P. W. HODGKINSON.
REVERSIBLE PROPELLER FOR BOATS.
APPLICATION FILED MAR. 10, 1909.

975,039.

Patented Nov. 8, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

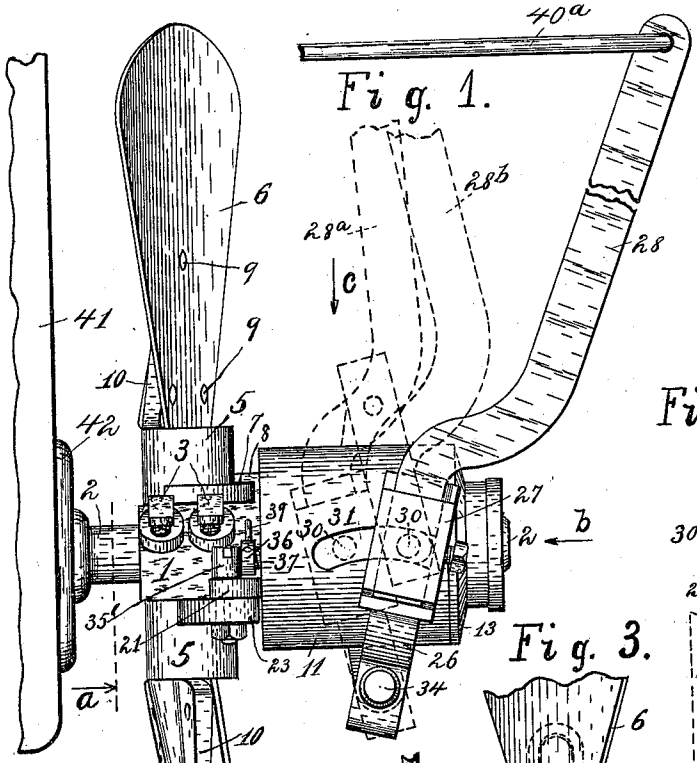


Fig. 2.

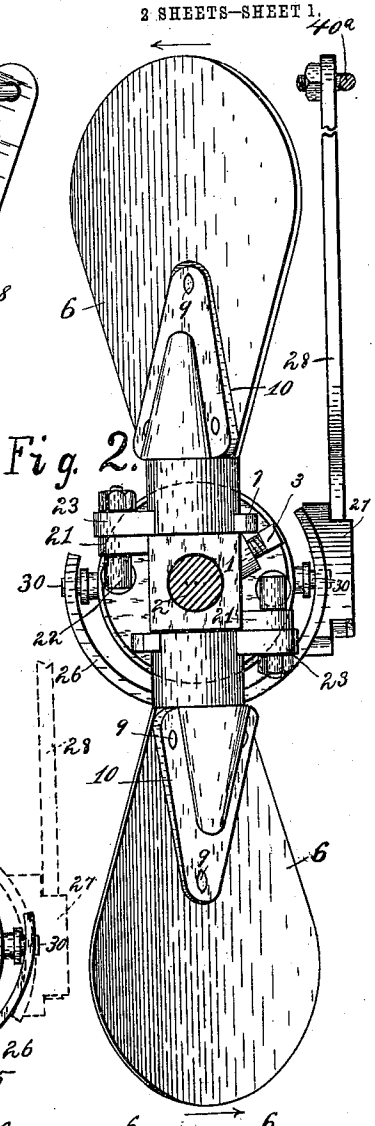
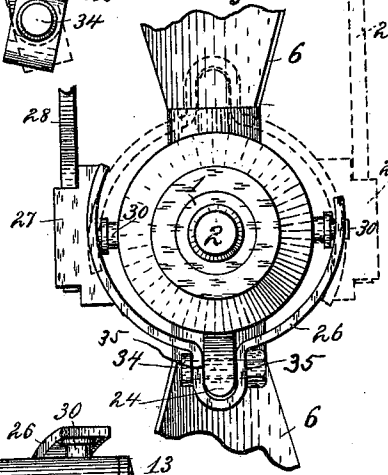


Fig. 3.



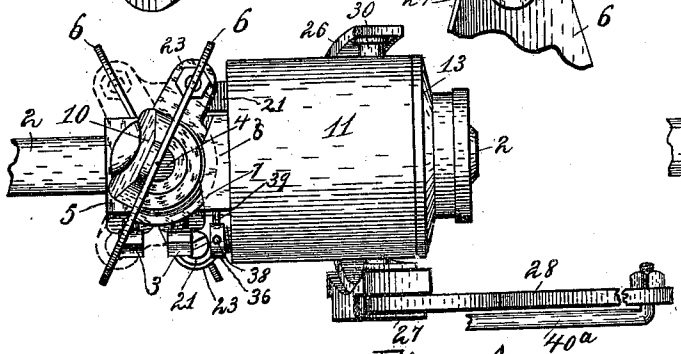


Fig. 4.

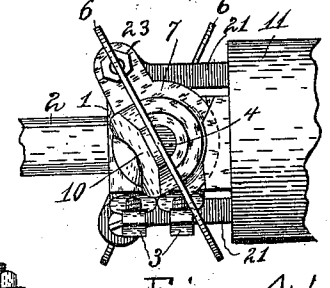


Fig. 4½.

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2 SHEETS—SHEET 2.

Fig. 5.

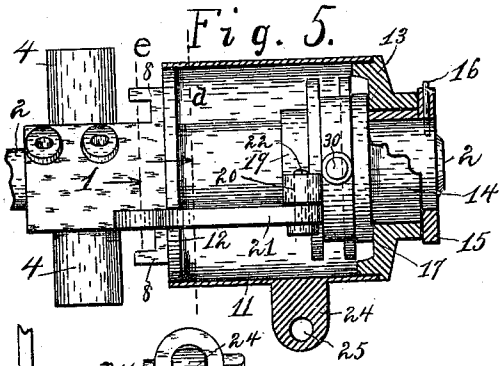
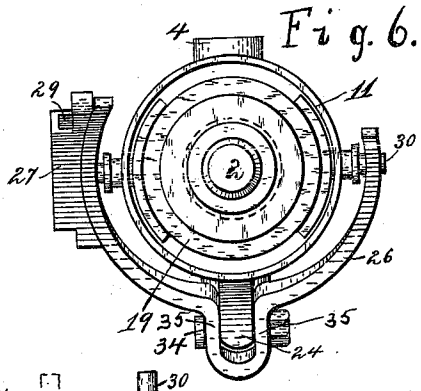


Fig. 6.



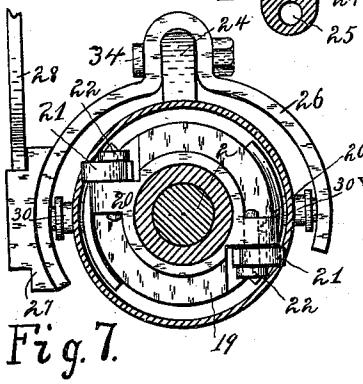


Fig. 7.

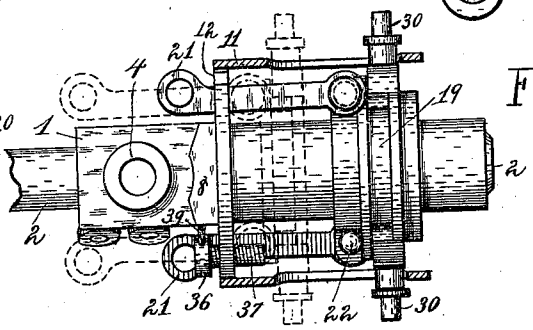
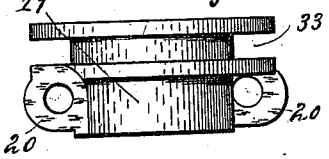


Fig. 8.

Fig. 9.



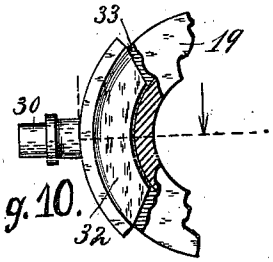
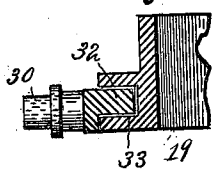


Fig. 10.

Fig. 11.



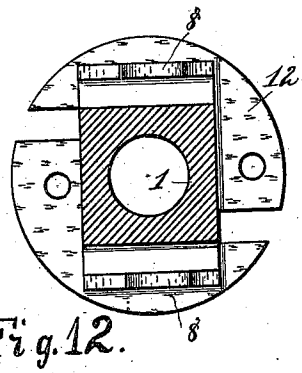


Fig. 12.

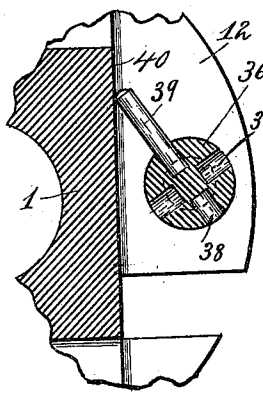


Fig. 13.

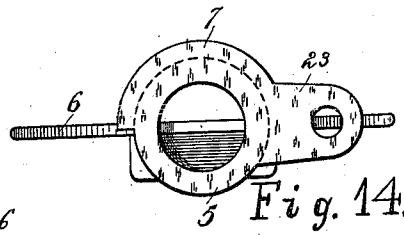
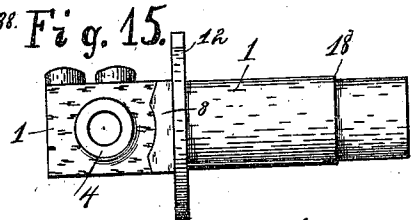


Fig. 14.

Fig. 15.



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Inventor:
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by C. B. Whitmore, Atty.

UNITED STATES PATENT OFFICE.

PERCY W. HODGKINSON, OF ROCHESTER, NEW YORK, ASSIGNOR TO CHARLES D. CAMP, OF ROCHESTER, NEW YORK.

REVERSIBLE PROPELLER FOR BOATS.

975,039. Specification of Letters Patent. Patented Nov. 8, 1910.

Application filed March 10, 1909. Serial No. 482,566.

To all whom it may concern:

Be it known that I, PERCY W. HODGKINSON, of Rochester, in the county of Monroe and State of New York, have invented a new and useful Improvement in Reversible Propellers for Boats, which improvement is fully set forth in the following specification and shown in the accompanying drawings.

This invention relates to certain new and useful improvements in propellers for boats and it has for its objects among others to provide an improved mechanism of this character, embodying a self-contained fulcrum and lever. Also means whereby should the boat be running near the shore, over a shoal or the like where the blade is apt to strike against some obstruction, the connections between the blade and its holder will readily give and allow the blade to yield to the obstruction and thus avoid serious injury being done to the other and more costly mechanism.

It has for a further object to provide a mechanism which shall be disposed entirely behind the blades for adjusting the leverage as well as the pitch so that the pitch of the blades may be adjusted so as to do the best service in giving the boat its speed.

A further object is to provide a mechanism applicable to boats propelled either by a right or left hand engine and so constructed that the reversing lever will, in all instances, incline in the direction in which the boat is to run. This is an important feature which will be readily understood when it is borne in mind that some engines employed in boats, and more especially in that class of smaller inland crafts generally known as steam launches and the like, are known as right hand engines and others as left hand engines and that where a man managing a boat propelled, for instance, by a right hand engine is suddenly called upon to manage a boat propelled by a left hand engine he would, from habit, be very apt to shift the reversing lever in the wrong direction and so cause the boat to move contrary to what he intended and thus liable to cause breakage or disaster from the boat moving in the wrong direction. My present improvement is adapted for either style of engine, being readily shiftable, so that the lever will always incline in the direction in which it is wished to move the boat, thus forming, as it were, a guide for the operator.

Other objects and advantages of the invention will hereinafter appear and the novel features thereof will be particularly pointed out in the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the numerals of reference marked thereon, form a part of this invention and in which—

Figure 1 is a left-side elevation of my improved propeller as in use on a boat, with parts broken away and other parts shown in different positions by full and by dotted lines. Fig. 2 is a front elevation of the device, seen as indicated by arrow *a* in Fig. 1, the engine shaft being transversely sectioned near the paddles. Fig. 3 is a rear elevation of the device, seen as indicated by arrow *b* in Fig. 1, parts being broken away and other parts shown in various positions by full and by dotted lines. Fig. 4 is a view from above the device, seen as indicated by arrow *c* in Fig. 1, the paddles and associated parts being shown in two positions each by full and by dotted lines, and portions broken away. Fig. 4½ is a plan of parts, similar to Fig. 4, showing the blades and coacting parts oppositely shifted. Fig. 5 is a central longitudinal section of the drum or casing, showing interior parts, parts being broken away and omitted. Fig. 6 is a rear-end view of the mechanism, as seen in Fig. 3, the rear head of the casing and other parts being omitted. Fig. 7 is a vertical transverse section of parts on the dotted line *d* in Fig. 5, further showing the internal mechanism. Fig. 8 is a plan of parts, seen as in Fig. 4, the casing being centrally, longitudinally sectioned, parts being shown in various positions by full and by dotted lines, and parts omitted. Fig. 9 is a view of the interior sliding head detached. Fig. 10 is a side elevation of a portion of the interior sliding head and a trunnion in place thereon, seen in the direction in which Fig. 6 is seen, a part being broken away and transversely sectioned. Fig. 11 is a section of the parts shown in Fig. 10, taken on the broken dotted line in said figure. Fig. 12 shows, in elevation, the forward head of the casing and integral parts viewed as in Fig. 2, the hub carrying the paddles being transversely sectioned on the dotted line *e* in Fig. 5. Fig. 13, drawn to a larger scale, is a view of parts shown as in Fig. 12, with a controlling screw transversely sectioned through

its head. Fig. 14 is a plan of the base of a paddle, detached, further showing the form of the holder for the paddle. Fig. 15 is a side view of the sleeve or hub for the paddles, detached, seen in a direction opposite that in which Fig. 8 is shown.

Like numerals of reference indicate like parts in the several views.

Referring to the drawings 1 designates the hub or sleeve carrying the paddles. It is made tubular in form and passed on to the end of the driving shaft 2 leading from the engine, not shown, but which may be of any of the well-known types suitable for this purpose. The hub may be rigidly held to the shaft in any suitable manner, in this instance being shown as secured by the set screws 3. The hub is formed with two oppositely projecting transverse thimbles or journal bearings 4, seen clearly in Fig. 5, for holding the two paddles, and upon which the latter may turn. The parts 5, to which the blades 6 of the paddles are attached, are formed with laterally projecting flanges 7 which project under the projecting ledges 8 of the hub on opposite sides thereof, as seen clearly in Fig. 5, to prevent the blades from slipping off of the journals or parts 4. The blades of the paddles, in this instance, are shown as secured by suitable rivets 9 to the extensions or arms 10, see Fig. 1.

The interior parts are clearly shown in Fig. 5 in which 11 is a cylinder or drum or casing upon a head or circular member 12 of the hub. 13 is a removable head at the end of the cylinder or drum. This head is formed larger in external diameter than the end of the hub 1, a bushing 14 being inserted between it and the hub for convenience in assembling the parts. Outside of the head 13 is a flange 15 held rigidly to the hub or sleeve 1 by any simple or convenient means, as, for instance, by a pin 16, as seen in Fig. 5, serving to hold the head 13 and the casing in place. A similar flange 17 is snugly fitted to the hub 1 against a shoulder 18, see Fig. 15, and between which flanges 15 and 17 the head 13 and the bushing 14 may freely turn but held against endwise motion.

On the hub 1 is slidingly fitted a circular grooved body 19, seen clearly in Figs. 5, 6, 7, 8 and 9, said grooved body having rests 20 carrying longitudinal arms or connectors 21 secured thereto by suitable means, as the pins or the like 22, and extending forward through openings in the head 12, as seen in Fig. 5, and connected with the lateral arms 23, seen in Figs. 1, 2 and 4, on the holders 5 for the blades. The parts 23 project on opposite sides of the hub 1 so that, when the sliding head or part 19 is moved (by mechanism soon to be described), one way or the other, along the hub 1, the blades will be given correspondingly opposite inclinations for propelling the boat forward or backward, as the case may be, the blades or paddles turning on the journals 4 with swivel motion, as will be readily understood. When the circular body 19 is at its rear position, as shown in full lines in Fig. 8, the two blades will occupy the inclined positions, as seen in Figs. 1, 2 and 4. When the circular body 19 is moved forward, to the dotted line position seen in Fig. 8, the blades will be moved to the opposite positions, such as seen in Fig. 4½.

The casing 11 is formed with a laterally projecting lug 24, seen in Figs. 5 and 7, having an opening 25 therethrough. This lug may be made to project either downward or upward by turning the casing half way around the hub. In Fig. 6, it is shown in one position, while in Fig. 7 it is shown in the opposite position. The lug 24 carries a semi-circular yoke 26 having a seat or recess 27 for receiving a suitable lever 28 for shifting the paddles. This lever is removable from the seat or recess 27 and may be inserted in either end of the latter, in a rectangular opening 29 in the seat or recess, as seen clearly in Figs. 4 and 6, according to the position occupied by the yoke, the lever always pointing upward.

30, seen in most of the figures, are a pair of trunnions projecting outward laterally through curved slots 31 in opposite sides of the casing 11 into bearings in the yoke, as seen most clearly in Figs. 6 and 7. These trunnions have extended curved base portions 32, seen in Figs. 10 and 11, with portions occupying the groove 33 in the sliding head or body 19, as seen clearly in Figs. 10 and 11, so that, when the head is shifted along the hub 1 by means of the lever 28, the connectors 21 will shift the paddles to either one position or the other, as above stated, the yoke 26 turning on a pivot 34 passing through the opening 25 in the lug 24 and through the opposite walls of the U-shaped portion 35 of the yoke, as seen clearly in Figs. 6 and 7.

It is to be understood that the sliding head or body 19 always turns with the hub 1, this head, the hub and the arms or connectors 21 all turning together with the shaft 2 independent of the casing 11, the bases or parts 32 of the trunnions 30 sliding around in the groove 33 of the head or body 19.

The pins 22 joining the arms or connectors 21 with the lateral arms 23 of the paddles are formed with extended heads 35′, seen in Figs. 1 and 2, which are disposed in position to meet heads 36 of short parts 37 threaded longitudinally through the head 12, as seen clearly in Fig. 8, which heads 37 form stops for the swivel action or turning of the blades on the journals 4. By turning the heads 37 out from the head 12 of the drum 11, the heads 35′ of the pins 22 will meet them

quicker and so sooner stop the swivel motions of the blades on the journals 4. But, if the heads 37 be screwed back against the head 12, the paddles will turn farther on their journals 4, thus giving them a sharper pitch for beating the water. The heads 37 have each a series of transverse or radial slots 38, seen best in Fig. 13, in which to receive removable stop pins 39, seen also in said figure, which, when the heads are turned to any position of adjustment, come in contact with the square part of face 40 of the hub or sleeve, as seen clearly in said Fig. 13, forming stops so that the heads 37 can turn no farther in that direction. The pins 39 are removable so as to be inserted in any one of the holes 38, by means of which to finely adjust the positions of the parts 37, so as to closely control the amount of the twist or pitch given to the blades.

Some engines that propel boats of this character are known as right hand engines and others as left hand engines; that is to say, one kind turns the shaft 2 in one direction and the other turns the shaft in the opposite direction. It is always desirable, however, to have the reversing lever 28 move the same relatively with the boat, whichever style of engine may be employed. This lever stands and moves in a vertical plane over the water back of the boat and beyond the propeller blades and is swayed by the man in charge in directions forward or backward to have the boat move forward or backward. It is desirable also to have the boat run in the direction in which the lever is inclined or swayed; that is to say, if it be desired to have the boat run forward, the upper end of the lever will be swung to its forward position, or inclined forward, while, if the lever is swung to its backward position, the boat will run backward. In Fig. 1, the parts are shown in full lines in the position they assume when it is designed to run the boat backward. For this purpose, the drum or casing 11 is made adaptable to be turned through a half revolution to bring the lugs 24 of the drum and the U-shaped portion 35 of the yoke either beneath it or above it, as shown in Figs. 6 and 7. When the lever 28 rests in the socket 27 with the yoke above the casings, as seen in Fig. 7, its motions will be just the reverse of those when the yoke is below the casing, as seen in Fig. 6, so that whichever way the shaft 2 is turned by the engine, the yoke will be shifted so that in either case the boat will run in the direction in which the lever inclines. The rest 27 is open at both ends, having a rectangular opening 29 upon both ends to receive the end of the lever 28, no matter which side up the yoke assumes. The dotted lines 28^a in Fig. 1 show the position said lever assumes when merely swung to its forward position, the yoke remaining below the casing. The dotted lines 28^b show the lever in its forward position when the yoke is swung upward or over the casing, as indicated in Fig. 7. The lever is designed to be shifted by the operator forward and backward, by suitable means, as a rod 40^a, seen in Figs. 1, 2 and 4, connected with the free end of the lever 28, in any suitable manner. This rod leads forward into or upon the boat, the lever and rod being of sufficient length to position the latter a proper distance above the paddles.

41, Fig. 1, designates the rear end of the keel of a boat, it being shown as provided with the ordinary extreme bearing 42 for the shaft 2, it being understood that the latter is of the ordinary kind in this service, being provided within the boat with a stuffing box of conventional form and which it is not thought necessary to herein show or describe.

While, in some of the views, the shaft 2 is shown as passed entirely through the sleeve or hub 1, it is to be understood that this is not essential, it being sufficient that the shaft enters said sleeve or hub sufficiently to receive the set screw 3, so as to be securely affixed thereto.

The screws 37 with their heads 36 constitute "pitch adjusters" for the paddles, serving to determine the pitch or the twist of the blades on the bearings or journals 4. The inner ends of these screws 37, as seen in Fig. 8, constitute stops for the left hand or forward movements of the sliding head, as will be clearly understood by the dotted lines in said Fig. 8. By means of these "pitch adjusters", when they are turned back so that their heads are against or near to the head or flange 12 of the hub 1, the blades will be permitted to turn to the proper angle or pitch necessary for doing the best service in urging the boat forward. This, I term "full lead forward". This "full lead forward" is desirable in order that the boat may do the best service in giving the boat speed.

In the present instance, it will be noted that the drum 11, the head 13 and the short bushing 14 are constructed so as to all turn together as a single piece or element between the two fixed flanges 15 and 17, the drum or casing 11 having a journal bearing, so to speak, at its forward end on the head 12 and at its rear end on the reduced end to the rear of the shoulder 18 of the hub or sleeve 1, as seen in Fig. 8 and as will be readily understood upon reference to Fig. 15, or, in other words, the hub 1, with its flange or head 12, turns within the drum 1 and its head 13 and the bushing 14. These latter parts do not turn only through half revolutions when it is desired to bring the yoke 26 above or below the casing, as hereinbefore described. It will be evident, however, that

the drum and its head 13 may be made in one integral part, if preferred.

From the foregoing description, when taken in connection with the annexed drawings, the mode of operation will be apparent and readily understood, and a further detailed description thereof does not seem necessary.

Modifications in detail may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

What is claimed as new is:—

1. In a propeller for boats, the combination with the blades, of controlling mechanism therefor embodying a pivotally mounted reversing yoke arranged wholly in the rear of the blades and on the propeller shaft.

2. In a propeller for boats, the combination with the blades, of controlling mechanism therefor embodying a pivotally mounted reversing yoke arranged wholly in the rear of the blades and on the propeller shaft and embodying a fulcrum and lever disposed between the end of said shaft and the blades.

3. In a propeller for boats, the combination with the blades, of controlling mechanism therefor embodying a pivotally mounted reversing yoke arranged wholly in the rear of the blades and on the propeller shaft and embodying a fulcrum and lever disposed between the end of said shaft and the blades, and means whereby said lever will be inclined in the direction in which the boat is to be moved.

4. In a propeller for boats, the combination with the blades, of a shifting mechanism embodying a pivotally mounted reversing yoke mounted on the propeller shaft to the rear of the blades.

5. In a propeller for boats, the combination with the blades, of a shifting mechanism embodying a pivotally mounted reversing yoke, said yoke having a seat with lever-receiving opening at each end.

6. In a propeller for boats, the combination with the blades, of a shifting mechanism embodying a pivotally mounted reversing yoke, said mechanism being mounted upon the propeller shaft and disposed wholly in rear of the blades.

7. In a propeller for boats, the combination with the blades, of a shifting mechanism embodying a pivotally mounted reversing yoke, said yoke having a seat with lever-receiving opening at each end, said mechanism being disposed wholly in the rear of the blades.

8. In a propeller for boats, the combination with the blades, of a shifting mechanism embodying a pivotally mounted yoke supported from the propeller shaft, and means for moving the same on its pivot, said yoke being mounted for inclined movement to the front or rear of a vertical plane.

9. In a propeller for boats, the combination with the blades, of a shifting mechanism embodying a pivotally mounted yoke, and means for moving the same on its pivot, said yoke being mounted for inclined movement to the front or rear of a vertical plane, said mechanism being disposed wholly at the rear of the blades.

10. In a propeller for boats, the combination with the blades, of a shifting mechanism disposed wholly in the rear of the blades and embodying a leverage and means capable of being revolved through half a turn to retain movement of the lever in the same direction for forward movement of the boat by right or left hand engine.

11. In a propeller for boats, the combination with the blades, of a shifting mechanism disposed wholly in the rear of the blades and embodying a leverage and means capable of being revolved through half a turn to retain movement of the lever in the same direction for forward movement of the boat by right or left hand engine, and means for adjusting the pitch of the blades to obtain a full lead forward.

12. In a propeller for boats, a hub, a drum mounted on a member of said hub for half-revolution, and a yoke pivotally carried by the drum and constructed to receive the operating lever.

13. In a propeller for boats, a hub, a drum mounted on a member of said hub for half-revolution, and a yoke pivotally carried by the drum and constructed to receive the operating lever, said drum and yoke being disposed to the rear of the blades.

14. In a propeller for boats, the combination with the blades and the hub, having journals upon which the blades are mounted to turn, of a member slidable on the hub, means connecting said member with the holders for the blades, said member and means being disposed to the rear of the blades and means for reciprocating said member embodying a pivotally mounted yoke having a seat with lever receiving opening at each end.

15. In a propeller for boats, the combination with the blades and the hub, having journals upon which the blades are mounted to turn, of a member slidable on the hub, means connecting said member with the holders for the blades, means for reciprocating said member, and a drum inclosing said sliding member said drum being supported from the shaft of the blades and said drum and member being disposed to the rear of the blades.

16. In a propeller for boats, the combination with the blades and the hub, having journals upon which the blades are mounted to turn, of a member slidable on the hub, means connecting said member with the holders for the blades, means for recipro-

cating said member, and a drum capable of being revolved through half a turn.

17. In a propeller for boats, the combination with the hub having projecting ledges on opposite sides and oppositely disposed thimbles, of blade holders having laterally projecting flanges coöperating with said ledges, and means connected with said holders for turning the blades on their thimbles.

18. In a propeller for boats, the combination with the hub having projecting ledges on opposite sides and oppositely disposed thimbles, of blade holders having laterally projecting flanges coöperating with said ledges, means connected with said holders for turning the blades on their thimbles, and stops for limiting the movement of the blades.

19. In a propeller for boats, the combination with the hub having projecting ledges on opposite sides and oppositely disposed thimbles, of blade holders having laterally projecting flanges coöperating with said ledges, means connected with said holders for turning the blades on their thimbles, and stops for limiting the movement of the blades, said parts being disposed to the rear of the blades.

20. In a propeller for boats, the combination with the blades, and the blade holders of a head sliding on the hub and turnable therewith, said head having grooves, arms connecting said head with the blade holders, trunnions having parts movable in the grooves of the head, and a yoke in which said trunnions are mounted said parts being disposed to the rear of the blades.

21. In a propeller for boats, the combination with the blades, and the blade holders of a head sliding on the hub and turnable therewith, said head having grooves, arms connecting said head with the blade holders, trunnions having parts movable in the grooves of the head, a yoke in which said trunnions are mounted, and a reversibly mounted drum to which said yoke is pivoted.

22. In a propeller for boats, the combination with the blades, and the blade holders of a head sliding on the hub and turnable therewith, said head having grooves, arms connecting said head with the blade holders, trunnions having parts movable in the grooves of the head, a yoke in which said trunnions are mounted, and a reversibly mounted drum to which said yoke is pivoted, said yoke having a lever-receiving seat.

23. In a propeller for boats, the combination with the blades, the hub and the shaft, of a reversibly mounted shifting mechanism disposed wholly in the rear of the blades for the blades embodying a reversibly pivotally mounted yoke.

24. In a propeller for boats, the combination with the blades, the hub and the shaft, of a reversibly mounted shifting mechanism for the blades embodying a reversibly pivotally mounted yoke, and a lever detachably mounted in the yoke to incline in the direction of the movement of the boat.

25. In a propeller for boats, the combination with the blades, the hub and the shaft, of a reversibly mounted shifting mechanism for the blades embodying a reversibly pivotally mounted yoke, a lever detachably mounted in the yoke to incline in the direction of the movement of the boat, said shifting mechanism embodying means for varying the pitch of the blades.

In witness whereof, I have hereunto set my hand this 9th day of March, 1909, in the presence of two subscribing witnesses.

PERCY W. HODGKINSON.

Witnesses:

E. B. WHITMORE,

A. M. WHITMORE.