Oct. 27, 1964 F. E. MITCHELL 3,153,945

SHIFT AND THROTTLE CONTROL UNIT FOR OUTBOARD MOTORS

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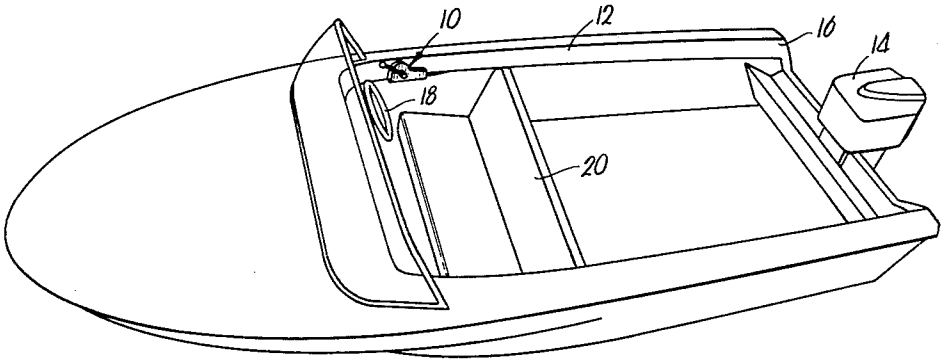


Fig. 1.

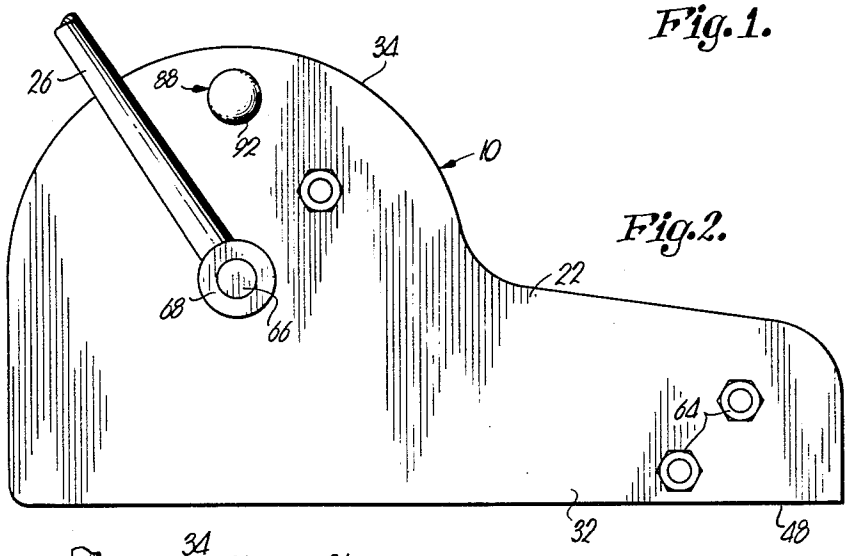


Fig. 2.

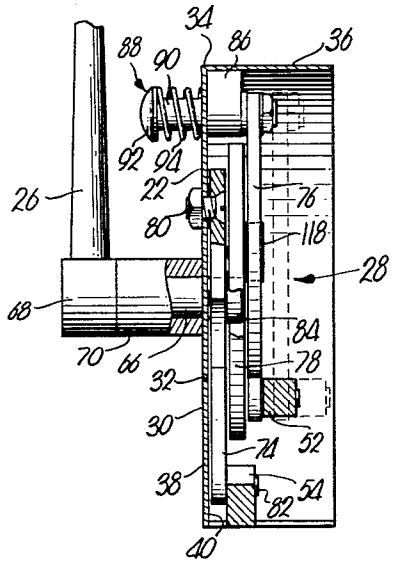


Fig. 6.

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Fig.3.

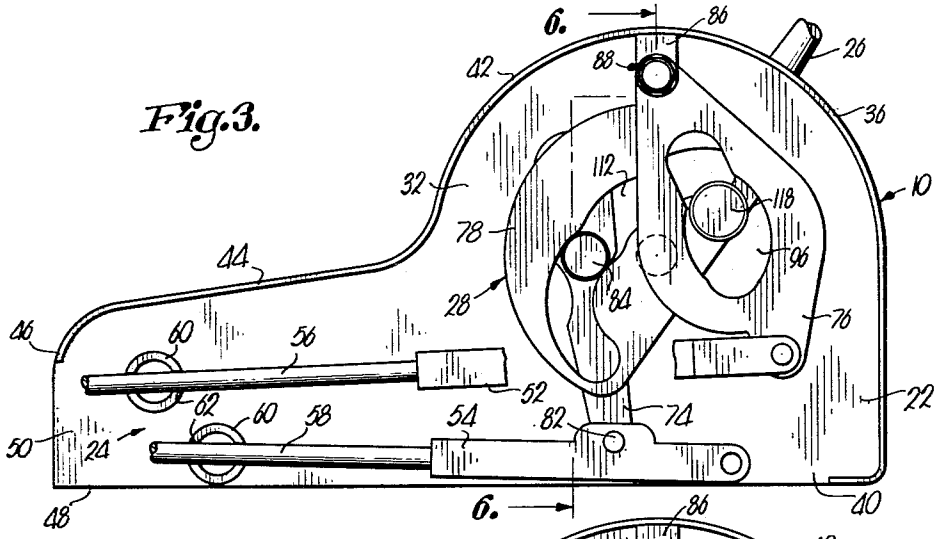
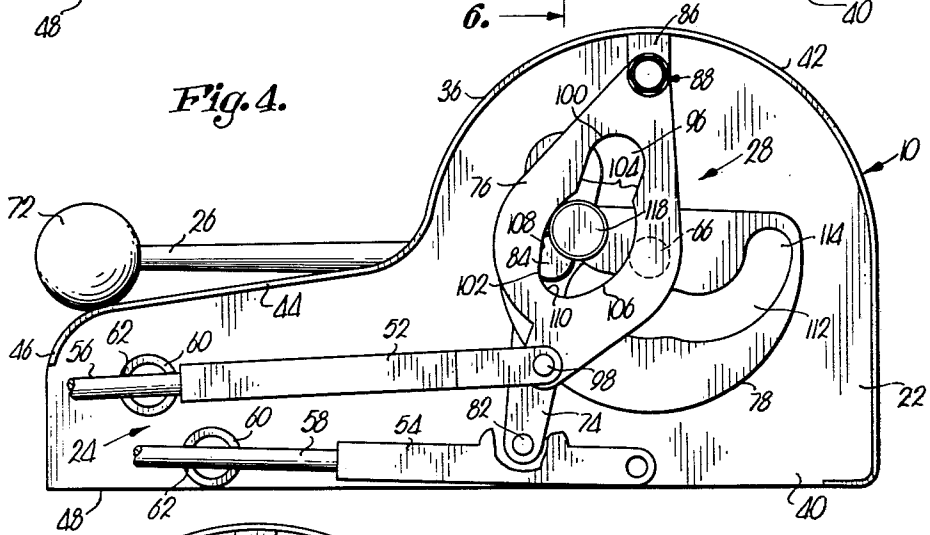


Fig.4.



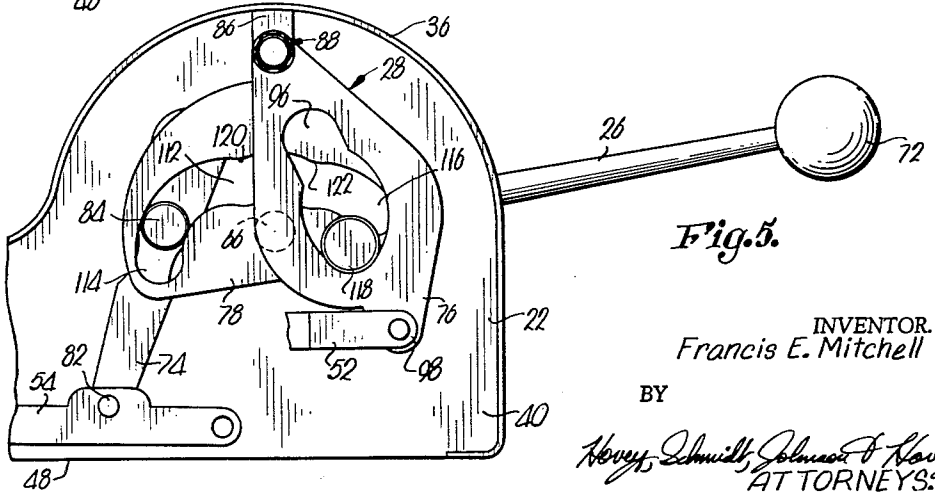


Fig.5.

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SHIFT AND THROTTLE CONTROL UNIT FOR OUTBOARD MOTORS

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9 Claims. (Cl. 74—472)

This invention relates to control devices for remotely operating the throttle and gear shifting mechanisms of an outboard motor of a boat and, more particularly, to those devices having a single actuating member for controlling both mechanisms.

Heretofore, outboard motors for boats were operated remotely by a control unit having a pair of independently actuated levers operably coupled with the throttle and gear shifting mechanisms respectively of the motor. Since all motors of this sype require that the throttle mechanism be in a position so that the motor is operating at a greatly reduced speed, usually the idling speed thereof, prior to actuating the gear shifting mechanism, a control unit of the aforementioned character gives rise to a number of problems, the foremost of which is the damage caused to the gears of the motor when an attempt is made to shift the gears when the throttle mechanism is set for a motor speed greater than the idling speed of the motor. Other problems arising as a result of the use of this type of control unit include the shifting of the throttle lever in the mistaken belief that the gear shifting lever is being actuated, the inadvertent shifting of the gear and throttle levers simultaneously, and the high acceleration imparted to the boat and the discomfort caused to the occupants thereof when the gears of the motor are shifted when the throttle is above the safe operating speed required for shifting said gears. In addition, many instances arise while boating which require that the throttle and gear shifting mechanisms be actuated rapidly, such as to avoid a collision with another object, and with a control unit of the above-mentioned type such rapid movement is not possible.

The instant invention circumvents these difficulties by providing a control unit for outboard motors which utilizes a single operating lever for simultaneously actuating the throttle and gear shifting mechanisms of the motor and permits the gears of the motor to be shifted when the motor is operated at a substantially reduced and safe speed thereof.

It is therefore the primary object of the instant invention to provide a remote control unit for an outboard motor which simultaneously operates the gear shifting and throttle mechanisms of the motor to eliminate the necessity of independently operating the mechanisms and thereby prevent the possibility of damage to the gears of the motor.

Another important object of the instant invention is the provision of a control unit for use with a boat having an outboard motor and having a single operating handle for simultaneously actuating the gear shifting and throttle mechanisms of the motor to thereby impart forward or reverse motion to the boat by the motor in a single movement of the handle in opposite directions from an intermediate neutral position.

Still another object of the present invention is the provision of a control unit operably coupled to the gear shifting and throttle mechanisms of an outboard motor for sequentially reducing the speed of the motor to an idling speed, shifting the gears of the motor and subsequently increasing the speed of the motor by shifting in a single motion a control lever from a first position to a second position.

Yet another object of the present invention is the provision of a control unit for systematically shifting a pair of throttle and gear shifting control linkages for an outboard motor, which unit includes cam-actuated means operably coupled to said linkages to thereby obviate the inclusion of gear trains in the unit for shifting the latter.

Other objects of the instant invention relate to the provision of a flat plate providing a support upon which the cam actuated means are secured; to the provision of a control member rigidly secured to the single operating handle and disposed between and operably coupled with a pair of swingable levers, the latter adapted to be connected with the throttle and gear shifting mechanism of an outboard motor; to the provision of an arcuate slot in the control member for receiving a roller secured to one of the levers for shifting the latter upon movement of said member by said handle; and to the provision of an aperture in the other of said levers for receiving a roller secured to the control member for shifting the other lever and thereby the linkage attached to the latter.

In the drawings:

FIGURE 1 is a perspective view of a boat having an outboard motor thereon and provided with a device which is the subject of this invention mounted thereon remote from the motor;

FIG. 2 is a fragmentary, elevational view of one side of the instant device showing the single operating handle thereof;

FIG. 3 is an elevational view of the opposite side of a device shown in FIG. 2 showing the cam actuated means for shifting a pair of linkages, parts being broken away to show details of construction;

FIG. 4 is an elevational view of the device as shown in FIG. 3, with the handle and cam actuated means being in a first position;

FIG. 5 is an elevational view of the device with the handle and cam actuated means being in the opposite position to that shown in FIG. 4; and

FIG. 6 is an end elevational view taken along line 6—6 of FIG. 3.

The gear shifting and throttle control unit which is the subject of this invention is broadly denoted by the numeral 10 and in the embodiment shown in FIG. 1, is adapted to be attached to a boat 12, having a motor 14 at the rear end 16 thereof, it being noted that control unit 10 is secured to boat 12 remote from motor 14 proximal to steering wheel 18 and seat 20 so that an operator of the boat may have access to control unit 10 and steering wheel 18 while seated on seat 20 of boat 12. Motor 14 is of the conventional type for outboard use and is provided with manually operated gear shifting and throttle mechanisms (not shown) thereon.

Control unit 10 includes a support 22, shiftable elements 24 carried by support 22 and adapted to be operably coupled with the gear shifting and throttle mechanisms of motor 14, an operating handle 26 carried by support 22 and cam-operated means 28 connected to shiftable elements 24 and handle 26.

Support 22 includes a housing 30 having a side wall 32 provided with an irregular upper-marginal edge 34 and top wall 36 secured to side wall 32 at the upper marginal edge 34 thereof and extending laterally therefrom as is clear in FIG. 6 of the drawings. Sidewall 32 is in the form of a flat plate having a pair of opposed faces 38 and 40 respectively, it being noted that side wall 32 is attached to boat 12 in any suitable manner. Top wall 36 is provided with an arcuate segment 42 substantially overlying cam-operated means 28 and an inclined segment 44 integral with arcuate segment 42 and substantially overlying shiftable elements 24. The normally lowermost end 46 of inclined segment 44 is spaced above bottom edge 48 of side wall 32 to present an entry 50 through which shiftable elements 24 pass to be operably coupled with the gear shifting and control mechanisms of motor 14.

Shiftable elements 24 include a pair of internally threaded linkages 52 and 54 and a pair of rods or control

cables 56 and 58 having ends threadably secured within linkages 52 and 54, cables 56 and 58 being adapted to be operably coupled with the gear shifting and throttle control mechanisms respectively of motor 14. Linkages 52 and 54 are secured to cam-operated means 28 in a manner hereinafter described and cables 56 and 58 are braced on side wall 32 by means of a pair of identical anchor brackets 60 each having an opening 62 therein for receiving a respective cable and permitting sliding engagement of the latter therewithin as the same reciprocate responsive to the actuation cam-operated means 28. Brackets 60 are mounted on side wall 32 by means of nut and bolt assemblies 64.

An elongated shaft 66 is rotatably mounted in side wall 32 in an opening (not shown) in the latter and projects outwardly from faces 38 and 40 thereof. Handle 26 is provided with a cylindrical collar 68 at one end thereof, it being noted that collar 68 is disposed over one end of shaft 66 and secured thereto by suitable means. A tubular sleeve 70 is interposed between collar 68 and face 38 of side wall 32 to maintain handle 26 in spaced relationship to the latter. Handle 26 is provided with a knob 72 which is adapted to be grasped by the user of control unit 10 for swinging handle 26 in a substantially vertical arc. Knob 72 is secured to handle 26 at the end thereof opposite to the end to which collar 68 is attached.

Cam-operated means 28 comprises first and second levers 74 and 76 respectively and a control member 78 interposed between levers 74 and 76.

First lever 74 is rotatably mounted at one end thereof on side wall 32 by virtue of nut and bolt assembly 80 securing first lever 74 to face 40. The opposite end of first lever 74 is pivotally mounted on linkage 54 by means of a pin or rivet 82 so that, as first lever 74 swings in a substantially vertical arc about an axis through nut and bolt assembly 80, linkage 54 reciprocates in a straight line and is free to pivot relative to first lever 74. A first roller 84 is rotatably mounted on first lever 74 intermediate the ends of the latter to provide a bearing surface for control member 78 in a manner hereinafter described. First lever 74 is disposed to one side of shaft 66 so that the same may be swung in a vertical arc and free from contact with shaft 66.

Second lever 76 is rotatably mounted at one end thereof to a boss 86 secured to face 40 of side wall 32 by suitable means, such as by nut and bolt assembly 88 securing second lever 76 to boss 86. The bolt 90 of nut and bolt assembly 88 is slidable within the opening (not shown) of boss 86 and is provided with a head 92 which, together with face 38 of side wall 32, provides a limit for a resilient coil spring 94, so that by forcing head 92 inwardly toward face 38, second lever 76 is shifted outwardly from boss 86 to a dashed line position as best seen in FIG. 6. Second lever 76 is provided with an elongated aperture 96 therein intermediate the ends thereof, it being noted that the end opposite to the end pivotally mounted on boss 86 is secured to linkage 52 by means of a pin or rivet 98 pivotally mounting linkage 52 to second lever 76. Aperture 96 is provided with a first portion 100 and a second portion 102, portion 100 being disposed proximal to the upper end of second lever 76 and portion 102 being disposed proximal to the lower end of the latter. Portion 100 is provided with a pair of substantially parallel edges 104 forming the sides of a U-shaped configuration and portion 102 is provided with a pair of spaced arcuate edges 106 and 108 coextensive with respective edges 104. The edge connecting arcuate edges 106 and 108 forms a seat 110 for a purpose hereinafter described.

Control member 78 is rigid to the end of shaft 66 projecting outwardly from face 40 of side wall 32 and is provided with an arcuate slot 112 therein having extremities 114 and 116 spaced from the connection of control member 78 with shaft 66 and substantially diametrically opposed relative to the connection. Slot 112 is substantially semi-circular in configuration and is of a width to receive first roller 84 on first lever 74 so that the periphery of roller 84 engages the spaced edges of slot 112. A second roller 118 is rotatably mounted on control member 78 at a point spaced from the connection thereof with shaft 66 proximal to extremity 116 of slot 112, it being noted that second roller 118 is disposed within aperture 96 so that the periphery of second roller 118 is engageable with the edges 104 of first portion 100 or the arcuate edges 106 and 108 of second portion 102. Edges 104 of first portion 100 are so spaced so that the periphery of first roller 118 substantially engages said edges when roller 118 is disposed within first portion 100.

The operation of control unit 10 is accomplished by shifting handle 26 from a neutral position to either a forward or reverse position as is desired by the operator of boat 12. The neutral position of handle 26 is reached when handle 26 is substantially vertical. In the neutral position, first roller 84 is substantially midway between extremities 114 and 116 of slot 112 and substantially laterally spaced from shaft 66, it being noted that extremity 116 overlies extremity 114 when handle 26 is in a neutral position. Further, first lever 74 is swung counterclockwise as viewed in FIGS. 3 to 5 inclusive as handle 26 moves to the neutral position, and linkage 54 connected with the throttle mechanism of motor 14 shifts to one end of its path of travel or to a throttle closed position corresponding to the idling speed of motor 14. As control member 78 moves to the neutral position by virtue of being rigid to shaft 26, second roller 118 thereon moves toward and into first portion 100 of aperture 96 so that the periphery of second roller 118 engages the spaced edges 104 of first portion 100 to swing second lever 76 so that the ends thereof are substantially vertically aligned with the connection of control member 78 with shaft 76. This action effectively causes linkage 52 to shift to a point intermediate its path of travel which corresponds to the neutral gear position of motor 14.

When it is desired to impart forward motion to boat 12, handle 26 is swung in a clockwise manner as viewed in FIGS. 3 to 5 inclusive and as a result, control member 78 also rotates in a clockwise manner. Thereupon, second roller 118 moves out of first portion 100 into second portion 102 of aperture 96 into engagement with arcuate edge 106 to force second lever 76 to swing in a substantially counterclockwise manner to force linkage 52 toward one end of its path of travel which corresponds to the forward gear position of motor 14. Simultaneously, slot 112 moves relative to first roller 84 forcing the latter toward extremity 114 of slot 112, which action effectively causes first lever 74 to swing in a clockwise manner about its pivot point to thereby cause linkage 54 to move toward the opposite end of its path of travel which corresponds to a throttle open position. Handle 26 is moved forwardly to a point corresponding to the speed at which the operator desires to operate boat 12, whereupon first roller 84 is disposed within slot 112 between the mid-point of the latter and extremity 114 thereof. At one point of the rotation of control member 78, second roller 118 moves into seat 110, as is clear in FIG. 5, which shows the relative positions of levers 74 and 86 with handle 26 in forward position.

When it is desired to reduce the speed and return the motor 14 to a neutral gear position, handle 26 is returned to the vertical or neutral position and roller 118 moves out of engagement with seat 110 toward first portion 100 in the manner shown in FIG. 3. Simultaneously, first roller 84 moves relative to slot 112 and swings first lever 74 to the throttle closed position. When second roller 118 engages edges 104 of first portion 100, lever 76 is returned to the neutral position with the ends thereof aligned with shaft 66.

To impart reverse motion to boat 12, handle 26 is swung in a counterclockwise manner so that second roller 118 moves out of first portion 100 into second portion

102 into engagement with edge 108 of the latter. Whereupon second lever 76 is caused to rotate in a clockwise manner to force linkage 52 toward the opposite of its path of travel which corresponds to the reverse gear position of motor 14. Simultaneously, first roller 84 approaches extremity 116 of slot 112 to cause first lever 74 to move to a throttle open position. The relative positions of handle 26 and levers 74 and 76 for the reverse gear position is shown in FIG. 4.

To insure that motor 14 is put into gear prior to the application of an increased throttle setting therefor, slot 112 is provided with arcuate stretches 120 and 122 on either side of the mid-point thereof so that first roller 84 will not move toward the corresponding extremity of slot 112 and thereby swing lever 74 to a throttle open position until second lever 76 is moved into either the forward or reverse gear position by second roller 118. Hence, stretches 120 and 122 provided a means for delaying the opening of the throttle of motor 14 until the gear mechanism therefor has been actuated.

If it is desired to heat motor 14 after initially starting the same, the throttle may be increased thereon by forcing head 92 of bolt 90 toward face 38 of side wall 32 so that second lever 76 is shifted to the dashed line position shown in FIG. 6. Thereupon, second roller 118 is disposed out of aperture 96 to permit control member 78 to move independently of second lever 76 and to swing first lever 74 to a throttle open position.

It is evident that control unit 10 provides a means for imparting forward or reverse motion to boat 12 when the same is operably coupled to the gear shifting and throttle control mechanisms of motor 14, which motion is smoothly and uniformly applied by virtue of the rollers 84 and 118 bearing against the inner edges of slot 112 and aperture 96 respectively. Such a device gives complete control to the operator thereof since there is no possibility of inadvertently shifting the gear mechanism of motor 14 with the throttle mechanism thereof above a safe speed for shifting the gears.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. A gear shifting and throttle control unit for a boat having an outboard motor and comprising a support adapted to be mounted on said boat remote from said motor; shiftable elements on said support and adapted to be connected to the gear and throttle controls respectively of the motor; an operating handle swingably mounted on said support and movable in opposed directions from an intermediate neutral position; first and second levers each swingably mounted at one end thereof on said support and secured at the opposite end thereof to a corresponding shiftable element, said first lever corresponding to said throttle control and said second lever corresponding to said gear control; a control member mounted on said handle and operably coupled with said levers; and first bearing means mounted on said first lever intermediate the ends thereof and operably coupled with said control member to swing said first lever responsive to the movements of said handle, said control member being disposed for shifting the second lever in opposite directions in response to movement of the handle in opposite directions from said neutral position thereof and for shifting the first lever in one direction regardless of the direction of movement of the handle from said neutral position thereof.

2. A gear shifting and throttle control unit as set forth in claim 1, wherein said second lever is provided with an aperture therethrough having an inner peripheral edge, said control member being engageable with said edge to swing said second lever responsive to the movements of said handle.

3. A gear shifting and throttle control unit as set forth in claim 2, wherein said control member is rigidly connected to said handle and is provided with an arcuate slot therein having extremities spaced from the connection of said member with said handle and substantially diametrically opposed relative to the latter, said first bearing means being disposed within said slot and movable relative thereto between the extremities thereof.

4. A gear shifting and throttle control unit as set forth in claim 3, wherein is included second bearing means mounted on said member spaced from said connection and proximal to one of said extremities of said slot, said second bearing means disposed within said aperture of said second lever and engageable with the peripheral edge of the latter.

5. A gear shifting and throttle control unit as set forth in claim 4, wherein said slot is provided with a pair of spaced, opposed, substantially semi-circular inner edges, said first bearing means engaging said edges of said slot when said member is moved from a first, foward gear position corresponding to said handle being swung in one direction to a second reverse gear position corresponding to said handle swung in the opposite direction.

6. A gear shifting and throttle control unit as set forth in claim 5, wherein said first bearing means comprises a first roller rotatably mounted on said first lever, said first roller being proximal to one extremity of the slot and said first lever being in a throttle open location when said member is in said first position and said first roller being proximal to the other extremity of the slot and said first lever being in said throttle open location when said member is in said second position, said first lever being in a throttle closed location when said first roller is substantially midway between said extremities.

7. A gear shifting and throttle control unit as set forth in claim 6, wherein said aperture is provided with a first and second portion each having a pair of spaced sides, said second bearing means comprising a second roller rotatably mounted on said member, said second roller being disposed within said first portion in engagement with the sides of the latter when said handle is in said neutral position, said second roller being movable into said second portion into engagement with one of the sides of the latter when said member is moved toward said first position thereof, said second roller being movable into said second portion and into engagement with the other of said sides of the latter when said member is moved toward said second position thereof.

8. The gear shifting and throttle control unit as set forth in claim 7, wherein said support comprises a flat plate adapted to be mounted uprightly on said boat; said levers being mounted on one face of said plate proximal to the upper margin of the latter and depending therefrom to swing in substantially vertical arcs, said member being disposed between said levers and connected with said handle at a point spaced below the ends of said levers mounted on said support.

9. The gear shifting and throttle control unit as set forth in claim 8, wherein said one end of said second lever being vertically aligned with the connection of said member with said handle.

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