July 21, 1942. H. B. ASHELMAN ET AL 2,290,666

AUTOMATIC ADJUSTABLE PROPELLER

Filed June 9, 1939

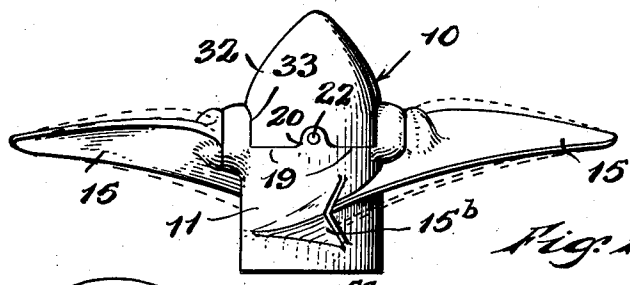


Fig. 1.

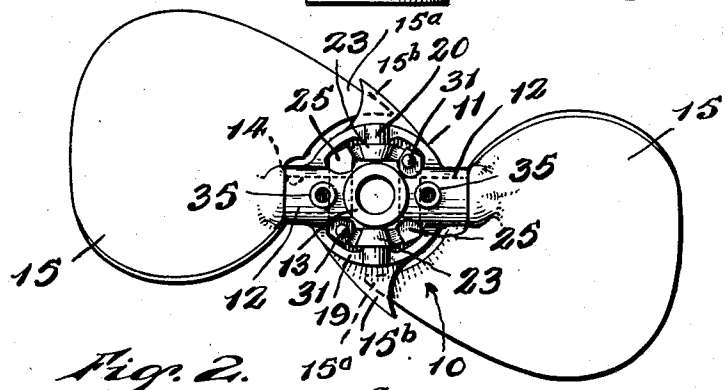


Fig. 2.

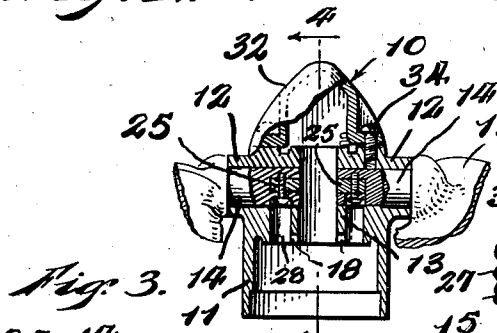


Fig. 3.

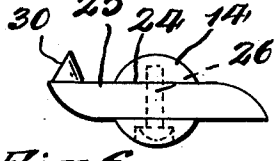


Fig. 6.

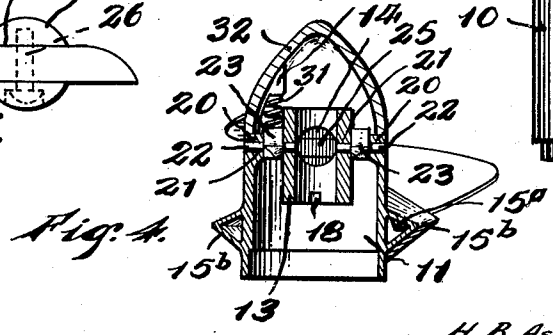
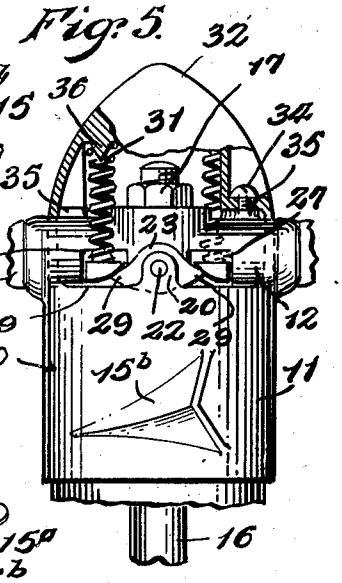


Fig. 4.

Fig. 5.



INVENTORS:
and: H. B. ASHELMAN,
AUGUST JOHNSON,
BY:
Christian R. Nielsen
ATTORNEY.

Patented July 21, 1942 2,290,666

UNITED STATES PATENT OFFICE

2,290,666

AUTOMATIC ADJUSTABLE PROPELLER

Hervey B. Ashelman and August Johnson, Fargo, N. Dak., assignors to Outboard, Marine & Manufacturing Company, Waukegan, Ill., a corporation of Delaware

Application June 9, 1939, Serial No. 278,352

11 Claims. (Cl. 170—162)

Our invention relates to propellers and more particularly to propellers of an automatically feathering type, and it consists in the constructions, arrangements and combinations herein described and claimed.

It has been the experience of operators of out-board motor engines that difficulty has been experienced in the throttling down of the motor to trolling or casing speeds, resulting in overheated motors when the attempt is made, resulting in excessive use of oil as well as fouling of the spark plugs, which eventually cause stoppage of the motor altogether.

It is therefore an object of the invention to provide an improved type of propeller especially adapted to out-board motors, permitting operation of the engine at high speeds, yet affording forward movement of the craft at such speed as will permit trolling or casting by fishermen.

It is therefore the cardinal purpose of the invention to provide a propeller in which the pitch of the blades of the propeller is automatically adjustable due to an unbalanced condition between the water pressure and the R. P. M. speeds of the motor.

It is also an object of the invention to provide a propeller which may readily replace present-day propellers whether of the outboard motor type or otherwise.

It is a still further object of the invention to provide a propeller which is of sturdy construction and liable in a minimum degree to derangement.

Additional objects, advantages and features of the invention will be apparent from the following description and accompanying drawing, wherein

Figure 1 is a side elevation of the propeller constructed in accordance with our invention.

Figure 2 is a top plan view with the hub cover cap removed.

Figure 3 is a fragmentary vertical sectional view through the propeller.

Figure 4 is a vertical section on the line 4—4 of Figure 3.

Figure 5 is an enlarged side elevation with the cover cap broken away.

Figure 6 is an enlarged end elevation of one of the cam members employed in the propeller.

There is illustrated a propeller 10 having a hub 11, the latter having integrally formed therewith at the outer end a pair of bearings 12, integrally formed with a medial longitudinally extended shaft receiving coupling sleeve 13. The bearings 12 are extended slightly beyond the sides of the hub, and each has journalled therein a shaft 14 of a propeller blade 15. It should be noted that the shafts 14 are mounted off center with respect to the blades 15, and it should also be noted that the blades 15 each have an extension 15—*a*, adapted to contact the hub 11 when the blades are moved to their full operative position. Guards 15—*b* are formed on the hub to protect the extensions 15—*a* against weeds and the like.

The sleeve 13 receives a driven shaft 16 of the engine held in place by a lock nut 17 (see Fig. 5). Any suitable means may be employed for locking the propeller hub to the shaft, and in the present instance, the lower end of the sleeve 13 is provided with transverse slots 18 for reception of a key, not shown.

The hub 11 is cut away at its upper end, as at 19, the cut away portion extending from adjacent one side of a bearing 12 to an upstanding apertured lug 20, and is then continued to the side of the opposed bearing. The lugs 20 are arranged in opposed relation and at right angles to the sleeve 13, and the bearing 13 is provided with an aperture 21 aligned with respective apertures of the lugs 20. A pin 22 is fixed in each pair of aligned apertures and rockably mounts a double acting cam 23, cooperable with the blade shafts 14 to effect movement of the blades 15 as will be described.

The blade shafts 14 have slots 24 in their ends for snug reception of elongated cams 25; and in order to insure positive retention of the cam within the slot, the shaft and cam are drilled and tapped for a set screw 26 (Figure 6); the shaft being countersunk to house the head of the screw within the periphery of the shaft. The cams 26 preferably comprise elongated bars having cam-shaped ends. The central portions of these bars may be rectangular in cross section, and socketed in square-jawed notches or open-ended slots formed in the ends of the respective stub shafts 14 of the propeller blades.

The bearings 12 are apertured as at 27 upon opposite sides and through these apertures, the end portions of the respective cams 25 are extended, each cam being of a length so as to project beyond the sides of the bearing a substantial distance, as shown in Figure 2. Each slot or notch 24 is of a depth to fully seat the cam 25 and when in place the cam abuts the outer wall of the aperture 27, thus serving as a cross key for retaining the shaft 14 within the bearing 12. In order that the cam 25 may be secured to the shaft after being positioned within the hub, the lower portion of the bearing 12

is provided with bores 28 permitting access to the screws 26.

The cam 23 has oppositely extended members 29 each being of a length to lie beneath respective end portions of respective cams 25, the contacting portions of the cams 23 and 25 being suitably shaped to provide a smooth camming action.

Each of the cams 25 is provided with a projection 30 forming a seat for a helical spring 31. As shown in Figure 2, the springs 31 and the projections 30 of the cams are arranged at opposite sides of the bearing 12. A hub closure cap 32 is provided, adapted to completely house the operative parts of the propeller, and, as shown, is bullet-shaped. The side walls of the cap are cut away as at 33 to fit around the bearings 12, and the lower edge of the cap will then be accommodated within the cut away portion 19 and seat firmly thereon when drawn thereagainst by screws 34 threadedly engaged in bosses 35 formed in the upper portion of the bearings 12. The cap 32 has a pair of projections 36 formed upon the interior wall thereof arranged in opposition to respective projections 30 and upon each of the projections 36 a spring 31 is anchored. It will thus be seen that the springs 31 hold the cams 23—25 in contacting relation and also hold the propeller blades 15 normally in feathered position.

In use, the propeller shown to exemplify the invention rotates clockwise as viewed in Fig. 2 with the larger surface of each blade disposed forwardly of the blade-supporting rock shaft in the direction of blade movement. Where the engine has been throttled down for trolling or casting speeds, the blades will assume the full line position shown in Figure 1, which is the feathered position of the blades offering but little resistance to the water, with consequent slow travel of the boat. Now when it is desired to speed up the travel of the boat, the speed of the engine is increased, and such increased speed of the engine will cause increased rotation of the propeller. Obviously, the resistance between the blades and the water is increased, causing the blades 15 to turn, increasing the angle or pitch of the blades, to propel the boat forwardly. It will be apparent that when the blades 15 are so turned, the springs 31 will be compressed, and by reason of the cams 23—25, variations in pitch of the blades will be kept precisely uniform. When the speed of the engine is reduced, the springs will return the blades to feathering positoin.

While we have shown and described a preferred construction, this is by way of illustration only, and we consider as our own all such modifications in structure as fall within the scope of the appended claims.

We claim:

1. In a feathering propeller, a hub, a bearing at one end extended transversely of the hub, a bearing formed integrally with the hub and first named bearing and extended longitudinally of the hub, a pair of shafts oscillably mounted in the transverse bearing, a cam on each shaft extended transversely and beyond the periphery of the shaft, a propeller blade on the other end of the shaft having a larger area forwardly of the axis of the shaft than the area disposed rearwardly thereof, said blade having a portion offset with respect to the longitudinal axis of the shaft and comprising an extension concentric to the hub, housings on the casing for partly enclosing the extensions, a cam member pivotally mounted on the hub upon respective sides thereof and at right angles to the first named cams, said last named cams havng an end disposed beneath respective ends of the first named cams, a removable closure for the hub, and a helical spring interposed between one end of the first named cams and the closure cap whereby to maintain said cams in operative engagement with respective ends of said second named cams.

2. In a feathering propeller, a hub, blades having stub shafts journaled in the hub, mutually contacting cams carried by the hub and stub shaft for operatively connecting the blades for concurrent oscillatory movement, said blades having greater area forwardly of their respective axes of oscillation than their area rearwardly of such axes in the direction of blade movement, and springs normally holding the blades in positions of minimum pitch, the blades being yieldable from said positions to positions of maximum pitch when the thrust upon the large forward areas of the respective blades reaches a sufficient value to overcome said springs,—said springs being also adapted to hold the shaft cams and hub cams in a continuous pitch regulating contact.

3. In a feathering propeller, the combination with a substantially cylindrical hub, blades journaled thereto for oscillation about a diametrical axis, said blades being mounted assymmetrically with the larger areas thereof extending forward of the axis and each having an offset portion extending partially about the hub toward the opposite blade, and a shroud mounted on the hub in oblique relation to the hub axis and adapted to enclose each said offset portion.

4. In a feathering propeller, the combination with a hub having cylindrical portions, blades journaled thereto for oscillation about a diametrical axis, said blades being mounted asymmetrically with the large areas theerof extending forward of the axis and each having a portion projecting about the hub and toward the opposite side thereof, and a shroud mounted on the hub and adapted to enclose part of each such projecting portion, said shrouds having walls in stream-lined relation to the large blade area.

5. A device as set forth in claim 4, wherein the shroud is substantially V-shaped in cross section, the walls thereof being adaptd to restrict pivotal movement of the blades in respect to the hub.

6. A self feathering propeller, comprising the combination of a driving shaft hub provided with laterally extending bearings, propeller blades having stub shafts journaled in said bearings, keys secured to the inner ends of the stub shafts and having projecting end portions for sliding engagement with shoulders on said bearings to retain the stub shafts therein, and rocker means on the respective sides of the shaft axes adapted to maintain continuous contact with said key projections for transmitting motion from one to the other to maintain the propeller blades at equal pitch, and means for resiliently urging the propeller blades toward a normal feathering position.

7. A self feathering propeller, comprising the combination of a chambered driving shaft hub provided with laterally extending bearings, propeller blades having stub shafts journaled in said bearings and provided with removable laterally

extending cam projections, cooperative means rockably mounted in the hub chamber and adapted for continuous bearing contact of the shaft cams therethrough during shaft oscillation, and yielding means for normally holding the propeller blades in feathering position, said propeller blades having major working surfaces extending from their respective shaft axes in the direction of revolution, whereby to utilize the pressure of the blades upon the water to urge them from feathering positions toward positions of maximum propulsion.

8. In a self feathering propeller, the combination of a chambered hub provided with an axially extending shaft receiving sleeve and shaft bearings extending transversely from the medial portion of said sleeve, asymmetrical propeller blades having stub shafts journaled in said bearings and provided with transversely extending key receiving sockets at their radially inner ends, keys in said sockets projecting laterally from their respective shafts, said bearings having shoulders for sliding engagement of the ends of the keys therewith, screws securing the keys to the respective shafts, means associated with said keys for precisely holding the propeller blades at an equal pitch, and means for resiliently urging said blades toward feathering position.

9. In a self feathering propeller, the combination of a driving shaft hub having spaced inner and outer sleeves and cam-like rocker members pivotally supported between said sleeves at diametrically opposite points, bearings for blade supporting shafts connecting said sleeves along a line at right angles to the axis of oscillation of said cam-like members, asymmetrical propeller blades having stub shafts mounted in said bearings and provided with cam followers adapted to maintain continuous engagement with said rocker members during oscillation of the propeller blades.

10. In a self feathering propeller, the combination of a driving shaft hub having spaced inner and outer sleeves and cam-like rocker members pivotally supported between said sleeves at diametrically opposite points, bearings for blades supporting shafts connecting said sleeves along a line at right angles to the axis of oscillation of said cam-like members, asymmetrical propeller blades having stub shafts mounted in said bearings and provided with cam followers adapted to maintain continuous engagement with said rocker members during oscillation of the propeller blades, and a cap for the hub, covering the inner ends of the blade shafts, rocker members, and their cam followers to prevent erosion of the bearings and cam surfaces.

11. In a self feathering propeller the combination with a hub, of asymmetrical blades mounted on the hub for oscillation about predetermined axes approximately radial with respect to the hub, each of the blades having a relatively larger area extending forwardly of its axis of oscillation in the direction of hub rotation, cam means connected with the respective blades for oscillation therewith, and cam levers individually pivoted through the hub between the respective blades and having their respective ends in operative motion receiving and transmitting engagement with the cam means of the respective blades at either side thereof, the cam means of the blades and the levers having cooperating surfaces constituting a closed motion transmitting system in which any movement of either blade about its axis of oscillation produces a corresponding change of pitch of the other blade, and means acting on the blades urging said blades toward feathered positions from which said blades are movable toward corresponding positions of maximum pitch when the enlarged forward areas of the respective blades are acted upon with sufficient pressure by the water in which the propeller operates.

HERVEY B. ASHELMAN.
AUGUST JOHNSON.

CERTIFICATE OF CORRECTION.

Patent No. 2,290,666. July 21, 1942.

HARVEY B. ASHELMAN, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 9, for "casing" read --casting--; and second column, line 23, for "sleeve 13, and the bearing 13" read --bearings 12, and the sleeve 13--; page 2, first column, line 66, claim 1, for "oscillably" read --oscillatably--; and second column, line 4, same claim, for "havng" read --having--; and line 32, claim 3, for "assymmetrically" read --asymmetrically--; and line 43, claim 4, for "theerof" read --thereof--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of September, A. D. 1942.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.