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ELEVATOR FOR OUTBOARD MOTOR

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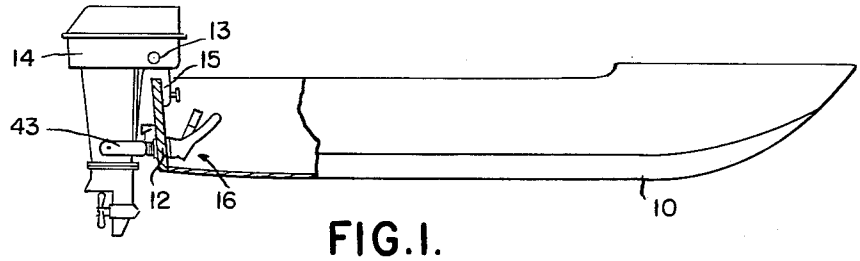


FIG.1.

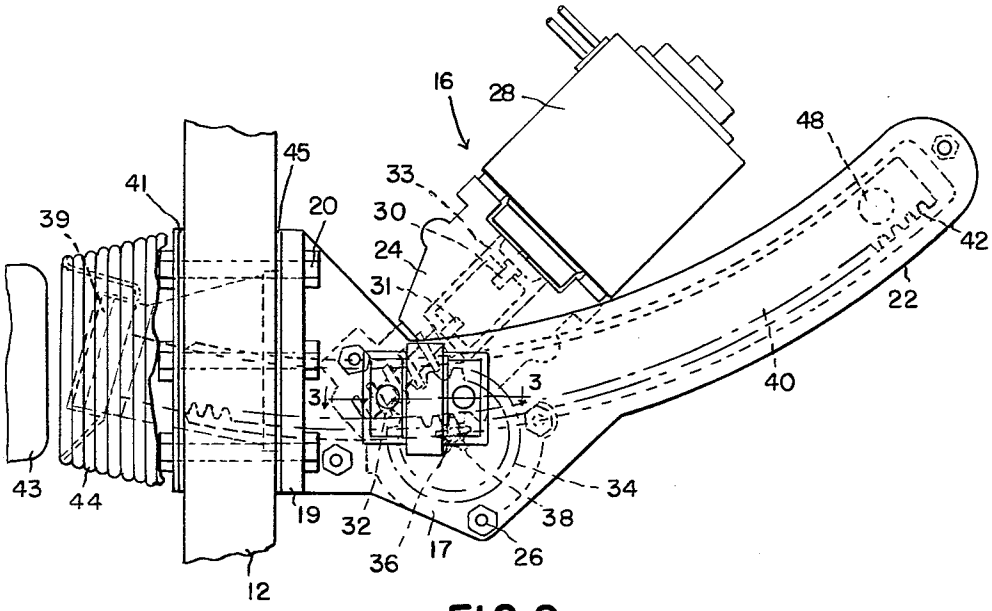


FIG.2.

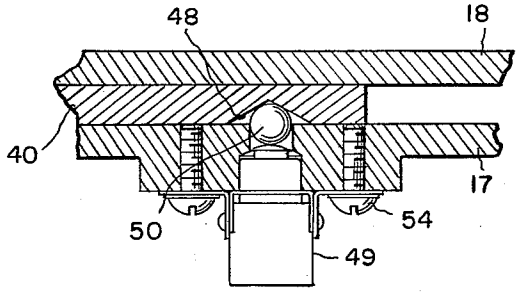


FIG.3.

INVENTOR.
OSCAR C. HANSEN

BY Whittemore, Hulbert & Belknap

ATTORNEYS

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ELEVATOR FOR OUTBOARD MOTOR

Oscar C. Hansen, Detroit, Mich., assignor to Ferro Stamping Company, Detroit, Mich., a corporation of Michigan

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The present invention relates to an elevator and refers more specifically to a power operated, rack and pinion lift mechanism for an outboard motor.

It is an object of the present invention to provide an outboard motor lift mechanism including a rack and pinion and power operated means for rotating the pinion, thereby moving the rack through an arcuate path so as to raise or lower the outboard motor as required.

Another object of the present invention is to provide an outboard motor lift mechanism including a shaft having a worm gear and a pinion thereon, a movable rack connected on one end thereof to the outboard motor, the teeth of said rack being in mesh with the teeth of the pinion, a worm in mesh with the worm gear, and power operated means for rotating the worm to effectively actuate the pinion and move the rack through an arcuate path to raise or lower the outboard motor out of or into the water respectively.

Still another object of the present invention is to provide an outboard elevator of the aforementioned type which includes means for holding the rack in its extended position to hold the outboard motor out of the water.

A further object of the present invention is to provide an outboard motor lift mechanism of the aforementioned type which is controlled by a remote control provided in the bow of the boat.

A still further object of the present invention is to provide an outboard motor lift mechanism of the aforementioned type which is relatively inexpensive to manufacture, durable in construction and positive in operation.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawing, illustrating a preferred embodiment of the invention, wherein:

FIGURE 1 is an elevational view of an outboard motor boat, partly in section.

FIGURE 2 is an elevational view of the outboard motor lift mechanism.

FIGURE 3 is a sectional view taken on line 3—3 of FIGURE 2 after the rack has been extended, showing in particular the means for holding the rack in the extended position.

The present invention is particularly adaptable for use with a boat having an outboard motor. The boat is designated in FIGURE 1 by the numeral 10 and includes at the rear end thereof a transom designated by the numeral 12. A pivot connection 13 is provided between the outboard mootr 14 and the mounting bracket 15 which supports the motor 14 on the transom 12. Previously, the raising or lowering of the outboard motor 14 about pivot 13 was accomplished manually. This required considerable effort on the part of the person performing this operation.

More important, however the invention is particularly applicable when moving the boat 10 into and out of a slip or when shallow waters, stones, weeds or other hazardous obstructions are encountered. In order to raise the outboard motor 14 from the water when certain of the aforesaid obstructions are encountered, remote control means, not shown, are provided in the bow or cockpit of the boat 10, along with the steering control mechanism. When it is necessary to raise the outboard motor 14, the remote control means is actuated by the

operator to energize the power operated lift mechanism 16 to be subsequently described so as to raise the outboard motor 14 out of the water. Such an operation may be accomplished without the necessity of the operator of the boat having to go back to the stern of the boat at a time when the attention of the operator must be directed to steering and guiding the boat through the obstructions.

The present invention includes the power operated lift mechanism 16 for lifting or lowering the outboard motor 14 about pivot 13 with respect to the boat 10 and includes a mounting bracket comprising a pair of plates 17 and 18 which form a hollow rack enclosure as will be subsequently described. The bracket is provided with a flange 19 which is adapted to be connected to the transom 12 by a plurality of bolts 20. The mounting bracket is of irregular contour and shape and includes an arcuate hollow rack housing 22.

A motor bracket 24 is connected to the mounting bracket by a plurality of bolts 26. An electrically operated reversible motor 28 is appropriately connected to the motor bracket 24 and is adapted to rotate the shaft 30 when the motor 28 is energized. The shaft 30 is connected to the worm shaft 31 by means of a coupling 33. The worm shaft 31 has a worm 32 on the other end thereof which is in mesh with a worm gear 34. The worm gear 34 is mounted on a rotatable shaft 36 which has a pinion 38 thereon.

As previously mentioned, the housing 22 is hollow with the interior thereof having an arcuate shape. Mounted in the housing 22 is a rack 40 which has a plurality of teeth 42 thereon. The rack 40 is adapted to be moved through an arcuate path by the pinion 38 so as to raise or lower the outboard motor 14 about the pivot connection 13. An opening is provided in the transom 12 through which the housing 22 extends for a predetermined distance beyond the outer wall of the transom 12.

The lift end of the rack 40 has a bumper 39 connected thereto, as is best shown in FIGURE 2, which is located directly opposite from the abutment or yoke 43 provided on the outboard motor 14. No direct connection is provided between the rack 40 and yoke 43, thereby permitting the outboard motor 14 to pivot relative to the boat 10 when it encounters certain obstructions such as logs or the like which were not anticipated by the operator of the boat.

A flexible and expandible boot 44 is located around the outer end of the housing 22 for enclosing the housing and the rack 40. When the rack 40 is moved to the left as viewed in FIGURE 2, the boot 44 expands so as to keep the rack 40 and housing 22 enclosed and free from water. The flexible boot 44 provides a fluid-tight seal for preventing water from entering the housing 22. An annular sealing disk 41 is provided on the outer wall of the transom 12 for preventing water from entering the interior of the boat 10 through the opening provided in the transom 12. An annular gasket 45 is provided between the inner wall of the transom 12 and the flange 19.

On the right end of the rack 40, as viewed in FIGURE 2, there is provided a recess 48. As the rack 40 moves to the left to an extended lift position, means are provided for terminating the movement of the rack 40. The means include an electrically operated interruptor 49 which inculdes a conventional limit switch and a spring urged ball 50 which is adapted to be received in the recess 48 provided in the rack 40. The interruptor 49 is appropriately connected to the plate 17 by bolts 54. The rack 40 moves to the left until the recess 48 is directly opposite the ball 50, at which time the limit switch is actuated to terminate the motion of the rack 40. It should be understood that other means may be utilized for terminating the motion of the rack 40.

In operation, when it is required to raise the outboard motor **14** from the position shown in FIGURE 1, the remote control means provided in the bow of the boat **10** is actuated, thereby energizing the motor **28** in order to rotate the worm **32** which in turn rotates the worm gear **34**. This results in rotation of the pinion **38** which is in turn adapted to move the rack **40** to the left through an arcuate path, as viewed in FIGURE 2, so as to move the bumper **39** against the yoke **43** and pivot the outboard motor **14** about the pivot connection **13**. When the rack **40** has been extended, the limit switch is actuated so as to terminate the movement of the rack **40**.

When it is required to lower the outboard motor **14**, the remote control means is actuated, thereby rotating the motor **28** in the opposite direction resulting first in applying a force to the rack **40** so as to cam the ball **50** out of the recess **48** and then moving the rack **40** to the right through an arcuate path to the position shown in FIGURE 2. The boot **44** contacts according to the movement of the rack **40**.

The drawing and the foregoing specification constitute a description of the improved elevator for outboard motor in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What I claim is my invention is:

1. In combination, a boat, an outboard motor at the stern of said boat, a pivot mounting having a horizontal axis between said outboard motor and boat, a power lift mechanism for pivoting said outboard motor in a vertical plane about said horizontal axis, said lift mechanism being mounted on the transom of said boat independently of the outboard motor and including a hollow housing connected to the inner wall of the transom, a movable rack and pinion in said housing, said pinion being in mesh with said rack, said rack being adapted to be moved through an arcuate path in a vertical plane extending lengthwise of said boat, one end of said rack extending through an opening provided in said transom, a bumper on said one end of the rack directly opposite the outboard motor, a drive motor, a drive connection between said drive motor and said pinion, and remote control means in the bow of said boat for energizing said drive motor to move said rack through said arcuate path to an extended position, thereby urging the bumper against the outboard motor and pivoting said outboard motor about the horizontal axis of said pivot mounting with respect to said boat.

2. A tilting device for boat transom mounted outboard engines comprising an engine mounting support adapted for engagement to said boat transom, an outboard engine, pivotal means for securing said engine to said support whereby the engine may be moved to alternate tilted positions with respect to said boat transom and support, an engine tilting mechanism for said engine, which is mounted on the transom independently of the engine and said support, said mechanism comprising a shaft, a worm gear on said shaft, a worm in mesh with said worm gear, an elongated rack of arcuate configuration movable through an opening provided in the transom and in a vertical plane extending lengthwise of the boat, said rack having a plurality of teeth and an end directly opposite from the engine for moving the engine upon actuation of the rack, a pinion on said shaft in mesh with the teeth of said rack, a drive motor connected to said worm, and control means for energizing said drive motor to drive said worm, worm gear and pinion and effect movement of said rack in said vertical plane, thereby moving said engine to an alternate tilted position with respect to said support and to the transom of the boat.

3. A tilting device defined in claim 2 wherein means

are provided for holding said rack after said rack has been moved to a position corresponding to the last mentioned tilted position of the engine.

4. A tilting device defined in claim 3 wherein said means is electrically actuated.

5. A tilting device for boat transom mounted outboard engines comprising an engine mounting support adapted for engagement to said boat transom, an outboard engine, pivotal means for securing said engine to said support whereby the engine may be moved to a tilted position with respect to said boat transom and support, an engine tilting mechanism for said engine which is mounted on the transom independently of the engine and said support, said mechanism comprising a shaft, a worm gear on said shaft, a worm in mesh with said worm gear, an elongated toothed rack of arcuate configuration, a pinion on said shaft in mesh with the teeth of said rack, said rack having one end extending through an opening provided in the transom and being movable in a vertical plane extending lengthwise of the boat, a bumper on said one end of the rack opposite the engine for moving the engine upon actuation of the rack, a reversible drive motor connected to said worm, and control means for energizing said drive motor to drive said worm, worm gear and pinion and effect movement of said rack through an arcuate path in said vertical plane thereby raising or lowering said engine to or from an alternate tilted position respectively with respect to said support and to the transom of the boat, depending on the direction in which said drive motor is energized.

6. A tilting device for boat transom mounted outboard engines comprising an engine mounting support adapted for engagement to said boat transom, an outboard engine, pivotal means for securing said engine to said support whereby the engine may be moved to a tilted position with respect to said boat transom and support, an engine tilting mechanism for said engine which is mounted on the transom independently of the engine and said support, said mechanism comprising a shaft, a worm gear on said shaft, a worm in mesh with said worm gear, an elongated toothed rack of arcuate configuration, a pinion on said shaft in mesh with the teeth of said rack, said rack having one end extending through an opening provided in the transom and being movable in a vertical plane extending lengthwise of the boat, a bumper on said one end of the rack opposite the engine for moving the engine upon actuation of the rack, a locking recess at the other end of said rack, a reversible drive motor connected to said worm, control means for energizing said drive motor to drive said worm, worm gear and pinion and effect movement of said rack through an arcuate path in said vertical plane thereby raising or lowering said engine to or from an alternate tilted position respectively with respect to said support and to the transom of the boat, depending on the direction in which said drive motor is energized, and locking means for engaging the recess in said rack for holding the rack in a position corresponding to the tilted position of the engine.

7. A tilting device defined in claim 6 wherein said locking means is electrically actuated and includes a plunger controlled ball which is received in said recess.

8. A tilting device defined in claim 6 wherein an expansible boot is connected to the outside wall of the transom for enclosing said one end of the rack and the opening in the transom.

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