

Sept. 11, 1962

K. I. ROBINSON ETAL  
OUTBOARD MOTOR TILT-UP DEVICE

3,053,489

Filed March 7, 1958

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FIG. 1

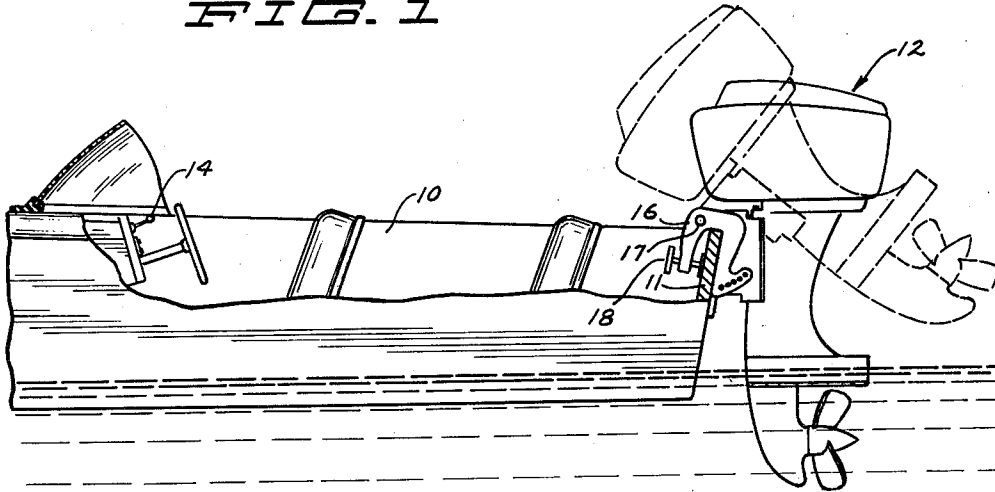
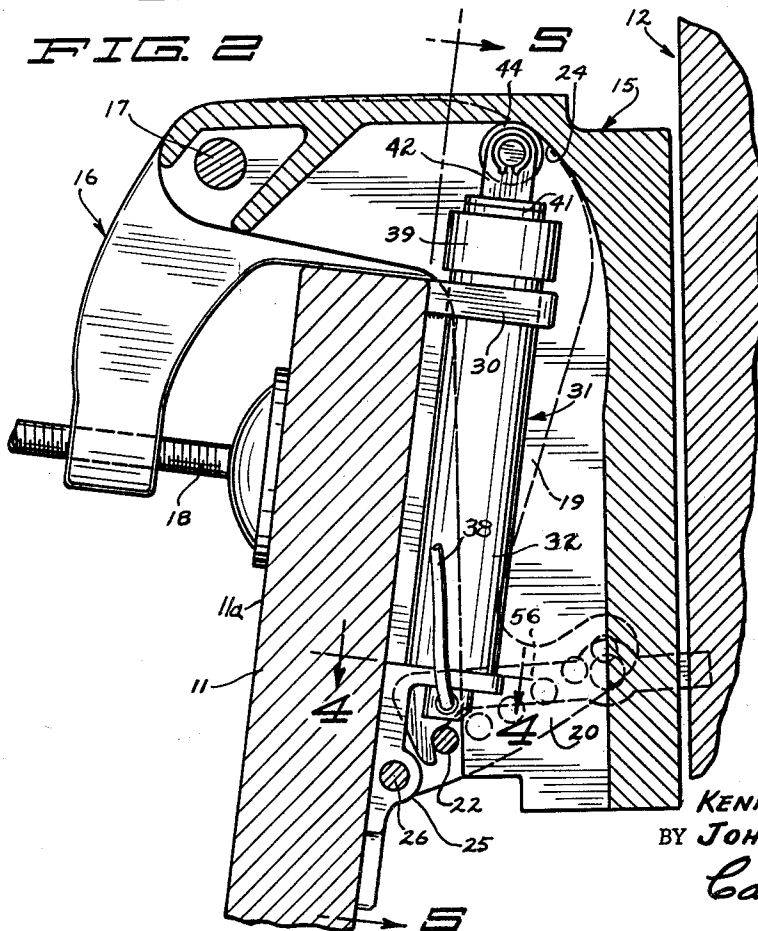


FIG. 2



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CUTBOARD MOTOR TILT-UP DEVICE

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FIG. 4

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FIG. 5

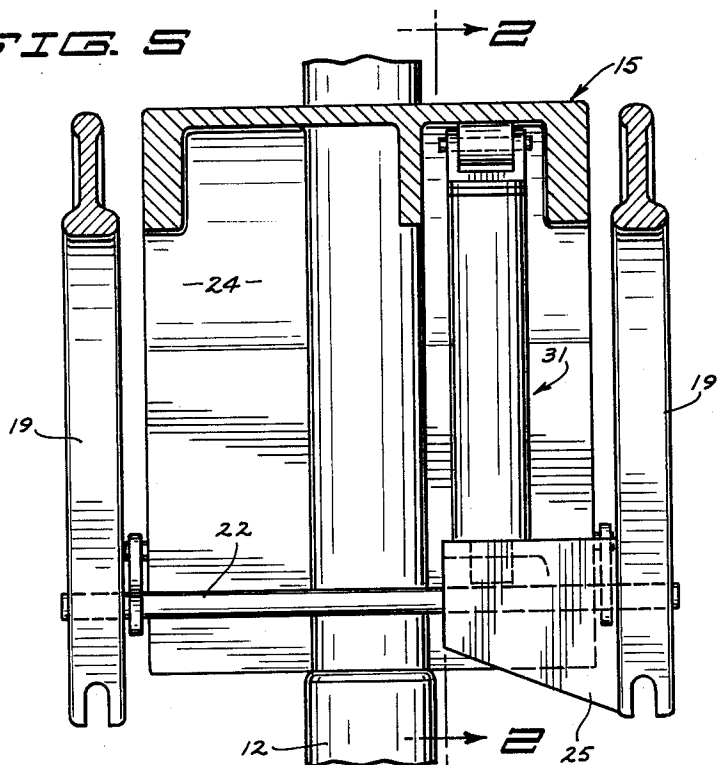


FIG. 6

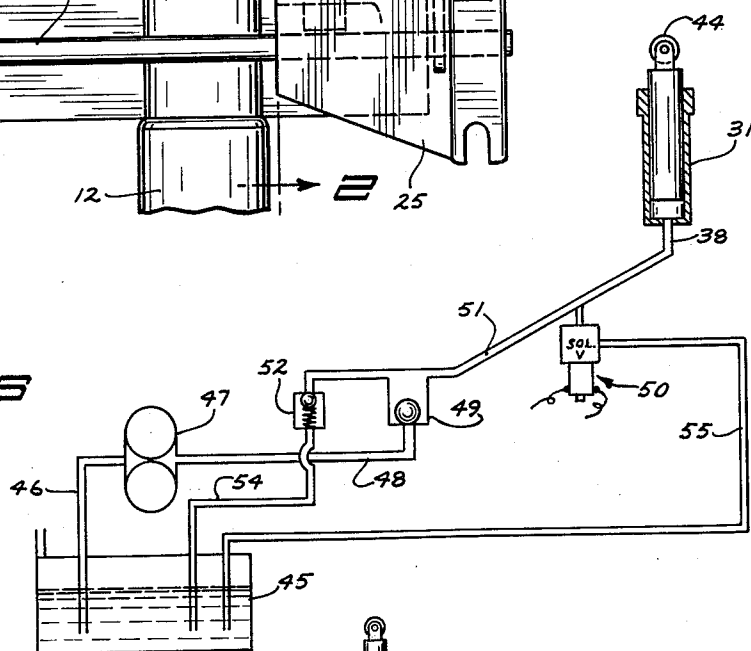
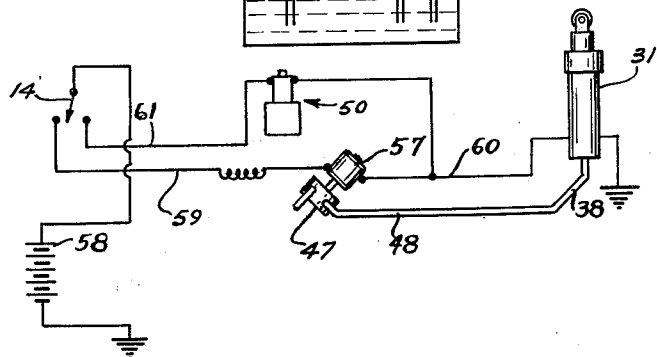


FIG. 7

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3,053,489

## OUTBOARD MOTOR TILT-UP DEVICE

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5 Claims. (Cl. 248-4)

This invention relates to means for tilting an outboard motor about its normal transverse tilting axis so as to elevate the propeller to various preselected positions.

The conventional outboard motor has a motor carrying bracket which is pivoted on a transverse axis to a boat bracket which mounts the motor on the transom of a boat. When it is desirable to remove the propeller of the motor from a submerged position as when launching or beaching the boat, the motor may be tilted forwardly about such transverse axis to elevate the propeller. With the increased motor weight brought about through higher horsepower, manual tilting of the motor has become extremely difficult and cumbersome. Furthermore, remote control of the engine from the front portion of the boat has made remote control of the tilting of the motor a desirable feature. It is with problems involved in this area that the present invention is concerned.

The principal object of the invention is to provide a new and improved hydraulically operated mechanism for automatically tilting an outboard motor between a normal upright running position with the driving propeller deeply submerged and a forwardly tilted position with the propeller in an elevated position near or above the surface of the water.

Another object of the invention is to provide a power driven outboard motor tilt-up device which can be quickly and simply detached from the motor for dismounting the motor from the boat independently of the device.

Another object of the invention is to provide an outboard motor tilt-up device which is readily detachable from the motor and which is so constructed as to become normally inoperative when so detached to prohibit accidental damage to the device.

Another object of the present invention is to provide a hydraulic system for an outboard motor tilt-up device with a novel valving arrangement which prohibits damage to the system due either to excessive outside pressures exerted upon the system or to operation of the hydraulic power source with the motor constrained in any position.

With these and still additional objects in view the invention broadly comprises providing an outboard motor with a detachable hydraulically operated jack which is disposed between the boat bracket and the motor or pivot bracket whereby when the jack is extended it will tilt the motor bracket and the motor carried thereby about the pivot connecting the motor to the boat bracket to a forwardly tilted position and which, when retracted, will allow the motor to gravitationally return to its upright operating position. The invention is more specifically characterized by providing a roller and cam connection between the jack and motor bracket and a detachable mounting for the jack on the boat bracket enabling the jack to be readily dismounted from the motor. The jack herein disclosed is provided with a pump operated hydraulic system and battery operated electrical system, the latter of which renders the jack inoperative when detached from the motor.

The above mentioned and still additional objects of the invention will be brought to light during the course of the following specification, reference being made to the accompanying drawings, in which—

FIG. 1 is a partial side elevation of a boat with an out-

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board motor mounted on the transom and shown in a forwardly tilted position in broken lines.

FIG. 2 is an enlarged longitudinal vertical section through the transom and motor mounting bracket taken along line 2—2 of FIG. 5. The tilting jack is shown in elevation in retracted condition with the motor in its normal operating position.

FIG. 3 is similar to FIG. 2 but shows the jack in section and extended with the motor bracket and motor in forwardly tilted position.

FIG. 4 is a section through the jack taken on line 4—4 of FIG. 2.

FIG. 5 is a substantially vertical section through the boat bracket taken on line 5—5 of FIG. 2 and looking rearwardly.

FIG. 6 is a diagrammatic view of the hydraulic system used to operate the jack in the tilt-up device.

FIG. 7 is a schematic diagram of the wiring circuit used to operate the device from a remote point on the boat on which the motor is mounted.

Referring now more particularly to the drawings, reference numerals will be used to denote like parts or structural features in the different views. In FIG. 1 there is shown a boat 10 having a transom 11 comprising forward and rear sides, 11a, 11b respectively, and an upper edge 11c extending transversely across the stern for supporting an outboard motor designated generally at 12. A manual control 14 is shown mounted on the operator's control panel of the boat.

The motor 12 is mounted on a generally L-shaped motor bracket 15 (FIGS. 2 and 3) which has one leg pivotally connected to the boat bracket 16 by means of a transverse pivot pin 17. It will be understood that motor 12 is movable between the positions shown in FIG. 1 about the axis of pin 17.

Screws 18 clamp the boat bracket 16 securely to the boat transom 11. The transversely spaced rear support portions 19 of bracket 16 extend downwardly along the rear side of the transom and each has a rearward arcuate projection 20 provided with a series of apertures 21 for selectively receiving the tilt pin 22 against which bracket 15 rests. The motor bracket 15 extends rearwardly from pivot 17, then turns downwardly at generally right angles between bracket 16 and the motor 12. The interior corner of bracket 15 is rounded or arched as at 24 to provide a curved forwardly facing cam or bearing surface 24. This surface 24 is relatively broad and is straight along any line thereon which is parallel to the axis of pin 17. The upper portion of the arc of surface 24 faces somewhat downwardly toward the lower end of the boat bracket as well as forwardly.

A jack mounting bracket is designated at 25. This is attached to one arm 19 of the boat bracket as by bolt 26 to rest flat against the back of the transom. This bracket is provided with a rearwardly extending ledge 27 (FIG. 4) which has a circular aperture or socket 28 which opens laterally through a slot 29. A U-shaped keeper 30 is also mounted on bracket 16 and spaced above bracket 25 in rearwardly opening position.

The jack is designated generally at 31. It comprises an outer cylinder 32 which is telescopically fitted with an inner extendable-and-retractable cylinder 34. The base of the outer cylinder is capped by a coupling 35 which has a nipple 36 adapted to seat rather snugly in the socket 28 of bracket 25. The coupling has an internal passage 37 which extends from the cylinder interior down through the coupling and out one side of nipple 36 where it is connected to a tube 38 (FIG. 4). Tube 38 is the hydraulic fluid supply tube and is in open communication through port 37 with the interior of the jack.

A bushing 39 is threaded on the upper end of cylinder

32 and it is provided with an internal groove which carries a sealing ring 40 to provide a seal between the bushing and cylinder 34 which extends therethrough. At its upper or extended end the cylinder 34 is provided with a cap 41 which integrally carries a pair of spaced ears 42. A terminal roller 44 the circumferential surface of which bears against the surface 24 of bracket 15 is journaled in ears 42 for rotation on an axis parallel to and coplanar with the axis of pin 17 when the jack end is retracted.

It will now be understood that as fluid under pressure is admitted through line 38 to the jack, the components being in normal operating position shown in FIG. 2, the jack will be extended along its longitudinal axis causing roller 44 to exert an upward lifting force against the surface 24 of bracket 15, moving bracket 15 and the motor 12 upwardly and forwardly about the axis of pivot 17. Inasmuch as roller 44 is initially at the elevation of pivot 17 it will gradually move away from the pivot as the jack is extended. Accordingly, the jack will, through roller 44, exert a moving lifting force against bracket 15 with the roller rolling along surface 24 away from the pivot 17. This continues until the jack reaches its maximum extension and the bracket 15 is tilted to the degree shown in FIG. 3 with motor 12 in a forwardly tilted out of water position.

When fluid is then let out of the jack, also through line 38, the motor will gravitationally descend about the pivot 17 until it reaches its initial position with bracket 15 in contact with the tilt pin 22 or until cessation of withdrawal of the fluid from the jack. During this lowering movement the roller 44 will, of course, return along the surface 24 a substantial portion of the weight of the motor resting on the roller.

The hydraulic system for supplying fluid to the jack 31 will now be described with particular reference to FIG. 6 of the drawings. The fluid reservoir is denoted at 45. A line 46 leads from the reservoir 45 to a pump 47. Line 48 leads from pump 47 to a check valve 49. Line 51 connects the tube 38 on the jack to check valve 49 and a pressure relief valve 52. A drain line 54 extends from relief valve 52 to the reservoir 45. When it is desired to extend the jack 31, the motor driven pump 47 is operated to draw fluid through line 46 from the reservoir and pump it into line 48. This fluid under pressure will pass through valve 49, line 51 and tube 38 into the jack to extend the jack. When a predetermined pressure is reached valve 52 will automatically open allowing fluid to return to the reservoir through line 54.

A fluid return line 55 leads from line 51 to the reservoir 45. A solenoid valve 50 disposed in line 55 is opened allowing the fluid to return from line 38 to the reservoir through a line 55. There is a constant retracting pressure on the jack created by the weight of the motor bearing upon the roller 44 until, of course, the motor bracket 15 has engaged the adjustable tilt pin 22. A catch 56 pivoted on the motor bracket may be hooked over pin 22 to prevent the lower motor from pulling away from the boat when operated in reverse.

The pressure relief valve 52 in the hydraulic system is set to open when a predetermined fluid pressure has been reached in the jack and line 51. This is made necessary to prevent damage to the system due to the high pressures which can build up under certain conditions. In addition it assures that the motor, when operation is resumed, will return to its preselected angle of tilt adjustment determined by the setting of pin 22. Thus, for example, if in lowering the motor to its operating position, the jack is not fully retracted the forward thrust of the motor will be exerted against the jack rather than the tilt pin. This would place an excessive force on the hydraulic system when the motor is operated at full or near full speed.

Accordingly, while the device here described can be used to adjust the operating tilt of the motor its principal function is to raise or lower the motor between operating

and non-operating positions. The jack will withstand limited thrust placed thereagainst when the motor is operated at low speeds with the motor tilted slightly forward as when operating in shallow water. As the speed is increased, however, the added thrust will cause the relief valve to open so that the motor will settle against the tilt pin.

In FIG. 7 the electrical circuit for the motor which powers pump 47 and for operating solenoid 50 is shown diagrammatically. The number 57 denotes the pump motor which is operatively connected to pump 47 to drive the pump so as to force liquid under pressure into line 48. The motor is connected to battery 58 through a line 59 and switch 14 which can be manually actuated from a neutral position to close the circuit through either line 59 or a line 61 which completes the circuit to solenoid valve 50. Both circuits are grounded through a wire 60 which extends from the motor to jack 31 to ground the circuit through the outboard motor. This wire may for compactness be embodied in or attached to the covering of fluid line 38. It will now be understood that the motor 57 being grounded through the motor 12 will become inoperative when the jack has been detached from the latter. This is to prevent operation of the jack and possible damage thereto in the event that control 14 is accidentally turned to the "on" position with the jack dismounted.

It is recognized that hydraulic jacks have been used heretofore for the adjustment of an outboard motor on its mounting bracket. Two examples of this may be observed in Patent No. 2,638,863 to Kiebler et al. and Patent No. 2,674,219 to Kiekhäfer. These disclosures, however, provide for vertical adjustment of the motor rather than a tilting adjustment. The tilting adjustment provided for herein has significant advantages over the type shown in those patents.

In the first place, the tilt pivot is already provided in the conventional outboard motor enabling the structure here disclosed to be readily adapted to existing motor construction. Secondly, by tilting the motor about its pivotal mounting the motor is less subject to damage upon engaging underwater obstructions. Moreover, the hydraulic system itself is not as likely to be damaged. This is particularly true in the type of tilt mechanism here disclosed. It will be readily understood that with the roller and cam surface type contact between the jack and motor, rather than a positive connection, the hydraulic system is not subject to damage in the event that the motor contacts an obstruction.

As hereinbefore mentioned the jack 31 is detachably mounted on the motor allowing complete and quick separation of the motor from the tilt mechanism and its hydraulic system when desired. To detach the jack the motor is first tilted forwardly either manually or by operation of the jack. The jack is then fully retracted while the motor is restrained in its tilted position. The jack may then be lifted from its seat in bracket 25 and pulled from clip 30 after turning the jack slightly about its axis so that the line 38 may pass through slot 29.

These steps are reversed in remounting the jack on the motor. The detachability of the jack with respect to the motor of course has many obvious advantages over heretofore known hydraulic tilt-up mechanisms which are built permanently into the motor. The feature allows more convenient transportation of the motor without the troublesome and time consuming task of disconnecting and reconnecting fluid and electric lines.

The invention thus economically and effectively carries out the aforementioned objectives. It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described our invention, what we claim to be new and desire to protect by Letters Patent is:

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1. A tilting motor mounting assembly for use on the vertical transom of boat wherein said transom includes forward and rear sides and a transverse upper edge, said assembly including a boat bracket having a depending support portion for fixed engagement at the rear side of the transom, said boat bracket including a transverse mounting portion defining a transverse pivot axis thereon, a power-operated jack mounted in a fixed upright position on said depending portion of said boat bracket, said jack including a vertically extendable-and-retractable upper end portion, a terminal roller on the upper end of said extendable-and-retractable upper end portion and having an axis of rotation substantially parallel to and coplanar with the transverse axis of said boat bracket when the jack end is retracted, and a motor bracket pivotally connected to said boat bracket on said transverse axis and extending rearwardly therefrom, said motor bracket including an inner, forwardly facing continuous cam and bearing surface resting on said terminal roller and having free rolling engagement therewith, said cam and bearing surface extending from a substantially horizontal plane overlying said retracted roller and arcuately around and below said roller whereby vertical extension of said roller causes substantially instantaneous upward tilting of said motor bracket.

2. The structure of claim 1, said jack comprising a fluid pressure-operated cylinder and piston.

3. The structure of claim 2 wherein said depending

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support portion of said boat bracket includes means removably supporting said jack thereon.

4. The structure of claim 3 including a fluid pressure system connected to said jack for operating the same, and an electrical control system connected to said fluid pressure system and grounded through said jack whereby removal of said jack de-energizes said electrical control system.

5. The structure of claim 1 wherein said boat bracket has an inverted U-shaped configuration for receipt on the said transom edge, clamp means on said boat bracket opposite said depending support portion, said motor bracket having an inverted L-shape extending rearwardly and downwardly over said terminal roller, and detachable latch means on said depending support portion and said motor bracket for retaining said brackets together.

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