

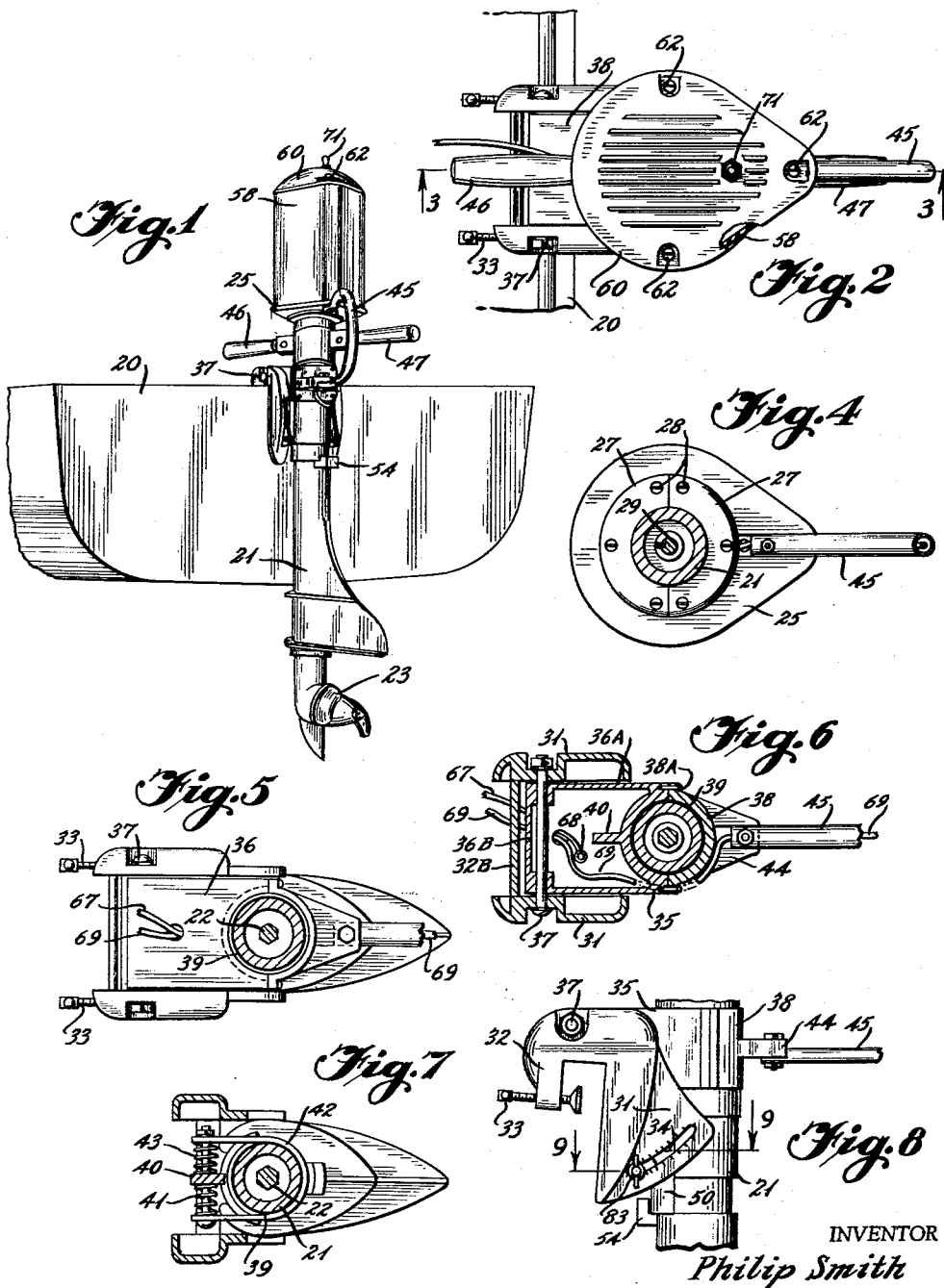
Dec. 19, 1961

P. SMITH
OUTBOARD MOTOR

3,013,518

Filed May 12, 1960

2 Sheets-Sheet 1



Dec. 19, 1961

P. SMITH
OUTBOARD MOTOR

3,013,518

Filed May 12, 1960

2 Sheets-Sheet 2

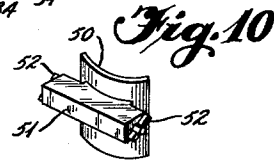
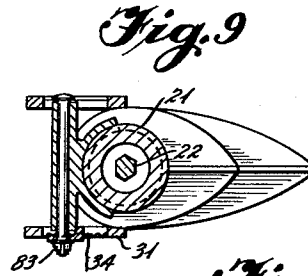
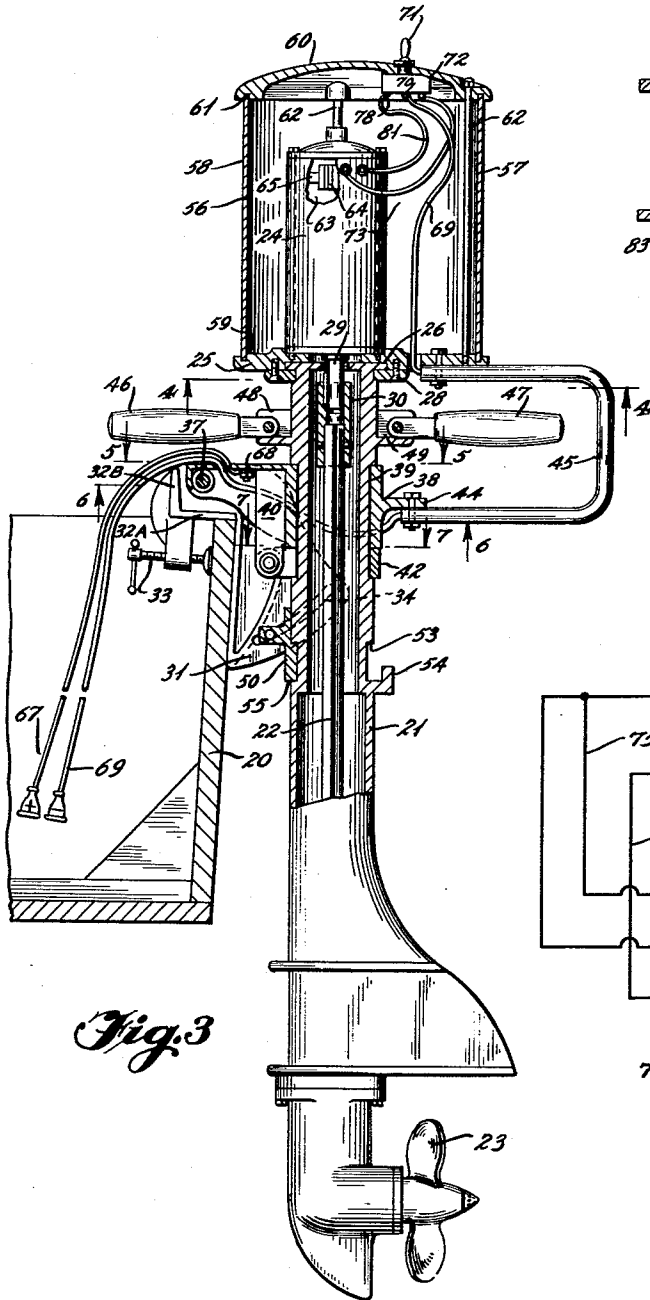
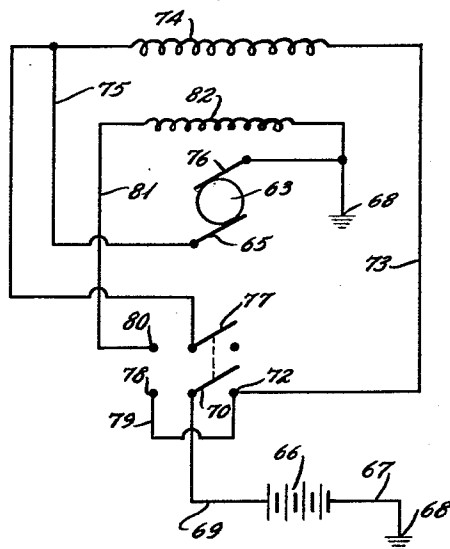


Fig. 12



INVENTOR
Philip Smith

BY *Hyatt D. Howell*
ATTORNEY

1

3,013,518

OUTBOARD MOTOR

Philip Smith, 110 Dillingham Ave., Kissimmee, Fla.

Filed May 12, 1960, Ser. No. 28,802

10 Claims. (Cl. 115-18)

The present invention relates to outboard boat motors and more particularly to a lightweight electrically driven outboard motor.

Previously known outboard boat motors have provided for controlled operation of a boat but the previous electric outboard boat motors have required slip rings and other complicated connections for carrying current to the electric motor. Also, the prior constructions were excessively heavy because of the complicated construction required to assure satisfactory operation.

An object of the present invention is to provide an electrically driven boat motor which overcomes the objections enumerated above and which provides for ease of mounting and ease of operation.

Another object is to provide an electrically driven outboard motor which can be used at varying speeds and which provides for complete control for 360° of steering operation.

Other and further objects will be apparent as the description proceeds and upon reference to the accompanying drawings, wherein:

FIG. 1 is a perspective of the electrically driven outboard motor mounted on a boat;

FIG. 2, a top plan view of the motor;

FIG. 3, a fragmentary section taken substantially on line 3-3 of FIG. 2 through the motor and clamp with the motor in forward driving position;

FIG. 4, a horizontal section looking upwardly taken substantially on the line 4-4 of FIG. 3 showing the electric motor mounting plate and the horseshoe shaped retaining member rotatably mounted on the end of the drive shaft housing;

FIG. 5, a horizontal section taken on line 5-5 of FIG. 3 showing the transom mounting clamp, the propeller shaft housing, mounting bearing and the leads for supplying power;

FIG. 6, a fragmentary horizontal section looking upwardly taken substantially on line 6-6 of FIG. 3 showing the ground lead connection to the propeller shaft housing bearing;

FIG. 7, a horizontal section taken on line 7-7 of FIG. 3 showing the frictional direction maintaining clutch between the propeller shaft housing and its supporting bearing;

FIG. 8, a fragmentary side elevation of the transom mounting clamp and the pivoted propeller shaft housing supporting bearing and the angular adjustment for varying the operative position of the propeller shaft housing;

FIG. 9, a fragmentary horizontal section taken substantially on broken line 9-9 of FIG. 8 showing the angular adjustment means and the adjustable saddle for limiting the angular position of the propeller shaft housing;

FIG. 10, a perspective of the propeller shaft housing engaging saddle for limiting the angular position;

FIG. 11, a perspective of the saddle positioning and retaining claw for maintaining a selected angular propeller shaft housing adjustment; and

FIG. 12, a wiring diagram showing the switching com-

2

bination for series and shunt windings of the electric motor.

Referring more particularly to the drawings, on the transom 20 of a boat an outboard motor assembly including a propeller shaft housing 21 having a drive shaft 22, a propeller 23 and an electric motor is mounted by suitable clamp means 31, 32.

On a motor supporting plate 25 having a circular recess a flange 26 on the upper end of the drive shaft housing 21 is received and is retained in place while permitting rotation by horseshoe shaped retaining members 27 attached by suitable screws 28 to the plate 25 thereby providing a driving assembly in which the propeller shaft 22 is driven from the armature shaft 29 of the motor 24 by means of a sleeve 30 suitably keyed to the armature shaft 29 and telescopically receiving the upper end of the propeller shaft 22.

For supporting the propeller shaft housing 21 and the motor for pivotal movement about its axis, a transom mounting bracket including a pair of U-members each formed from a first leg in the form of a gusset member 31 connected by the bight portion to the other leg 32 of the clamp is clamped in position on the boat transom 20 by means of clamping screws 33. The pair of U-members are connected and maintained in operative spaced relation by the connecting flanges 32A, 32B. Each gusset member 31 is provided with an arcuate slot 34 having outwardly extending teeth.

Pivotaly mounted between the gusset members 34 and the other legs 32 of the clamp is a drive shaft mounting bearing 35 which includes a laterally extending table portion 36 with side flanges 36A, and an end flange 36B which provide enlargements which receive a bolt 37 extending through the two U-members of the transom clamp, the enlargements providing for pivotal movement about the axis of the bolt 37 whereby the outboard motor may be selectively moved from the operative position shown to a position in which the propeller is out of the water and the propeller shaft housing is substantially horizontal to permit passage over shallow water.

Cooperating with the mounting bearing 35 is a bearing-like cap 38 secured to the mounting bearing 35 by screws. The cap 38 and mounting bearing 35 surround an intermediate reduced diameter portion of the propeller shaft housing 21 and retain a thin friction sheet 39 between the bearing and the propeller shaft housing 21 to maintain selected steering directions. A downwardly extending web 40 on mounting bearing section 35 projects below the bottom edges of the mounting bearing 35 and cap 38 and is provided with an aperture which receives a bolt 41 passing through the ends of a friction producing strap 42 and through compression springs 43 whereby the adjustment of the screw 41 and the springs varies the frictional resistance of the strap 42 against the friction material 39 and the propeller shaft housing to maintain a selected steering direction.

An outwardly extending shelf 44 projects from the bearing cap 38 and is provided with a semi-circular recess on its lower surface while motor mounting plate 25 is also provided with a semi-circular recess on its lower surface. A U-shaped tubular brace 45 has the ends of its legs fixed in the semi-circular recesses by means of suitable bolts thereby preventing relative rotation between the mounting bearing 35 and the motor mounting plate 25 while leaving a substantial space between the legs of the

3

U-shaped tubular brace 45 permitting the passage of steering handles 46, 47 which are pivotally mounted on upwardly opening channel shaped diametrically disposed lugs 48 and 49, respectively, on the propeller shaft housing 21 whereby the propeller shaft housing can be rotated to vary the position of the propeller 23 and the rudder and thereby control the steering of the boat including reverse propulsion when the propeller is positioned adjacent the boat.

To maintain the propeller housing in proper vertical operating position, a propeller housing receiving saddle having an arcuate segment 50 and a laterally extending web 51 having arcuate lugs 52 is mounted with its arcuate lugs 52 in the arcuate slots 34 of the gusset members so that the adjacent portion of the propeller shaft housing seats in the saddle in the position in FIG. 3 so the forward motion producing thrust on the propeller will urge the housing more tightly into the saddle. It will be noted that the propeller shaft housing is provided with a groove 53 and is provided with an upwardly extending flange 54 on the propeller side thereof and such flange 54 is adapted to pass outwardly of an enlarged portion 55 of the saddle 50 and maintain the propeller housing shaft 21 in fixed relation to the saddle by positive engagement of flange 54 with enlarged portion 55 whereby reverse operation will not draw the propeller shaft housing away from the boat since the flange 54 in that position will prevent pivotal movement of the propeller shaft about pivot bolt 37.

The motor stator of motor 24 is concealed by a protecting shield which includes a cylindrical section 56 and a dihedral section 57 which are connected together along their points of tangency by sheet metal joints 58. One section is provided with an S-shaped bend along the joint 53 and the edge of the other section snugly fits into the recess of the S-shaped bend to provide for slight adjustment so that the lower ends of the cylindrical and dihedral sections will snugly fit into a continuous groove 59 on the upper surface of plate 25. A top 60 is provided with a corresponding groove 61 receiving the upper ends of the shield sections being secured in place by a plurality of bolts 62 which maintains the shield and top in operative position.

The armature 63 of motor 24 is provided with the usual commutator 64 which receives electric power from the usual brush 65 to drive the armature and thereby drive the shaft 29.

Referring more particularly to FIGS. 3 and 12, a power source such as a battery 66 is connectable by one lead 67 passing through an aperture in bearing bracket 35 section connected to a ground terminal 68 thereon while the other lead 69 from the battery extends through the same aperture in the bearing bracket section 35 and continues around one side of bearing bracket sections 35 and 38 into and through the U-shaped tubular brace 45 and through an opening in the stator supporting plate 25 to one blade 70 of the double pole double throw control switch 71. The control switch 71 provides for high and low speed operation by providing for a series connection of armature 63 and field winding 74 in one position in which the blade 70 is operated to close contact 72 connected to a lead 73 to one end of the series winding 74. The other end of the series winding is connected by a lead 75 within the motor to a brush 65 which carries current to the armature 63 completing the circuit through the brush 76 to a ground connection 68 through the frame of the stator U-shaped brace 45 and the bearing bracket support 35, 38. In this position of the switch 71 the other blade 77 is inoperative as the cooperating contact is unconnected.

When the switch is closed in the opposite direction the blade 70 completes a circuit to contact 78 and through a lead 79 carries current to the said one end of the series winding 74 since leads 79 and 73 are connected together either internally of the motor or on the switch thereby

4

completing the operation of the motor through the series winding. However in the closing of the switch 70 in the said other direction the blade 77 engages contact 80 which is connected through a lead 81 to one end of a shunt winding 82, the other end of such shunt winding being connected to ground 68 through a suitable lead which is also connected to brush 76.

It will thus be seen that applicant has provided an effective outboard motor operating by a control switch which provides for variations in speed by operation in one direction for a series winding and operating in the other direction for simultaneous series and shunt windings and with the said switch having an "off" intermediate position shown. The simple positive electrical connections assures continuous operation with a minimum of servicing. The elevation angle of the propeller shaft can be accurately adjusted by the proper positioning of the supporting saddle in the arcuate slot 34 and the cooperating positioning and retaining claw or claws 83 at one or both ends of bolt 84 cooperating with the teeth and the edges of arcuate slots 34. The claw 83 has a guiding lug 84 received in the arcuate slot 34 for maintaining the teeth 85 in proper aligned relation to cooperate with the teeth along arcuate slot 34. The reverse operation can be readily accomplished by 180° rotation of the propeller shaft housing by means of the handles 46 and 47 and when the handle 47 and propeller 23 are adjacent the boat reverse operation of the boat will occur, the arcuate lug 54 engages the arcuate saddle 50 preventing pivotal movement of the motor assembly during reverse operation.

It will be obvious to one skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawings and described in the specification, but only as indicated in the accompanying claims.

What is claimed is:

1. An electrically driven outboard motor comprising a clamp for securement to the transom of a boat, a propeller drive shaft housing support bearing pivotally mounted on said clamp for movement about a transverse axis, a friction clamp mounted on said propeller drive shaft supporting bearing for frictionally gripping said drive shaft housing, a propeller and propeller drive shaft on said propeller drive shaft housing, said drive shaft housing being provided with a shoulder means preventing axial movement of said drive shaft housing, a pair of handles extending from diametrically disposed locations on said drive shaft housing for rotating said drive shaft housing and varying the position of the propeller for steering a boat and reversing the movement thereof, an electric motor mount pivotally mounted on the upper end of said drive shaft housing, a motor stator fixed to said motor mount, a tubular U-shaped brace member fixedly mounted on said drive shaft housing supporting bearing and said motor mount preventing relative rotation therebetween, a double pole double throw switch mounted on said motor mount with one blade connected to a source of power through said tubular U-shaped brace member and the other blade connected to one brush and one terminal of a series field winding, the other brush being connected to ground and to one end of the shunt field winding, the contact on one side of the one blade of the switch being connected to one end of the series field, the other contact on said one side of said switch being unconnected, one contact on the other side of the switch for cooperation with the one blade being connected to the said one end of the series field winding, the other contact on said other side being connected to the one end of the shunt field winding, the other end of the shunt field winding being connected to the ground and to the other brush of the motor.

2. An electrically driven outboard motor comprising a clamp for mounting on the transom of a boat including a

5

pair of gussets, a bearing mount pivotally mounted on said clamp for movement about a horizontal axis, a vertically positioned propeller drive shaft housing rotatably mounted in said bearing mount, a saddle adjustably mounted on said gussets for engaging the propeller shaft housing, a pair of handles mounted in diametrically opposite positions on said propeller shaft housing above said bearing mount, a motor support rotatably mounted above said handles on said propeller drive shaft housing, a motor having a plurality of fields mounted on said motor support, a U-shaped tubular brace extending between and fixed to said motor support and said bearing mount for preventing relative rotation between said motor support and said bearing mount, an armature having a shaft rotatably mounted within said motor and motor support and having its shaft projecting into said propeller drive shaft housing, a propeller drive shaft in said housing for driving the propeller from said motor, a coupling between said armature shaft and said propeller drive shaft providing for ease of assembly, said propeller drive shaft housing being rotatable within said bearing mount without rotating said motor support, an electric lead from said bearing mount through said U-shaped tubular member to said motor, a switch on said motor providing for connection between the brushes and the fields of the motor for variable speed operation.

3. An outboard motor comprising mounting means by which such motor may be attached to a boat, a propeller, a propeller shaft mounting said propeller and carried by said mounting means, a motor driving said propeller shaft, means within said motor for driving the same at high and low speeds comprising a stator having heavy series and light shunt windings, an armature and a commutator for supplying torque to the commutator for rotating the armature shaft, a double pole double throw switch having an inoperative position of the blades in which the motor is inoperative, one blade being connected to the source of power, one contact on one side of said blade being connected to one end of the series winding, the other end of the series winding being connected to the other blade of the switch and also being connected to one brush of the motor, the other brush of the motor being connected to ground and the other lead from the power source being connected to ground whereby operation of said one blade to make contact with said one contact on said one side will cause high speed operation of said motor, one contact on the other side of said one blade being connected to said one contact on said one side whereby said one blade when moved in the other direction completes the same circuit, the other blade of said switch making contact with the other contact on the said other side and said other contact on said other side being connected to one end of said shunt winding, the other end of said shunt winding being connected to the other brush and ground whereby said shunt winding is connected between the other end of said series winding and ground thereby producing a slower speed operation when the blades of the switch are in the said other position.

4. An outboard motor comprising a mounting means for attachment to a boat, a propeller shaft housing rotatably mounted in said mounting means, a motor mounted on one end of said propeller shaft housing in a manner to provide for relative rotation between said motor and said propeller shaft housing, a propeller rotatably mounted on the other end of said propeller shaft housing, means to positively connect said motor and said mounting means to prevent relative rotational movement therebetween, and a shaft driven by said motor, means to drivingly connect said motor shaft and the propeller, friction means between said propeller shaft housing and said mounting means whereby the propeller drive shaft housing can be rotated independently of the motor for steering so that said propeller produces thrust in any selected direction without requiring movement of the motor, and

6

handle means on said drive shaft housing providing for 360° steering adjustment relative to said mounting means.

5. The invention according to claim 4 in which the mounting means includes a clamp for securement to a boat, a bearing mount pivotally connected to said clamp for movement about a horizontally extending pivotal axis for raising and lowering said propeller with respect to the boat, a saddle on said clamp and an arcuate lug on said propeller shaft housing for locking engagement with said saddle to prevent pivotal movement of said propeller shaft housing about said horizontal axis when said propeller shaft housing is in one position of adjustment.

6. The invention according to claim 5 in which the clamp is provided with arcuate slots having teeth projecting therefrom and the saddle has lugs engageable with said arcuate slots to maintain proper operative position and a toothed claw and clamping screw cooperate with the saddle, claw and clamp to maintain the saddle in selected position of adjustment.

7. An outboard motor comprising a clamp having two U-shaped brackets for attachment to a boat, flanges connecting said U-shaped brackets and maintaining a predetermined spacing therebetween, a bearing mount having a connecting table portion and depending flanges pivotally mounted between said U-shaped bracket members, a propeller shaft housing rotatably mounted in said bearing mount, a propeller rotatably mounted on said propeller shaft housing, a motor stator mounted on one end of said propeller shaft housing in a manner to provide for relative rotation between said motor stator and said propeller shaft housing, means to positively connect said motor stator and said bearing mount to prevent relative rotational movement therebetween, a motor shaft rotatably mounted in and driven by said motor stator, means to connect said motor shaft and the propeller, said structure permitting the propeller drive shaft housing to be rotated independently of the motor stator so that said propeller produces thrust in any selected direction without requiring movement of the motor stator.

8. An outboard motor mounting means comprising a clamp for mounting on a boat, a bearing mount connected to said clamp for pivotal movement about a horizontally extending axis providing for raising and lowering a propeller with respect to a boat, said clamp being provided with arcuate slots concentric about said horizontal pivot axis, a saddle having arcuate lugs adjustably mounted by its lugs in said arcuate slots, a propeller shaft housing rotatably mounted in said bearing mount, a propeller on said propeller shaft housing spaced from said pivot axis, an arcuate flange on said propeller shaft housing for locking engagement with said saddle to prevent pivotal movement about said horizontal axis when said propeller shaft housing is in one position of adjustment, and means to adjustably retain the saddle in a selected position to obtain the desired elevational angle.

9. A boat propulsion unit comprising a bracket for mounting on a transom of a boat, a propeller drive shaft housing supporting bearing mounted on said bracket, a propeller drive shaft housing rotatively mounted on said bracket and projecting upwardly and downwardly beyond the limits of said bracket, a propeller drive shaft in said propeller drive shaft housing, a propeller mounted on said housing and operatively connected to said propeller drive shaft, a motor stator mounted on the upper end of said propeller drive shaft housing permitting relative rotation between said propeller drive shaft housing and said stator, an armature rotatably mounted in said stator for rotation about an axis substantially coincident with the axis of said propeller drive shaft and its housing, means connecting said armature to said propeller drive shaft, means spaced from said propeller drive shaft housing connecting said stator to said bracket preventing relative rotative movement of said stator with respect to said bracket, and propeller shaft housing control means mounted on said propeller shaft housing interme-

7

diating said propeller shaft housing supporting bearing and said stator whereby power can be supplied directly to said stator from a source of power in the boat, said structure permitting said propeller shaft housing to rotate to provide for steering and reversing control of the boat on which the propulsion unit is applied.

10. The invention according to claim 9 in which the stator includes a plurality of windings and the armature is rotated by energization of the windings in said stator, the electricity being furnished from the boat through the bracket along the means to prevent relative rotation be-

5

10

8

tween the bracket and the stator to the windings of the stator, control means being provided directly on the stator for controlling the motor.

References Cited in the file of this patent

UNITED STATES PATENTS

2,079,871	Price	May 11, 1937
2,116,146	Gondek	May 3, 1938
2,545,086	Harris	Mar. 13, 1951
2,877,733	Harris	Mar. 17, 1959
2,919,392	Smith	Dec. 29, 1959