UNITED STATES PATENT OFFICE

2,674,219

OUTBOARD MOTOR BRACKET ASSEMBLY PROVIDING VERTICAL ADJUSTMENT OF THE MOTOR UNIT

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Application September 1, 1951, Serial No. 244,799

5 Claims. (Cl. 115—18)

This invention relates to outboard motors for boats and particularly to means for raising and lowering the motor to dispose the propeller at various depths in the water.

The invention provides hydraulic means operable from within the boat for raising and lowering the motor while driving the boat without interruption.

A principal object of the invention is to provide for the vertical adjustment of the propeller while the boat is in operation as in the course of a race.

A further object is to provide an improved motor support bracket for the raising and lowering of the motor unit relative to the boat whereby the motor may be adjusted to accommodate boats having transoms of different heights for normal operation and to raise the motor unit for operating in shallow water or in weed beds.

Another object is to provide a support bracket for the motor unit which will allow tilting of the motor unit relative to the bracket to accommodate transoms of different angles and allow the motor to be adjusted to different angles and raised and lowered for the desired operation.

Another object is to vary the effective thrust of the propeller by varying the depth of the propeller in the water.

Another object is to provide for tilting of the motor and steering movement on transverse and vertical axes, respectively, and raising and lowering of the motor without additional brackets.

These and other objects and advantages will be more fully set forth in the following description of a preferred embodiment of the invention as illustrated in the accompanying drawings.

In the drawings:

Fig. 1 is a side elevation of a boat and outboard motor with the latter in the lower position so that the propeller is entirely submerged and a substantial distance beneath the water line;

Fig. 2 is a view similar to Figure 1 showing the motor raised so that the propeller is only partially submerged;

Fig. 3 is a rear view of the boat and motor shown in Fig. 2;

Fig. 4 is an enlarged view of the lower part of the motor unit in the lowered position with parts of the motor and the clamp bracket and swivel bracket broken away and sectioned, and includes a diagrammatic illustration of the hand pump, control valve, and oil reservoir which is carried in the boat and connected to the motor for raising and lowering the latter;

Fig. 5 is a view similar to Fig. 4 showing the motor unit in the fully raised position; and

Fig. 6 is a cross-section through the body of the valve shown in Fig. 4 and showing the valve in open position for lowering the motor unit.

The outboard motor unit shown in the drawings includes the engine 2 which is generally enclosed by the cowl 3. The drive shaft housing 4 of the motor comprises a unitary cast hollow member having a planform upper face 5 supporting engine 2 and extends therefrom downwardly into the water. The underwater member 8 is secured by bolts including the bolt 7 as shown to the lower end of drive shaft housing 4 and carries the propeller 8 for propulsion of the boat 9 to which the motor is secured. Propeller 8 includes a series of blades 10 of a given pitch and is driven by engine 2 by means of the drive shaft 11 extending from the engine through housing 4 to member 6.

The outboard motor unit 1 is secured by the bracket assembly 12 to the transom 13 of the boat 9 to drive the latter and is removable from the boat for transporting separately thereof. Motor unit 1 is adjustable relative to the bracket assembly 12 whereby the motor unit may be adapted for use with other boats, not shown, or different dimensions, and according to the present invention is vertically adjustable to allow further for operation of the motor unit with the same boat under varying conditions for maximum speed and efficiency of engine 2 and propeller 8.

Bracket assembly 12 includes the pair of spaced clamps 14 fitted with the clamp screws 15 for tightening and securing the clamps over the transom 13 of the boat. The upper transverse pin 16 joins clamps 14 and carries therebetween the swivel bracket 17 for relative pivotal movement on the axis of the pin. The lower end of each clamp 14 on the outside of the boat is provided with a series of holes 18. The lower pin 19 is adapted to be inserted in corresponding holes of both clamps selectively disposed to limit the pivotal movement of bracket 17 on pin 16.

The hollow sleeve 20 is carried by bracket 17 which is normally adjusted as described so that the sleeve is substantially vertical and carried by bracket 16 rearwardly thereof. The lower end of sleeve 20 extends a substantial distance beneath the bracket and is threaded at the lower end to receive the fitting 21. The rod 22 within sleeve 20 projects above bracket 17 and the upper end of sleeve 20 and is threaded at its
The motor unit 1 is supported on bracket 16 by the upper and lower lugs 25 and 26 respectively, over the lower end of rod 22 and lower portion of sleeve 28. Lugs 25 and 26 are cast integrally with the forward edge of housing 4 and are internally formed to receive the bushings 27. Each bushing 27 comprises inner and outer brass ferrules 29 and 30, respectively, and the intermediate rubber cushion material 31 bonded therebetween. The upper bushing 27 in upper lug 25 is mounted on collar 23 and cap 24. The lower bushing 27 in lug 26 is slidingly mounted over the lower end of sleeve 28 which latter projects through the lug and with the upper bushing 27 in lug 25 resiliently secures the motor with respect to bracket 16 of the bracket assembly to absorb the vibration of engine 2.

Steering of the boat is provided for by turning motor unit 1 on the vertical axis of sleeve 20 which changes the direction of thrust of propeller 5. For steering, rod 22 is allowed to turn with motor unit 1 on the inside of sleeve 23 and the bushing 27 in lug 26 is free to turn on the outside of sleeve 20 with the motor unit.

According to the invention, motor unit 1 is supported on a vertical axis by the sleeve 20 placed between a lower bracket assembly 12 by axial movement of rod 22 within sleeve 20 and lower bushing 27 on the outside of sleeve 20.

Rod 22 is provided with the ring seal 31 at the lower end thereof and is dimensioned to fit and operate as a plug with the interiorly formed bore 32 of sleeve 20 which with fitting 21 forms a cylinder for the piston. A limited portion of rod 22 above seals 31 may be relieved as at 33 to prevent binding of rod 22 in bore 32.

Rod 22 is lifted within bore 32 by fluid pressure which is supplied below rod 22 to sleeve 20 through the hose 34 connected to fitting 21. The motor unit is supported relative to bracket assembly 12 by the fluid in sleeve 23 at the height which disperses propeller 5 at the level or depth desired.

The fluid under pressure is supplied through hose 34 by the positive displacement pump 35 and controlled by the valve 36 connected thereto. The fluid is retained by the reservoir 37 and 38 supplied through the conduit 39 to valve 35. Valve 35 is shown diagrammatically in Fig. 4 in the position adapted to direct the flow of fluid from reservoir 37 to pump 35 and from pump 35 to hose 34 and sleeve 20 so that, by operating the pump, fluid is supplied from the reservoir to the sleeve under pressure as described. Ordinarily, pump 35 will prevent any flow of fluid back to reservoir 37 so that the pump may be relied on to secure the motor unit in the position selected. By turning valve 39 to the position shown in Fig. 6 hose 34 and conduit 35 are directly connected allowing the fluid to by-pass pump 35 and return to the reservoir under the pressure exerted by the weight of the motor unit 1 supported by rod 22.

The maximum upper and lower positions are determined by the lengths of rod 22 and sleeve 20 and the supply of available fluid. Any intermediate position is allowed by operating pump 35 or valve 36 to raise or lower the motor unit.

Where the motor unit is to be used on various boats having transoms of different heights and angles, full adjustment of the clamp bracket assembly is provided therefor. By tilting the motor on pin 18 to the desired angle and inserting pin 19 in corresponding selected holes 18, sleeve 20 and the motor can be adjusted to accommodate any angularity of the transom, within limits. The height of the transom, within limits, may be adjusted for as described by raising or lowering the motor on the axis of sleeve 20.

Pump 35 and valve 36 are disposed in the boat and readily operated to raise and lower the motor unit within in operation where, as in the course of a race changing conditions of the boat or of the water make such adjustments desirable.

In the operation of the motor unit, the depth of propeller 5 in the water is an important factor in the efficiency of propeller operation. Varying the depth of the propeller also changes the torque necessary to turn the propeller at a given speed of rotation. Assuming no unfavorable change in propeller efficiency, altering the depth of the propeller can be utilized also to advantage to change the engine torque load and allow the engine to operate more efficiently or with a higher power output at different rotational speeds. Rod 22 is turnable in sleeve 20 in any supported position within the range of adjustment provided as described and allows for steering of the boat by turning the motor on the axis of sleeve 20 as with the tiller 39 in any such position.

Various embodiments of the invention may be employed within the scope of the following claims.

1. In an outboard motor unit including an engine and a drive shaft connected thereto, a lower underwater member, a drive shaft housing connecting said engine and said underwater member, and a propeller carried by said underwater member and driven by said engine through said drive shaft, the combination of a bracket assembly adapted to be secured to the transom of a boat, a cylinder carried by said bracket assembly and having a closed lower end and an open upper end, a piston secured to said motor unit and extending downwardly within said cylinder and rotatable and axially movable therein, means for supplying fluid under pressure to the lower end of said cylinder and supporting the piston therein and the motor unit thereon, and a lever for turning the motor unit and said piston within said cylinder for effecting the steering movement of the motor unit.

2. In an outboard motor unit including an engine and a drive shaft connected thereto, a lower underwater drive member, a drive shaft housing connecting said engine and said member, and a propeller carried by said lower member and driven by said engine through said drive shaft, the combination of a bracket assembly adapted to be secured to the transom of a boat, a cylindrical sleeve carried by said bracket assembly and having an open upper end and a free, projecting lower closed end, bearing means extending downwardly within said sleeve and rotatable and axially movable therein and secured at its upper end to said motor unit, fluid pressure supply means connected to the lower end of said sleeve and supporting said bearing means therein and the motor unit thereon, a guide bearing turnable and slidable on said lower portion of said sleeve and secured to said motor unit, and a lever for turning the motor unit supported by said bearing means on said sleeve for effecting the steering movement of the motor unit.

3. In an outboard motor unit including an engine and a drive shaft connected thereto, a
lower underwater drive member, a drive shaft housing connecting said engine and said drive member, and a propeller carried by said lower member and driven by said engine through said drive shaft, the combination of a bracket assembly adapted to be secured to the transom of a boat, a cylindrical sleeve carried by said bracket assembly and having an open upper end and a free, projecting lower closed end, bearing means extending downwardly within said sleeve and rotatable and axially movable therein and secured at its upper end to said motor unit, fluid pressure supply means connected to the lower end of said sleeve and acting against said rod and adapted to raise the motor unit respecting the bracket assembly, a valve controlling said pressure supply means and providing for the selective release of pressure within said sleeve to allow lowering of the motor unit respecting the bracket assembly, a guide bearing means turnable and slidable on said lower portion of said sleeve and secured to said motor unit, and a lever for turning the motor unit supported by said bearing means on said sleeve for effecting the steering movement of the motor unit.

4. In an outboard motor unit including an engine and a drive shaft connected thereto, a drive shaft housing supporting said engine, and a propeller supported by said housing and driven by said engine through said drive shaft, the combination of a bracket assembly adapted to be secured to the transom of a boat, a cylinder carried by said bracket assembly and having an open upper end and a projecting unobstructed lower closed end, a piston extending downwardly within said cylinder and rotatable and axially movable therein and secured at its upper end to said motor unit, fluid pressure supply means connected to the lower end of said cylinder and supporting said piston therein and the motor unit thereon, a guide bearing turnable and slidable on the outer lower portion of said cylinder and secured to said motor unit, and a lever for turning the motor unit on the axis of said cylinder for effecting the steering movement of the motor unit.

5. In an outboard motor unit including an engine and a drive shaft connected thereto, a drive shaft housing supporting said engine, and a propeller supported by said housing and driven by said engine through said drive shaft, the combination of a clamp bracket adapted to be secured to the transom of a boat, a swivel bracket pivotally secured to and supported by said clamp bracket for relative adjustment on a transverse axis, a cylinder carried by said swivel bracket assembly and having an open upper end and a projecting unobstructed lower closed end, a piston extending downwardly within said cylinder and rotatable and axially movable therein and secured at its upper end to said motor unit, fluid pressure supply means connected to the lower end of said cylinder and supporting said piston therein and the motor unit thereon, a guide bearing turnable and slidable on the outer lower portion of said cylinder and secured to said motor unit, and a lever for turning the motor unit on the axis of said cylinder for effecting the steering movement of the motor unit.

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