

No. 878,022.

PATENTED FEB. 4, 1908.

C. F. ROPER.
SPEED CONTROLLING REVERSING PROPELLER.

APPLICATION FILED OCT. 29, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

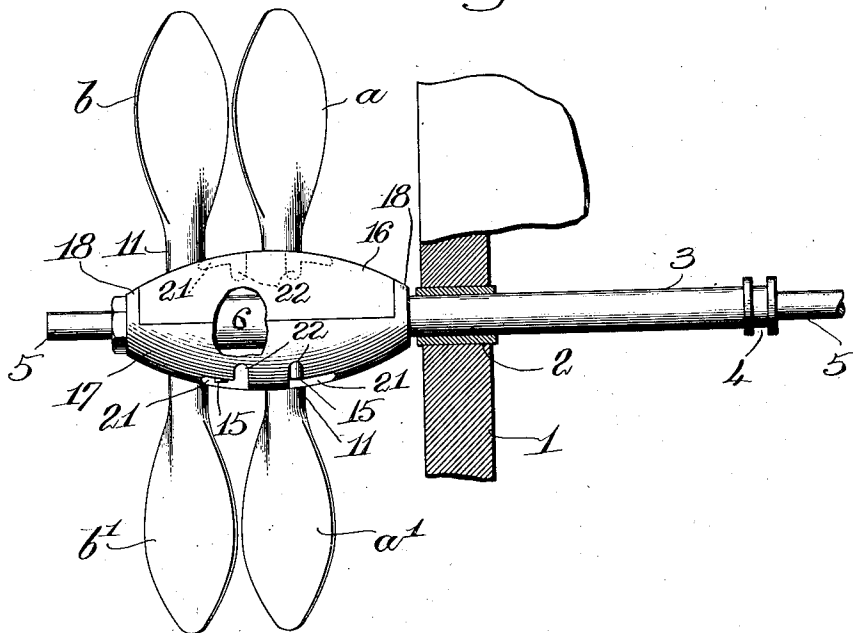
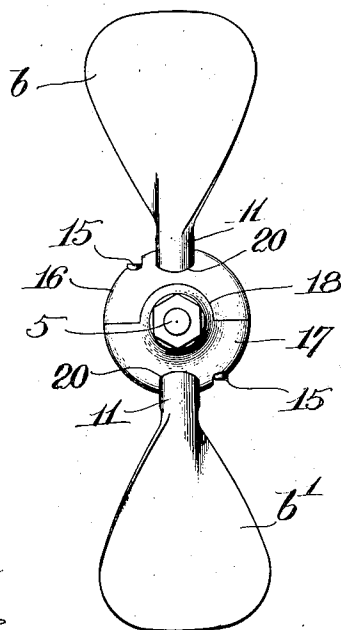


Fig. 2.



Witnesses.

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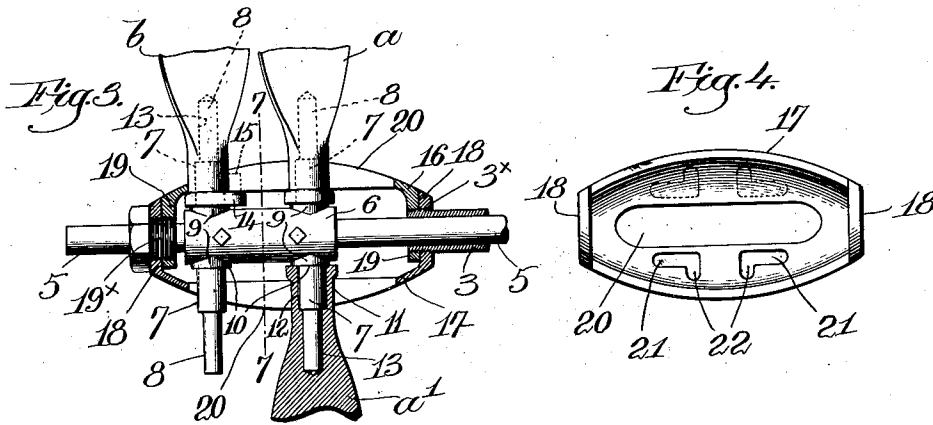


Fig. 5.

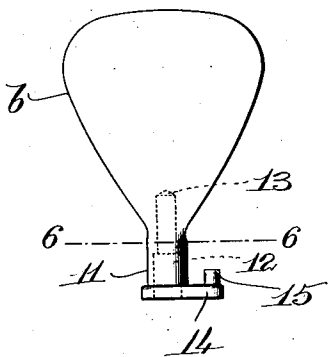


Fig. 6.

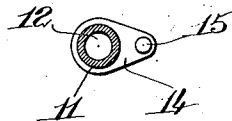
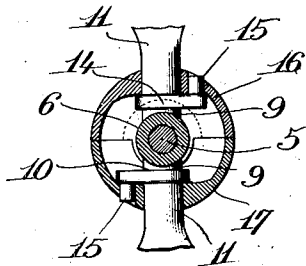


Fig. 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

CHARLES F. ROPER, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO C. F. ROPER & COMPANY,
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SPEED-CONTROLLING REVERSING-PROPELLER.

No. 878,022.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed October 29, 1906. Serial No. 341,004.

To all whom it may concern:

Be it known that I, CHARLES F. ROPER, a citizen of the United States, residing at Hopedale, county of Worcester, and State of Massachusetts, have invented an Improvement in Speed-Controlling Reversing-Propellers, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

In United States Patent No. 807,498, granted to me December 19, 1905, I show and describe a novel speed-controlling reversing propeller by the use of which the speed of the boat can be varied from zero to maximum, either ahead or astern, with the motor running at normal speed and always in the same direction. The construction of the propeller is such, as set forth in said patent, that a substantially constant resistance is maintained on the motor, the reversal in direction, as well as speed variation, being effected wholly by the propeller itself, obviating the use of clutches and reversing gearing. There is a wide field of usefulness for such propellers in small boats and launches, and my present invention has for its object the production of various novel features of construction and arrangement in such a propeller as above referred to, whereby the strength, durability, and general efficiency of the apparatus is increased and made thoroughly practical in a commercial sense.

The novel features of the invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a side elevation, partly broken out, of a propeller embodying my present invention, mounted at the stern of a boat, the manually-operated means for governing or regulating the speed and direction by or through the propeller being omitted, as forming no part of my invention; Fig. 2 is a left hand end elevation of the propeller shown in Fig. 1; Fig. 3 is a detail showing the supporting hub for the propeller blades, two of the blades being shown in elevation and a third partly in section, the bearing stud or pintle for the fourth blade being shown in full, and the casing in section; Fig. 4 is a top plan view of one part of the combined controller and casing, to be referred to; Fig. 5 is a side elevation of one of the propeller blades, de-

tached; Fig. 6 is a transverse sectional detail on the line 6—6, Fig. 5, looking down; Fig. 7 is a transverse section of the combined controller and casing, on the line 7—7, Fig. 3, looking toward the left.

Referring to Fig. 1 the stern-post 1 of the boat has a suitable bearing 2 in which is rotatably mounted a longitudinally movable sleeve 3, through which extends the driving shaft 5 of the motor, all substantially as in my said patent, the sleeve having a grooved collar 4 on its inner end, and by means of a suitable yoke-lever, (not shown) the longitudinal movement of the sleeve is effected.

It is supposed that the shaft 5 is driven by the motor uniformly as to direction and speed, as in my patent. Near the outer end of the shaft an elongated blade-carrying hub 6 is fixedly secured, see Figs. 1 and 3, said hub having thereon, and preferably integral with it, opposite pairs of strong and heavy elongated bearing-studs or pintles 7, projecting radially from the hub, the two studs on one side being diametrically opposite the two on the other side. Said studs are preferably reduced in diameter at their outer ends, as at 8, and the hub has bosses 9 formed upon it to present flat annular seats 10, at the base of and concentric with each stud. Herein I have shown two sets or pairs of propeller blades, mounted on the hub, each pair consisting of two oppositely-extended blades, as *a*, *a'* and *b*, *b'*, all of the blades being shown in Fig. 1, and as each blade is constructed like its fellows only one will be described in detail. Each blade is a casting and has a strong and heavy cylindrical base or hub 11 provided with a central socket 12, see Fig. 3, and dotted lines Fig. 5, the inner end of the socket being extended through the hub well into the blade, as at 13, and reduced in diameter to conform to the end 8 of a pintle and also because the blade thins down from the hub 11. The blade is pivotally mounted on one of the bearing-studs or pintles, which fits easily in the socket provided for it, and it will be seen that a very long and strong extended bearing is thus provided, the stud extending well into the solid metal of the body of the blade.

A lateral foot 14 extends from the bottom of each blade hub, and rests upon the annular seat 10 of the adjacent boss 9 of the blade-carrying hub 6, a pin or follower 15

projecting from the outer face of the foot parallel to the socket 12 and eccentric thereto. The blades are thus mounted so that they can be turned on the bearing studs, but 5 revolve bodily with the hub 6 by or through rotation of the drive shaft 5. The angularity of the blades may be varied, as will be described, so that either of the two blades of a pair, or the blades of one pair may be varied 10 as to their angularity relatively to the blades of the other pair.

I have herein provided a combined controller and casing, such part having the twofold function of controlling the angularity 15 of the blades and also of inclosing the hub 6 and the adjacent parts of the blades, while retaining the latter on the bearing-studs. Such controller and casing is herein shown as made in two separable parts 16, 17, 20 divided longitudinally, each part being a casting of semi-cylindrical shape in cross-section, the ends of the part 17 being upturned at 18 to overlap the oppositely 25 turned ends 19 of the part 16, the overlapped ends at the inner extremity of the casing being internally threaded, Fig. 3, to receive the threaded end 3^x of the sleeve 3. Said sleeve thereby rigidly connects the inner 30 ends of the casing and is firmly secured to both parts of the casing. The overlapped ends 18, 19 at the outer extremity of the casing are internally threaded, and an externally threaded bushing 19^x is screwed into the same, as shown in Fig. 3, the bushing 35 securely locking together the parts of the casing at the outer extremity thereof, the bore of the bushing fitting easily around the outer end of the shaft 5. A shell-like casing is thus provided, which surrounds the shaft 40 5 and the hub 6 thereon, and which is longitudinally movable relatively thereto, but said casing and the sleeve 3 rotate with the driving shaft.

Each casing part is longitudinally and 45 centrally slotted at 20, see Figs. 3, 4 and 7, to loosely receive the hubs 11 of the two blades on one side of the hub 6, the slots being long enough to afford the proper clearance when the controller-casing is 50 moved longitudinally. The foot 14 of each blade projects toward the side of the casing, and that portion of a foot between the follower 15 and the hub 11 is held in place by the overlying part of the casing, as will 55 be manifest from the dotted lines Fig. 7. Each casing part is provided with two cam-slots, but when the casing is assembled the two pairs of cam-slots are reversely arranged, as indicated by dotted lines Fig. 4. These 60 cam-slots are similar to equivalent slots in my patent, each comprising a longitudinal portion 21 and a short transverse portion or bend 22 at its inner end, and one of the followers 15 enters each cam-slot, as in Fig. 1. 65 It is not considered necessary to describe

in detail the changes in the angularity of the propeller blades effected by longitudinal movement of the controller, in view of the full description thereof in my patent herein referred to, it being sufficient to state that in 70 Fig. 1 the blades are set for full-speed ahead, the controller-casing being in its extreme inward position.

Reduction of speed will be effected by moving the controller outward, or to the 75 left, Fig. 1, thereby first changing the angularity of the blades *a*, *a'*, through the cooperation of their followers and the transverse portions of their cooperating cam-slots, and continued outward movement of the con- 80 troller will change the angularity of the blades *b*, *b'* when their followers have traversed the longitudinal portions of their cam-slots, and finally complete the change in the position of the blades *a*, *a'*. When 85 at its extreme outward position the controller will have set the blades in position for full-speed astern. The shell-like form of the controller serves to protect and inclose the parts, and its externally ovoid 90 shape very materially prevents the collection of grass or seaweed, and reduces the resistance to passage through the water.

The construction of the mechanism is very strong, rigid, and durable, and easy to pro- 95 duce, while permitting of very rapid and effective change in the setting of the blades according to the desired speed and direction of movement of the boat.

My invention is not restricted to the pre- 100 cise construction and arrangement of the apparatus herein shown, as I have merely illustrated and described in detail one practical embodiment of my invention.

Having described my invention, what I 105 claim as new and desire to secure by Letters Patent is:—

1. A rotatable shaft, a hub fixed thereon and having rigid, radially extended and elongated bearing studs thereon in diamet- 110 rically opposite pairs, a propeller blade pivotally mounted on each stud, each blade having a deep socket extending well into the solid body thereof to receive the stud, and a single controlling means to effect equal and 115 opposite angular movement of the blades of a pair and also to vary the angularity of the blades of one pair relatively to those of the other pair.

2. A rotatable shaft, a hub fixed thereon 120 and having integral therewith opposite pairs of independent, radially extended and elongated bearing studs thereon, a propeller blade pivotally mounted on each stud and having a deep socket extended into the 125 solid body of the blade to receive the stud, and controlling means common to both pairs of blades to vary the relative angularity of the blades of the two pairs.

3. A rotatable shaft, a hub fixed thereon 130

and having opposite pairs of integral, radially extended and elongated bearing studs thereon, and a propeller blade pivotally mounted on each stud, each blade having a heavy, elongated hub the opening through which is extended into the body of the blade, to receive the stud and provide an elongated, strong and rigid bearing-connection between the blade and the hub, and a lateral foot extended from the blade-hub provided with a follower eccentric to such hub, combined with controlling means operatively connected with the eccentric followers of the several blades, to effect equal and opposite angular movement of the blades of a pair and also to vary the angularity of the blades of one pair relatively to those of the other pair.

4. A rotatable shaft, a hub fast thereon and having rigid, oppositely extended and elongated pairs of bearing studs thereon, two pairs of propeller blades pivotally mounted on said studs, each blade having a deep socket to receive the stud and a follower eccentric to the base of the blade, and a combined controller and casing surrounding the hub and shaft and movable longitudinally relatively thereto, the controller being longitudinally slotted on opposite sides to receive the bases of the blades and having cam-slots to cooperate with the followers.

5. A rotatable shaft, a hub fast thereon and having rigid, oppositely extended and elongated pairs of bearing studs thereon, two pairs of propeller blades pivotally mounted on said studs, each blade having a hub-like base provided with a stud-receiving socket extended into the body of the blade, and a follower eccentric to the base, and a separable two-part combined controller and casing surrounding the hub and shaft and movable longitudinally relatively thereto, the parts of the controller being longitudinally slotted to receive the bases of the blades and having cam-slots to receive and cooperate with the followers.

6. A rotatable shaft, a hub fast thereon and having rigid, oppositely extended and elongated pairs of bearing studs thereon, a flat annular seat at the base of and concentric with each stud, two pairs of propeller blades pivotally mounted on the studs, each blade having an elongated hub with a central stud-socket extended into the body of the blade, and a lateral foot having a follower thereon eccentric to the hub and parallel to the socket therein, and a separable combined controller and casing inclosing the hub and movable longitudinally on the shaft, the casing having longitudinal slots to receive the blade hubs and provided with cam-slots to cooperate with the followers and control the angularity of the blades by longitudinal movement of the controller, the ends of the

blade hubs resting on the annular seats at the bases of the studs.

7. A rotatable shaft, a hub fast thereon and having rigid, oppositely extended and elongated pairs of bearing studs thereon, two pairs of propeller blades pivotally mounted on said studs, each blade having a deep socket to receive the stud and a follower eccentric to the base of the blade, and an externally ovoid casing surrounding the stud-carrying hub and movable longitudinally relatively thereto, said casing having overlapped ends apertured to receive the shaft and the casing also being longitudinally slotted to receive the bases of the blades, and having cam-slots to cooperate with the followers.

8. A rotatable shaft, a hub fast thereon and having rigid, oppositely extended and elongated pairs of bearing studs thereon, two pairs of propeller blades pivotally mounted on said studs, each blade having a deep socket to receive the stud and a lateral foot provided with a follower eccentric to the socket, and a combined controller and casing surrounding the hub and shaft and movable longitudinally relatively thereto, the controller being longitudinally slotted on opposite sides to receive the bases of the blades and having cam-slots to cooperate with the followers, the controlling-casing adjacent the sides of the longitudinal slots extending over the feet of the blades and retaining the latter in position on the bearing studs.

9. In apparatus of the class described, a driving shaft, two oppositely extended pairs of propeller blades mounted thereon and angularly movable about their own axes, a two-part casing longitudinally slotted to receive the hubs of the blades and having overlapped ends provided with threaded openings, a sleeve screwed into one pair of overlapped ends and longitudinally movable on the shaft, a threaded bushing screwed into the opposite overlapped ends of the casing and through which the shaft freely passes, and positive connections between the casing and propeller blades, whereby longitudinal movement of the casing varies the angularity of the blades.

10. In apparatus of the class described, a driving shaft, two oppositely extended pairs of propeller blades mounted thereon and angularly movable about their own axes, an externally ovoid, two-part combined controller and casing longitudinally slotted to receive the blade hubs and inclosing their connections with the shaft, means to lock the casing parts together and to embrace the shaft loosely, and connections between the casing and the blades, whereby longitudinal movement of the former relatively to the shaft varies the angularity of the latter.

11. A combined controller and casing for a

speed-controlling reversing propeller, comprising two longitudinally slotted shell-like parts having overlapped ends provided with registering threaded openings, and tubular
5 locking members adapted to be screwed into the openings to lock the parts of the casing together, the propeller shaft passing loosely through said locking members.

In testimony whereof, I have signed my name to this specification, in the presence of 10 two subscribing witnesses.

CHARLES F. ROPER.

Witnesses:

GEO. W. GREGORY,
MARGARET A. DUNN.