft,

- e. a pair of blade mounting rings having a common interface and arranged to be fixedly attached to the outer edge of said hub radial depending flange,
 - f. a plurality of radial bores for said propeller blades disposed at the interface of said pair of rings, said radial bores being equi-angularly spaced around the circumference of said rings and sized to rotatively mount the blade shafts therein,
 - g. a cylindrical sleeve arranged to be slidably mounted on the outer surface of said hub means and arranged to have a flat outer surface corresponding to the flange of each of the propeller blades, a laterally extending groove being provided in each of the flat surfaces of said sleeve having the eccentric stud on the flange of said blades engaged therein whereby as the sleeve is moved longitudinally with respect to said hub the angular pitch of said blades can be simultaneously adjusted to any position between a forward drive position and a reverse drive position,
 - h. one end of said sleeve including an exposed circumferential groove therein spaced from the edge of said sleeve, and
 - i. a manual control lever having a yoke at one end disposed so that said yoke is positioned in said sleeve groove for longitudinally shifting said sleeve and varying the pitch of said propeller blades while the assembly is being rotated by said drive shaft.
2. A variable pitch propeller assembly as defined in claim 1 wherein:

said blade mounting rings include recesses along the inside surface arranged coaxial with said radial bores for accommodating the inner surface of the blade shaft flanges thereby providing a flat bearing surface for securing said blade flanges between said sleeve and said mounting rings.
 3. A variable pitch propeller assembly as defined in claim 1 wherein:

said blades are kidney shaped and are dished from the center outwardly.
 4. A variable pitch propeller assembly as defined in claim 1 wherein:

said manual lever extending from said yoke is pivotally mounted for manually reciprocating said sleeve by pivoting said lever.

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