June 19, 1962 R. A. HERREMAN 3,039,724

OUTBOARD MOTOR MANIPULATING MECHANISM

Filed April 29, 1960 4 Sheets-Sheet 1

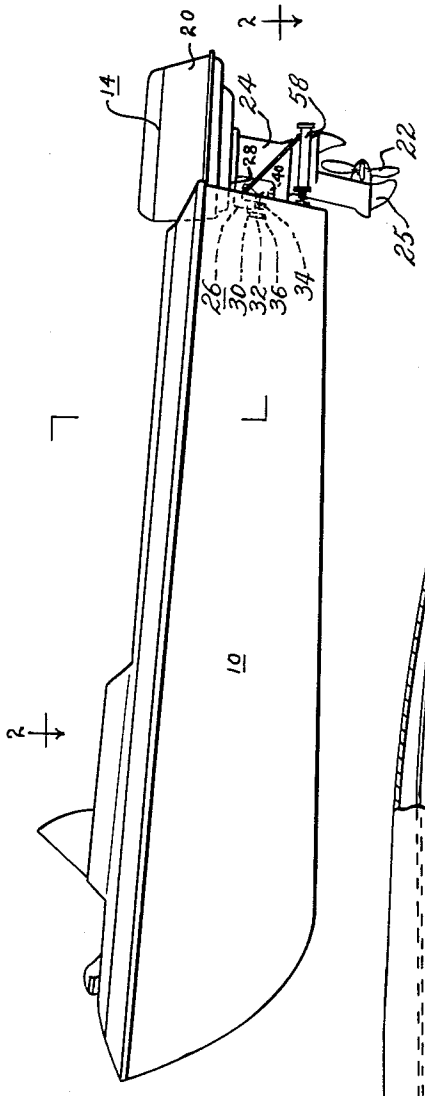


FIG. 1

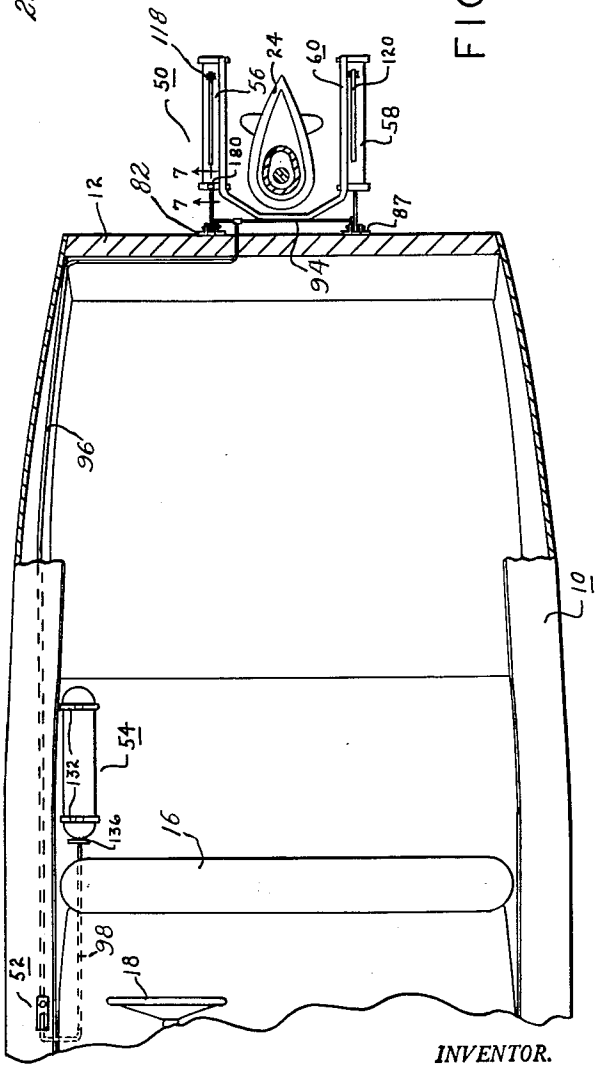


FIG. 2

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OUTBOARD MOTOR MANIPULATING MECHANISM

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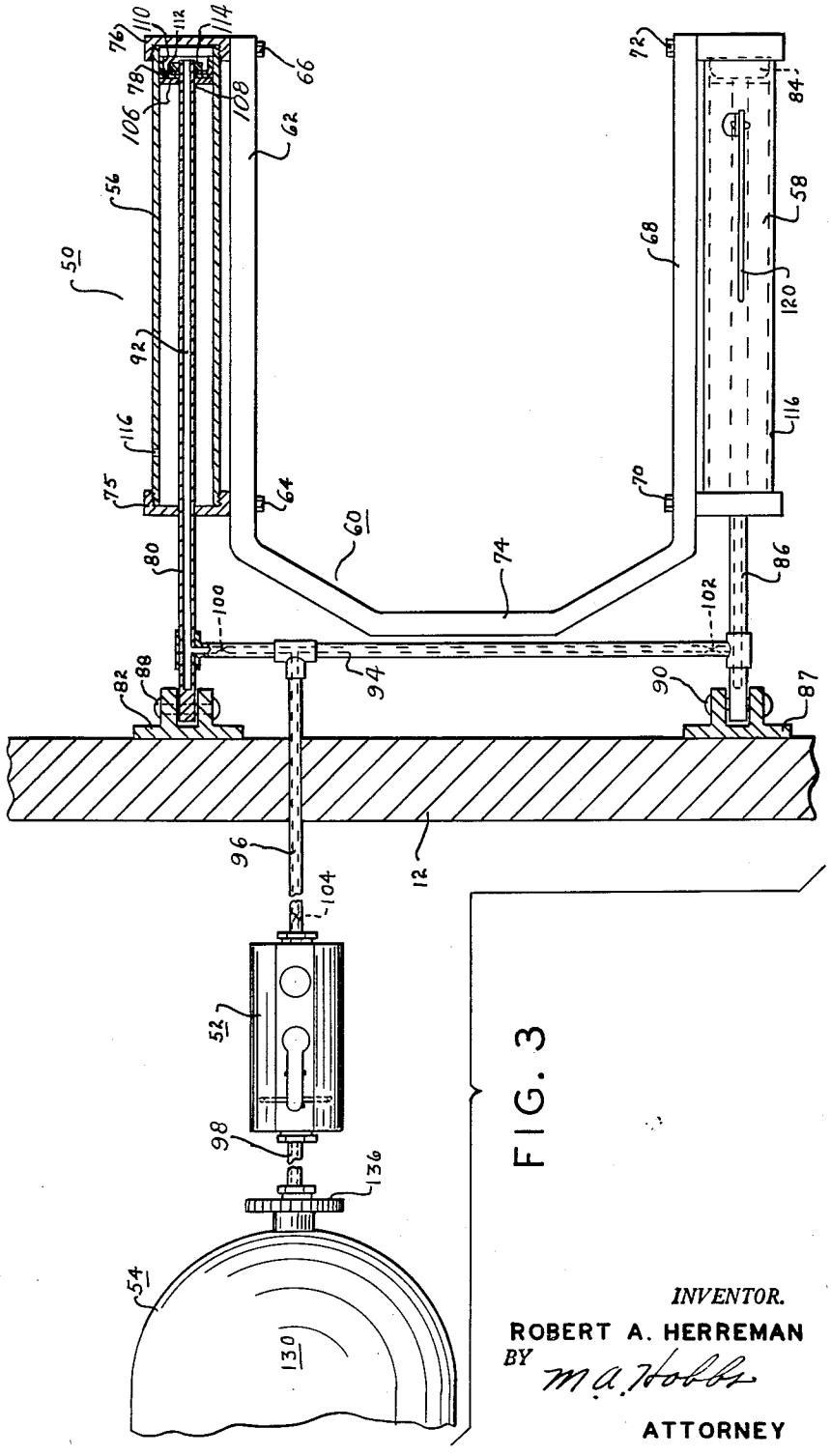


FIG. 3

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OUTBOARD MOTOR MANIPULATING MECHANISM

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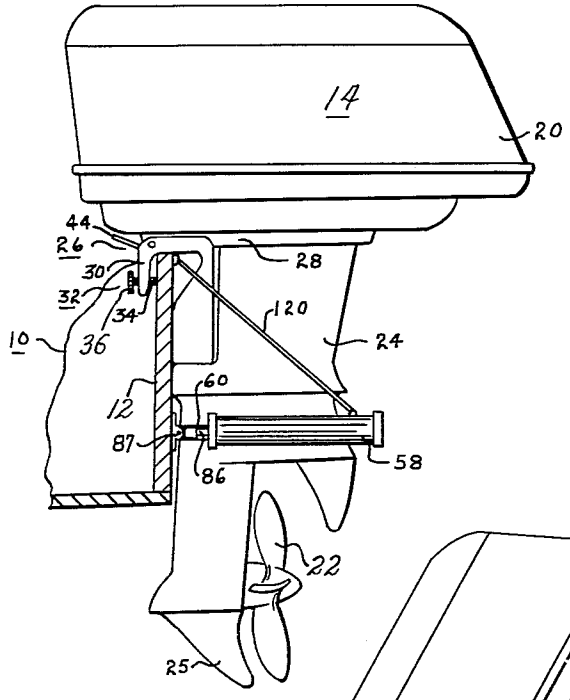


FIG. 4

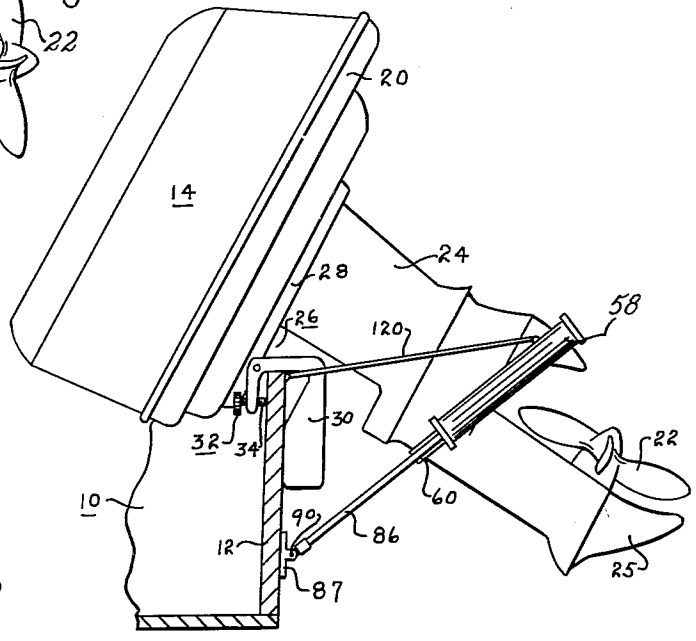


FIG. 5

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OUTBOARD MOTOR MANIPULATING MECHANISM

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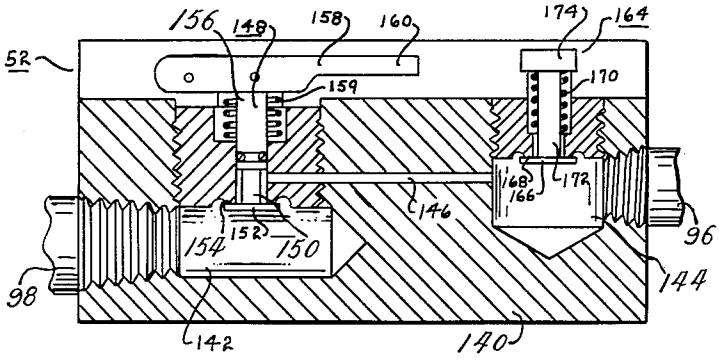


FIG. 6

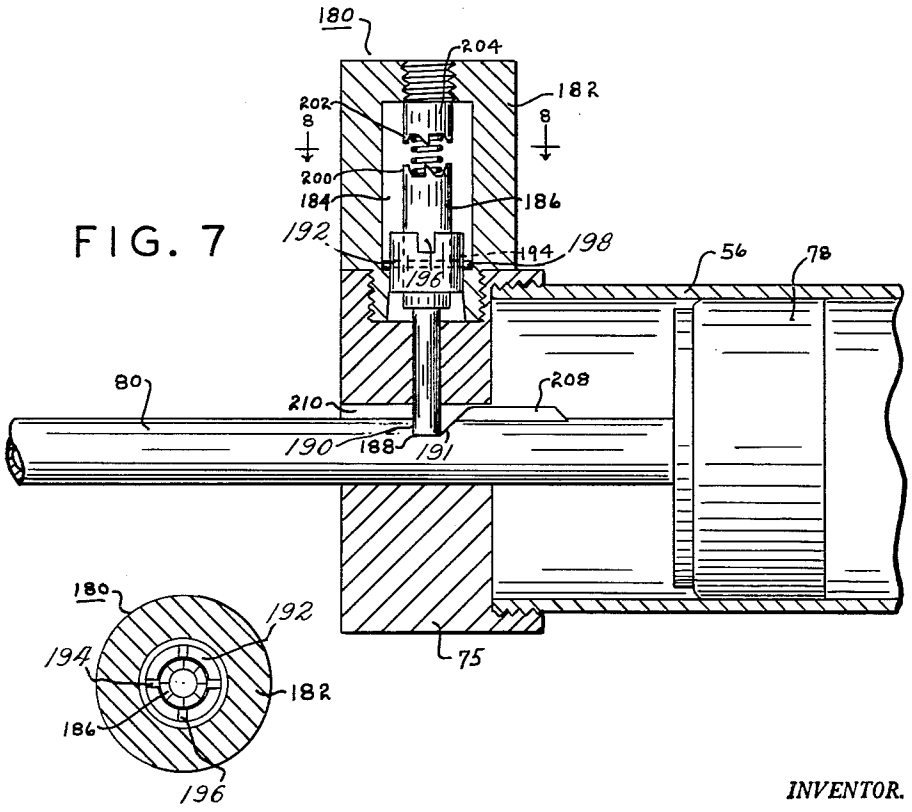


FIG. 7

FIG. 8

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3,039,724

OUTBOARD MOTOR MANIPULATING MECHANISM

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Filed Apr. 29, 1960, Ser. No. 25,780
11 Claims. (Cl. 248—4)

The present invention relates to a positioning mechanism for boat motors and more particularly to a mechanism for lowering and raising outboard motors to and from operating position.

In the past few years outboard motors have been increased in size, weight and horsepower to the extent that they have become extremely difficult to raise from their normal operating position to a locked position above the water level and also difficult to lower to operating position without permitting the motor literally to fall from its normal locked position above the water. Even for people capable of lifting and lowering the motor, these operations constitute a considerable hazard in that the operator is required to stand in the boat and/or lean over the transom of the boat in order to have a secure grip on the motor for the lifting and lowering operations. Walking to and from the motor is also often required in that the boats on which these large motors are used are normally piloted from a place toward the forward end of the boat, thus presenting an additional hazard for the operator of the boats with the large motors. Various types of motor lifting and lowering devices have been tried, including manual, hydraulic and electrical mechanisms, but these prior devices have either been expensive to build and install, difficult in themselves to operate to raise and lower the motor, or are not safe to the average non-professional and often inexperienced boat operator. It is therefore one of the principal objects of the present invention to provide an apparatus for raising and lowering outboard motors, which can be operated by a simple, easily actuated control device located at a point in the boat remote from the motor and which does not interfere with the normal operation and control of the motor while the motor is in its lowered position.

Another object of the invention is to provide an outboard motor lifting and lowering apparatus which can be operated with no appreciable physical force or movement on the part of the operator and which can be effectively controlled by the operator in a sitting or confined position within the boat.

Another object of the invention is to provide an outboard motor lifting and lowering apparatus, which is simple in construction and operation and which can be readily installed on any conventional outboard without cutting, drilling or otherwise changing the construction of the boat transom other than securing parts of the apparatus to the boat using only a few relatively small screws or bolts.

Still another object of the invention is to provide an outboard motor lifting and lowering apparatus which locks the motor in its raised position automatically as the motor is controlled at a point in the boat remote from the motor, and which automatically releases the motor at the will of the operator and gently lowers the motor to its normal operating position.

A further object is to provide a mechanism of the aforesaid type which can be temporarily installed on a boat and easily removed therefrom along with the outboard motor, and which does not occupy any otherwise normally usable space in the boat.

Another object of the invention is to provide a motor manipulating mechanism for tiling outboard motors between their operating and nonoperating positions, which applies a balanced thrust against the lower portion of the motor to raise the motor from the water, and which

retracts away from the motor when the present mechanism is not in use.

Additional objects and advantages will become apparent from the following description and accompanying drawings, wherein:

FIGURE 1 is a side elevational view of a boat having mounted thereon an outboard motor and my motor lifting and lowering mechanism;

FIGURE 2 is an enlarged partial top plan and cross sectional view of the boat, motor and my mechanism shown in FIGURE 1, the section being taken on line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged fragmentary and partial cross sectional view of my motor lifting and lowering mechanism, showing it mounted on the transom of the boat;

FIGURE 4 is a side elevational view of an outboard motor and my lifting and lowering mechanism mounted in running position on the transom of a boat;

FIGURE 5 is a side elevational view of the outboard motor and the lifting and lowering mechanism with the motor being held in its lifted position by the mechanism;

FIGURE 6 is a vertical cross sectional view of the control unit for the present motor lifting and lowering mechanism;

FIGURE 7 is a fragmentary vertical cross sectional view of a locking mechanism for holding the motor in its lifted position, the section being taken on line 7—7 of FIGURE 2; and

FIGURE 8 is a horizontal cross sectional view of the locking mechanism, taken on line 8—8 of FIGURE 7.

Referring more specifically to the embodiment of my invention illustrated in the drawings, numeral 10 designates an outboard motor boat having a transom 12 on which an outboard motor 14 is shown mounted in its lowered position in FIGURES 1 and 2 for propelling the boat, and in its raised position out of the water in FIGURE 5. The boat is adapted to be piloted from a seat 16 located forward in the boat, by a steering wheel 18 mounted on a steering mechanism connected to motor 14 by suitable cables and pulleys (not shown) attached to the boat structure. One or more additional seats may be provided in the boat to the rear of seat 16, including one at the rear of the boat adjacent transom 12, without interfering with the installation of my mechanism. For the purpose of the present description both the boat and outboard motor may be considered as conventional and the present invention is not limited in its application to any particular kind or make of outboard motor, the one shown being, for example, a forty horsepower unit consisting of a motor enclosed in a housing 20 and connected to a propeller 22 by a drive shaft disposed in a leg 24 rigidly connected at its upper end to the motor frame or supporting housing 20 and terminating at its lower end in a rudder 25. The outboard motor, which term hereinafter refers to the entire unit unless otherwise specified, is mounted on the boat transom 12 by a mounting device 26 including a swivel bracket 28 secured to the motor and a stern bracket 30 pivotally connected to bracket 28. The swivel bracket 28 holds the motor so that it can be oscillated on an upright axis for steering. The stern bracket 30 is adapted to seat over the top of transom 12 and to be secured thereto by a plurality of clamping units 32 consisting of a shaft 34 threadedly received in a portion of bracket 30 and a handle 36 for rotating the clamp. The pivoting of the swivel bracket relative to the stern bracket permits the motor to be tilted downwardly into operating position as shown in FIGURES 1 and 4. In conventional mountings of this general type a thrust receiving member 40 adjustable to various positions receives the forward thrust from the swivel bracket and transmits the propelling force of the motor to the boat.

Most of the more expensive models of outboard motors

are equipped with a latching mechanism for locking the motor in its upright operating position so that the operation of the motor can be reversed without the motor tilting upwardly from the water. While the mechanism for locking the motor in its operating position may be considered conventional and is therefore not disclosed in detail herein, a lever for manually operating the latching mechanism is shown at numeral 44, said lever being moved downwardly to release the latch mechanism to permit the motor to be tilted from the water.

The embodiment of my outboard motor raising and lowering mechanism shown in the drawings consists of a power lifting unit 50 and power control and supply units 52 and 54, respectively, unit 50 including cylinders 56 and 58 projecting rearwardly from the transom of the boat on opposite sides of the outboard motor positioned approximately half way down leg 24. The cylinders are rigidly connected to one another by a U-shaped saddle 60 of which arm 62 is secured to cylinder 56 by bolts 64 and 66 and arm 68 to cylinder 58 by bolts 70 and 72. The two arms are connected by a cross member 74 which is adapted to contact the adjacent side of leg 24 when the lifting unit is operated. The cylinders are substantially the same and are closed by end caps 75 and 76 and cylinder 56 contains a piston 78 and rod 80 connected to the rear of the transom by a bracket 82, and cylinder 58 contains a piston 84 and rod 86 connected to the transom by a bracket 87. The two brackets are secured to the rear side of the transom by suitable screws extending into the transom and are pivotally connected to rods 80 and 86 by pins 88 and 90, respectively. Each rod contains a longitudinal passage 92 extending from the piston end through most of its length and connects the outer end of the cylinder with a tube 94, which in turn is connected by a tube 96 to control unit 52 and thence by a tube 98 to power supply unit 54. In order to prevent a sudden surge of power into the cylinders when the cylinders are actuated by a supply of compressed gas, restrictions 100 and 102 are preferably included in tube 94 adjacent rods 80 and 86 and a still further restriction 104 in tube 96. Pistons 78 and 84 may be of any well known conventional design, the type shown in the drawings consisting of a washer 106 seated against a shoulder 108 on the piston rod, and a cup shaped gasket 110 clamped against the washer by a second washer 112 and nut 114 threaded on to the end of the rod. In order to prevent excess pressure from being built up in the two cylinders by gas supplied from the source 54, a vent hole 116 is placed in the side wall of each cylinder at the end of the power stroke to relieve the pressure and to form an effective stop for limiting the travel of the piston in the cylinder. As used in the specification and claims, the term "rear end" of the piston refers to the right hand end as seen in the drawings.

The saddle 60 is held in the desired position on the motor leg 24 by support rods 118 and 120 pivotally connected to cylinders 56 and 58, respectively, and pivotally connected to the transom near the top thereof by suitable brackets. These two rods, one of which may be dispensed with if desired, cause the saddle to pivot upwardly and follow the tilting motor as the pistons are extended during the power stroke, as illustrated in FIGURE 5. Rods 118 and 120 also hold the saddle in a horizontal inoperative position after the motor has been lowered to running position in the water.

The two cylinders are operated by compressed gas, for example carbon dioxide, from a steel cylinder 130 of power supply unit 54. Cylinders 130 are available as filled exchangeable units, or they can be readily filled with compressed carbon dioxide, air or other suitable gas at readily available stations. Cylinder 130 is held in place in the boat by any suitable clamping means 132 and is connected to control unit 52 by a rubber or copper tube 98, the flow of gas from the cylinder being controlled by a shut-off valve 136 which is mounted on the cylinder and is removed from tube 98 when the cylinder is removed for refilling or replacement by a full cylinder.

Control unit 52 consists of a valve body 140 having an inlet passage 142 connected to tube 98, an outlet passage 144 connected to tube 96, and a passage 146 connecting asid inlet and outlet passages and containing a valve 148 consisting of a reciprocable valve element 150 with an enlarged end 152 for seating on valve seat 154, and a stem 156 actuated by a lever 158 pivoted at one side of the stem and engaging the upper end of the stem. The valve element is urged to its seat by a spring 159 around stem 156 and by pressure from cylinder 130, and is readily opened by the operator by pressing downwardly on the free end 160 of lever 158. The outlet passage is connected to the atmosphere by an exhaust valve 164 consisting of a valve element 166 urged to its seat 168 by the pressure in the outlet passage and by a spring 170 around stem 172 of the valve. The valve is operated when cylinders 56 and 58 are to be exhausted, by pressing on a button 174 on the outer end of stem 172. The control unit 56 may be connected directly to the outlet conduit of cylinder 130, thus eliminating tube 98. A mechanism 180 for automatically locking cylinders 56 and 58 in their extended position and the motor in its raised position, is shown in FIGURES 7 and 8. Mechanism 180 consists of a housing 182 secured to the inner end of cylinder 56 and having a cylindrical chamber 184 in which is mounted a plunger 186. The plunger projects from the housing into a recess 188 in rod 80 and forms a stop for the laterally extending shoulder 190 of recess 188 to hold the rod in its extended position. The plunger is removed from the slot by again energizing the piston to move the rod further to the right, as shown in FIGURE 7, and thereby forces the inclined surface 191 against the plunger causing the plunger to retract into housing 182. In order to hold the plunger in its retracted position, a sleeve 192 in which the plunger reciprocates is provided with a pair of deep opposed slots 194 and a pair of shallow opposed slots 196 in the inner edge thereof, and the inner end of the plunger is provided with a transverse pin 198 for seating in corresponding slots. The plunger is rotated a partial revolution each time it is retracted by engaging a pair of annular toothed members 200 and 202 on the inner end of plunger 186 and a sleeve 204 secured to the end of housing 182 in axial alignment with the plunger. The pitch of the teeth on the members 200 and 202 is such that plunger 186 is rotated sufficiently to shift pin 198 alternately from the deep slots to the shallow slots. The longitudinal movement of plunger 186 for engaging and rotating the plunger is obtained by a lug 208 secured to rod 80 and having an inclined surface continuing outwardly from inclined surface 191. When the pin is in deep slots 194 the plunger extends into recess 188 and locks rod 80 in its extended position, and when the pin is in the shallow slots 196 the plunger is held in its retracted position free of rod 80. A longitudinal groove 210 is provided in the end cap 75 to permit lug 208 to move into the outer end of the cap. Only one locking mechanism 180 is preferably used since one mechanism performs the function of holding both rods 80 and 86 extended and avoids the need of synchronizing the two mechanisms.

In the operation of the present outboard motor lifting and lowering mechanism, when it is desired to lift the motor from its running position shown in FIGURE 4, lever 158 is pressed downwardly by the operator, opening valve element 148 and admitting compressed gas from cylinder 130 and tube 98, through tubes 96 and 94, and passage 92 of rods 80 and 86 into the rear end of cylinders 56 and 58. The pressure of the gas in the cylinders forces the cylinders and saddle 60 outwardly to the rear, tilting the motor from the position shown in FIGURE 4 to the position shown in FIGURE 5. The movement of the cylinders continues outwardly until the rear edge of the piston reaches port 116. Since the cylinders at

this port have reached their maximum travel, the operator releases lever **158** shutting off the supply of compressed gas to cylinders **56** and **58** and permitting them to retract to the point where plunger **186** seats in recess **188** against shoulder **199** holding the cylinders in their extended position and the motor in the position shown in FIGURE 5. When it is desired to release the motor and lower it to its running position, the operator first presses lever **158** again to admit gas into the cylinders and move the cylinders to the point at which lug **208** will force plunger **186** upwardly against member **202** and rotate the plunger sufficiently for pin **198** to seat in the shallow slots **196**. The cylinders are now free to return to their inoperative position shown in FIGURE 4. The rate at which the motor is lowered is regulated by controlling exhaust valve **164**.

From the foregoing description of the operation it is seen that the entire lifting, locking, unlocking and lowering operations can be fully performed by the manipulation of lever **158** and button **174**, i.e. by opening and closing easily operated valves **148** and **164**, without any need for the boat operator to leave his seat or to apply any appreciable pressure or use any appreciable physical movement. The simplicity and ease of operation of the control unit add greatly to the safety of the operator and other occupants of the boat in that it is not necessary for the operator to move around in the boat in order to operate the present mechanism either to raise or lower the motor. This important feature is in part made possible by the use of the compressed gas cylinder as the source of power since the operating pressure is provided without employing any moving parts and without the use of any complicated, difficult to handle control levers or mechanisms. Further, the cylinder of compressed gas is not affected by water or changes in atmospheric condition and can be placed in normally unused space in the boat without danger of fire or explosion.

Since some outboard motors rotate on their vertical axis 360 degrees for reversing the direction of the boat, the motors include a mechanism for locking them in their running position, as explained previously herein. While these motors are usually operated with this mechanism in its unlocked position and hence are in condition to be tilted using the mechanism previously described, it may be desirable in some instances to include a penumatic means operated by the same control unit **52** to unlatch the locking means the instant pressure is admitted into cylinders **56** and **58**. A mechanical means independent of the present motor tilting mechanism may be used instead. While cylinders **56** and **58** are preferably mounted on saddle **60** and rods **80** and **86** attached to the transom, this arrangement may be reversed if desired. Various other additions, modifications and changes may be made in the present mechanism without departing from the scope of the invention.

I claim:

1. A mechanism for raising and lowering an outboard motor having a frame, a leg depending from said frame for supporting a propeller, and means for mounting said motor on the transom of a boat including a pivot forming a horizontal axis on which the motor tilts between operating and nonoperating positions, said mechanism comprising a U-shaped saddle the cross member of which extends horizontally between the transom and the leg of the motor and the arms of which extend rearwardly along opposite sides of the leg, a cylinder secured to each arm and arranged parallel therewith, a piston in each cylinder, a rod in each cylinder attached to the piston and extending from the forward end of the cylinder and having a passage therein communicating with the rearward end of the cylinder, means for pivotally attaching one end of each rod to the boat transom, a cylinder of compressed gas, a conduit connecting said gas cylinder with said passages in said rods, a valve in said conduit for controlling the flow of gas from said gas cylinder to said first mentioned cylinders, an exhaust valve in said conduit between said control valve and said first mentioned cylinders, a shut off valve in said conduit between said compressed gas cylinder and said control valve, a pair of restrictions in said conduit between said exhaust valve and said first mentioned cylinders, a means for locking one of said piston rods in its extended position and the U-shaped saddle in its motor lifted position including a recess in said one rod, a plunger for seating in said recess, a lug for retracting said plunger from said recess as said rod is extended, means for alternately placing said plunger in its retracted and extended positions for locking and releasing said one rod, and a rod attached to one of said first mentioned cylinders for holding said saddle in its operating position.

2. A mechanism for raising and lowering an outboard motor having a frame, a leg depending from said frame for supporting a propeller, and means for mounting said motor on the transom of a boat including a pivot forming a horizontal axis on which the motor tilts between operating and nonoperating positions, said mechanism comprising a U-shaped saddle the cross member of which extends horizontally between the transom and the leg of the motor and the arms of which extend rearwardly along opposite sides of the leg, a cylinder secured to each arm and arranged parallel therewith, a piston in each cylinder, a rod in each cylinder attached to the piston and extending from the forward end of the cylinder and having a passage therein communicating with the rearward end of the cylinder, means for pivotally attaching one end of each rod to the boat transom, a cylinder of compressed gas, a conduit connecting said gas cylinder with said passages in said rods, a valve in said conduit for controlling the flow of gas from said gas cylinder to said first mentioned cylinders, an exhaust valve in said conduit between said control valve and said first mentioned cylinders, a means for locking one of said first piston rods in its extended position and the U-shaped saddle in its motor lifted position including a recess in said one rod, a plunger for seating in said recess, a lug for retracting said plunger from said recess as said rod is extended, means for alternately placing said plunger in its retracted and extended positions for locking and releasing said one rod, and a rod attached to one of said first mentioned cylinders for holding said saddle in its operating position.

3. A mechanism for raising and lowering a boat motor having a frame, a leg depending from said frame for supporting a propeller, and means for mounting said motor on the rear of a boat including a pivot forming a horizontal axis on which the motor tilts between operating and nonoperating positions, said mechanism comprising a saddle having a cross member extending horizontally between the boat and the leg of the motor and arms extending rearwardly along opposite sides of the leg, a cylinder secured to each arm and arranged parallel therewith, a piston in each cylinder, a rod in each cylinder attached to the piston and extending from the forward end of the cylinder, means for pivotally attaching one end of each rod to the boat, a cylinder of compressed gas, a conduit connecting said gas cylinder with said first mentioned cylinders, a valve in said conduit for controlling the flow of gas from said gas cylinder to said first mentioned cylinders, a releasable means including an element operated in response to the movement of one of said piston rods for locking said one piston rod in and releasing it from its extended position, and a rod attached to one of said first mentioned cylinders for holding said saddle in its operating position.

4. A mechanism for raising and lowering a boat motor having a frame, a leg depending from said frame for supporting a propeller, and means for mounting said motor on the rear of a boat including a pivot forming a horizontal axis on which the leg tilts between operating and nonoperating positions, comprising a frame having a cross member extending horizontally between the boat and the leg of the motor and arms extending rearwardly

along the opposite sides of the leg, a cylinder secured to each arm and arranged parallel therewith, a piston in each cylinder, a rod in each cylinder attached to the piston and extending from the forward end of the cylinder, means for pivotally attaching one end of each rod to the boat, a releasable means including an element operated in response to the movement of one of said piston rods for locking said one piston rod in and releasing it from its extended position, a cylinder of compressed gas, a conduit connecting said gas cylinder with said first mentioned cylinders, a valve in said conduit for controlling the flow of gas from said gas cylinder to said first mentioned cylinders, and an exhaust valve in said conduit between said control valve and said first mentioned cylinders.

5. A mechanism for raising and lowering a boat motor having a frame, a leg depending from said frame for supporting a propeller, and means for mounting said motor on the rear of a boat including a pivot forming a horizontal axis on which the leg tilts between operating and nonoperating positions, comprising a U-shaped frame having a cross member extending horizontally and arms extending rearwardly along opposite sides of the leg, cylinder, piston and rod assemblies having one end attached to said U-shaped frame on opposite sides thereof and the other end connected to the boat, a source of compressed gas, a conduit connecting said source with said cylinders, a valve in said conduit for controlling the flow of gas from said source to said cylinders, an exhaust valve in said conduit between said control valve and said cylinders, a releasable means including an element operated in response to the movement of one of said piston rods for locking said one piston rod in its extended position and the U-shaped frame in its motor lifted position and for releasing said rod and frame from said position, and a rod connected to said U-shaped frame for holding said frame in its operating position.

6. A mechanism for raising and lowering a boat motor having a frame, a leg depending from said frame for supporting a propeller, and means for mounting said motor on the rear of a boat including a pivot forming a horizontal axis on which the leg tilts between operating and nonoperating positions, comprising a frame having a cross member extending horizontally between the boat and the leg of the motor, cylinder, piston and rod assemblies having one end attached to said second mentioned frame on opposite sides thereof and the other end connected to the boat, a releasable means including an element operated in response to the movement of one of said piston rods for locking said one piston rod in and releasing it from its extended position, a source of compressed gas, a conduit connecting said source with said cylinders, a valve in said conduit for controlling the flow of gas from said source to said cylinders, and an exhaust valve in said conduit between said control valve and said cylinders.

7. A mechanism for raising and lowering a boat motor having a frame, a leg depending from said frame for supporting a propeller, and means for mounting said motor on the rear of a boat including a pivot forming a horizontal axis on which the leg tilts between operating and nonoperating positions, comprising a U-shaped frame having a cross member extending horizontally between the boat and the leg of the motor and arms extending rearwardly along opposite sides of the leg, a cylinder, piston and rod assembly having one end attached to said U-shaped frame and the other end arranged to be connected to the boat, a source of compressed gas, a conduit connecting said source with said cylinder, and a valve in said conduit remotely positioned with respect to said cylinder and having a means for controlling the flow of gas from said source to said cylinder.

8. A mechanism for raising and lowering a boat motor having a leg and means for pivoting said leg between operating and nonoperating positions, comprising a frame for engaging said leg, a cylinder, piston and rod assembly having one end attached to said frame and the other end arranged to be connected to the boat, a cylinder of compressed gas, a conduit connecting said gas cylinder with said first mentioned cylinder, and a valve in said conduit for controlling the flow of gas from said gas cylinder to said first mentioned cylinder, an exhaust valve in said conduit between said control valve and said first mentioned cylinder, and a releasable means including an element operated in response to the movement of said piston rod for locking said piston rod in its extended position and for releasing said rod from said position.

9. A mechanism for raising and lowering a boat motor having a leg and means for pivoting said leg between operating and nonoperating positions, comprising a frame for engaging said leg, a cylinder, piston and rod assembly having one end attached to said frame and the other end arranged to be connected to the boat, a cylinder of compressed gas, a conduit connecting said gas cylinder with said first mentioned cylinder, and a valve in said conduit remotely positioned with respect to said first mentioned cylinder and having a means for controlling the flow of gas from said gas cylinder to and from said first mentioned cylinder.

10. A mechanism for raising and lowering a boat motor having a leg and means for pivoting said leg between operating and nonoperating positions, comprising a frame for engaging said leg, a cylinder, piston and rod assembly having one end attached to said frame and the other end arranged to be connected to the boat, a source of compressed gas, a conduit connecting said source with said cylinder, and a valve in said conduit remotely positioned with respect to said cylinder and having a means for controlling the flow of gas from said source to and from said cylinder.

11. In a mechanism for raising and lowering a boat motor having a leg and means for pivoting said leg between operating and nonoperating positions: a frame for engaging said leg, a cylinder, piston and rod assembly having one end attached to said frame and the other end arranged to be connected to the boat, a means for locking said piston rod in its extended position including a recess in said rod, a plunger for seating in said recess, a lug for retracting said plunger from said recess as said rod is extended, and means for alternately placing said plunger in its retracted and extended positions for locking and releasing said rod.

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