April 2, 1963 C. W. BUDDO 3,083,587

SINGLE LEVER OPERATING CONTROLS

Filed Sept. 24, 1959

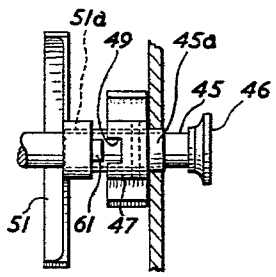


FIG. 4

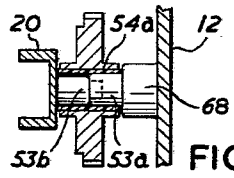


FIG. 5

FIG. 1

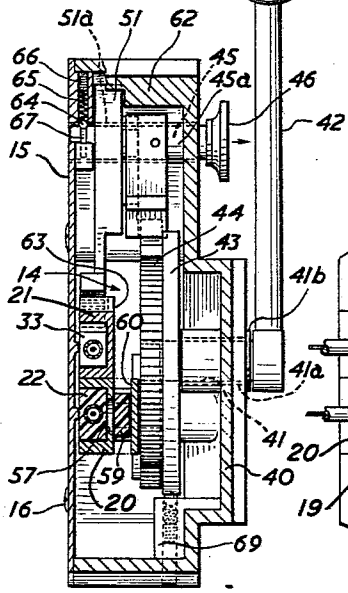


FIG. 2

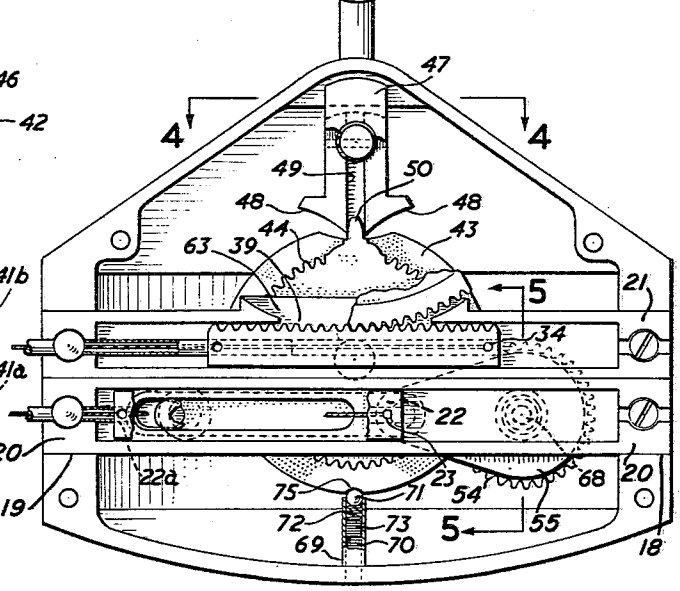


FIG. 3

INVENTOR
CHARLES W. BUDDO

BY: Maybee & Legris
ATTORNEYS

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SINGLE LEVER OPERATING CONTROLS

Charles W. Buddo, Toronto, Ontario, Canada, assignor to Charles Whitney Buddo Limited, Toronto, Ontario, Canada, a corporation

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6 Claims. (Cl. 74—471)

This invention relates to single lever operating controls for two operating leads of the type having telescoped inner and outer parts which are relatively movable.

In the co-pending application filed jointly by Charles W. Buddo, Wilfred M. Maybee and Richard C. Maybee on October 31, 1958, Serial No. 771,025, now United States Patent No. 2,933,943 there is described a single lever operating control which is particularly adapted for use as a remote control of an outboard motor of a boat. The present invention is concerned with the improvement of certain structural features of the type of control described in said United States Patent No. 2,933,943.

An object of the invention is to provide a single lever operating control which is simple to manufacture and which uses a relatively small number of component parts.

It is a further object of the invention to provide a single lever operating control for an outboard motor of a boat which may be adapted for mounting on either of the port or starboard sides of the boat without requiring special adaptors and by merely changing the positions of certain parts of the control.

The invention will now be described by way of example with reference to the accompanying drawings, in which like reference numerals indicate like parts throughout the several views, and in which:

FIGURE 1 is a rear elevation of an operating control according to the invention, for an outboard motor of a boat, with part of the housing removed and with part of the mechanism cut away to show the structure thereof, in this view the control is arranged for mounting on the port side of a boat,

FIGURE 2 is a transverse section on the line 2—2 of FIGURE 1 and with the housing completed,

FIGURE 3 is a view similar to FIGURE 2 but showing the control arranged for mounting on the starboard side of a boat,

FIGURE 4 is a horizontal section on the line 4—4 of FIGURE 3 but showing parts in disengaged relation, and

FIGURE 5 is a section on the line 5—5 of FIGURE 3.

Referring now to the drawings, the control includes a housing indicated generally at 10 and comprising a first housing part 11 having a base 12 and a peripheral wall 13 upstanding from the base to define an enclosure 14. The housing also includes a second housing part 15, see FIGURE 2, secured to the free edge of the peripheral wall 13 by screws 16 received in threaded holes 17 of the first housing part.

Opposed portions of the peripheral wall 13 are provided with notches 18 and 19 in which are mounted first and second channel section guides 20 and 21. Each of the channel section guides has opposed walls and a bottom and is mounted in the notches so that the bottoms of the channels are spaced from the base 12 of the first housing part and so that the open sides of the channels face away from the base. The first housing part and the guides are conveniently made of metal by die casting. A first operating element 22 is mounted in the first lower guide 20 and is provided with a longitudinal bore 22*a* and a cable locking collar 23, see FIGURE 3, to secure to the element the inner part 24 of an operating lead having an outer part 25. The outer part 25 of the lead is provided at its end with a cylindrical boss 26 which fits within a cylindrical recess 27 at the end of the guide 20

to anchor the lead part; and with a sleeve 26*a* slidable in the bore 22*a*. A cylindrical recess 28 is provided at the other end of the guide 20 and screws 29 pass through holes to the bottoms of the recesses 27 and 28 and are received in threaded holes in the wall 13 to hold the guide in the notches 18, 19.

In a similar manner the ends of the second upper guide 21 are provided with cylindrical recesses 30 and 31 having holes in the bottoms thereof through which pass screws 32 which are received in threaded holes in the wall 13 and secure the second guide in position in the notches. A second operating element 33 is slidably mounted in the second guide 21 and is provided with a longitudinal bore 33*a* and with a cable locking collar 34 for securing thereto the inner part 35 of an operating lead having an outer part 36. The end of the outer part 36 is provided with a cylindrical portion 37 which fits within the recess 30 at the end of the guide to anchor the lead part and with a sleeve 37*a* slidable in the bore 33*a*. The second operating element 33 is in the form of a toothed rack having teeth 38. The second guide 21 has an aperture 39 in one wall thereof and the teeth 38 of the second operating element 33 face said aperture. The first and second operating elements 22, 33 are conveniently made from synthetic resin, e.g. nylon or polystyrene.

Rotatably mounted in a bay portion 40 of the base 12 is a main shaft 41 carrying an operating lever 42 at its outer end. The shaft rotates in a nylon bearing 41*a* received in the base and having an external flange 41*b*. Mounted on the main shaft 41 is a disc 43 and, concentric with the disc, a substantially complete gear wheel 44. The disc 43 and gear wheel 44 are conveniently formed from a single piece of nylon or the like. Rotatably mounted in registering bores in the base 12 and the second housing part 15 is a secondary shaft 45 which has an operating knob 46; also secured to the shaft is a Geneva cam member 47. The shaft 45 is held in nylon bearings in the base and second housing part, the bearing in the base being indicated at 45*a*. The Geneva cam member has wing surfaces 48 which co-operate with the peripheral surface of the disc 43 and also has a central channel 49 in which is received a projection 50 integral with the gear wheel 44. Freely mounted on the secondary shaft 45 by means of a nylon bearing 51*a* is a toothed quadrant 51 having teeth 52 which mesh with the teeth 38 on the second operating element 33, the teeth 38 and 52 are enabled to mesh by virtue of the aperture 39 in the wall of the second guide 21. The Geneva cam member 47 and the quadrant 51 are conveniently made from metal by die casting.

Composite shaft 53, comprises part 53*a* upstanding from base 12 of the first housing part mating with a second part 53*b* depending from the first guide 20 (FIG. 5). Mounted on shaft 53 is a gear wheel 54 which meshes with the gear wheel 44 on the main shaft 41. Integral with the gear wheel 54 is a crank arm 55 which carries at its free end a pivot pin 56. The first guide 20 is provided with a slot 57 in the bottom or back thereof and the first operating element is provided with a movable pivot pin 58 which projects through the slot 57; the pivot pin is bored transversely to pass the sleeve 26*a*. A link 59 is pivotally interposed between the pivot pin 56 on the crank 55 and the pivot pin 58 on the first operating element 22; the link has an elongated slot 59*a* which embraces the pivot pin 58. An offset or cranked plate 60 is secured to the first guide 20 and has a portion lying opposite to the slot 57 to hold the link 59 so that the slot 59*a* is in engagement with the pivot pin 58. The link 59 is conveniently made of nylon and the plate 60 and pivots

pins 56 and 58 of metal. The gear wheel 54 is supported on the shaft 53 by a nylon bearing 54*a*.

The toothed quadrant 51 and the Geneva cam 47 are provided with disengageable interengaging means. These consist in part of the channel 49, and in part of a rib 61 (FIG. 4) on the quadrant 51 which fits into the central channel 49 on the Geneva cam member. The quadrant 51 is prevented from moving towards the base 12 by supporting means consisting of a lug 62, see FIGURE 2, on the first housing part and also by an extension 63 on the bottom of the second guide opposite to the aperture 39 on which the quadrant rests. The secondary shaft 45 is a sliding fit in the bearing 51*a* of the quadrant 51 and therefore the Geneva cam member 47, which is secured to the shaft 45, may be pulled towards the base 12 to disengage the rib 61 of the quadrant from the central channel 49 of the cam member. The second housing part is provided with a detent, consisting of a ball 64, a spring 65 and a screw 66, see FIGURE 2. The shaft 45 is provided with a peripheral groove 67 which normally receives the ball 64 as shown in FIGURE 2 in which position the quadrant 51 and the cam 47 are interconnected for rotation.

Upstanding from the base 12 of the first housing part is a second shaft part 68 which may co-operate with the shaft part 53*b* to form an alternative shaft for the gear 54 as shown in FIGURE 3.

A rib 69 springs from the lower portion of the peripheral wall 13 and is drilled to provide a bore 70. In the bore are mounted a ball 71, a spring 72 and a set screw 73. Three notches 74, 75, 76 (see FIG. 1) are provided in the periphery of the disc 43 for engagement by the detent provided by the ball 71. The notches 74 and 76 are positioned about 90° from notch 75 to coact with the detent at full throttle positions and the notch 75 coacts with the detent when the lever 42 is in its neutral position as shown in the drawing.

The operation of the arrangement shown in FIGURES 1 and 2 is as follows: The lever 42 is shown in its neutral position, if it is moved towards the right in FIGURE 1 the ball 71 will be forced out of the notch 75 and the gear wheel 44 will revolve. The projection 50 will turn the Geneva cam member 47 until the left hand wing surface 48 thereof comes into contact with the peripheral surface of the disc 43. The movement of the Geneva cam member will be transmitted through the rib 61 and the central channel 49 to the toothed quadrant 51 which in turn will move the second operating element 33. Movement of the operating element 33 will operate the operating lead 35, 36.

Moreover, as the gear wheel 44 revolves it will revolve the gear wheel 54 and turn the crank arm 55 from its dead center position shown in FIGURE 1. Movement of the crank arm will move the link 59. The elongated slot 59*a* is dimensioned so that the Geneva cam will have been turned until its wing surface engages the periphery of the disc 43 before the right hand end of the slot 59*a* contacts the pivot pin 58 and begins to move the first operating element 22. As the operating element 22 is moved it will then move the inner part 24 of the operating lead 24, 25.

The operating lead 35, 36 may be connected to the gear shift of an outboard motor and the operating lead 24, 25 may be connected to the throttle of the outboard motor. It will thus be seen that the gear of the motor will be engaged before the throttle is opened. If the operating lever 42 is moved in the opposite direction a similar operation will occur except that the second operating element 33 will move in the opposite direction. At full throttle position after movement of the lever to the right in FIGURE 1 the notch 76 will be engaged by the detent ball 71. The lever is thus releasably held in full throttle forward position.

If it is desired to advance the throttle without engaging the gear then the Geneva cam member 47 can be disengaged from the toothed quadrant by moving the secondary shaft 45 to the right in FIGURE 2 by pulling on the knob 46 and causing the ball 64 to ride up out of the groove 67. In this position of the parts, although the projection 50 of the wheel 44 still engages the Geneva cam member 47, any motion acquired by the cam member will not be passed on to the quadrant since the rib 61 will be withdrawn from the channel 49 and therefore the throttle may advance without moving the gear shift.

It is a feature of the invention that the control can be used on either side of a boat without special modifications. For operation on the port side of a boat, the gear wheel 54, its associated crank arm 55 and the first guide 20 are assembled in the relative positions shown in FIGURE 1. For operation on the starboard side of a boat, the parts are assembled in the positions shown in FIGURE 3, i.e. the gear wheel 54 and its crank arm 55 are mounted on the shaft part 68 and the first lower guide 20 and its associated operating element 22 are turned end for end. It will be seen that the guide 20 may be placed in the notches 18, 19 in either of two opposed orientations, one of the orientations being shown in FIGURE 1 and the other of the orientations being shown in FIGURE 3.

The positions of the parts are changed as follows, assuming that the parts are in the position shown in FIGURE 1, the first and second housing parts 11 and 15 are separated and the operating leads 35, 36 and 24, 25 are disconnected from their associated operating elements 33 and 22 and the leads and elements removed. As the operating element 22 is lifted out it will bring with it the pivot pin 58 which is attached to the element. The screws 29 and 32 are then loosened and the guides 20 and 21 are removed from the notches 18, 19. The link 59 is disconnected from the pivot pin 56 on the crank arm 55. The gear wheel 54 and crank 55 are then removed from the shaft part 53*a* and placed upon the shaft part 68 in the dead center position shown in FIGURE 3 and the link 59 is again connected to the pivot pin 56. The guides 20 and 21 are then replaced in the first housing part with the guide 20 in its opposite orientation so that the slot 57 is to the left of the housing in FIGURE 3 rather than to the right of the housing as in FIGURE 1, the plate 60 is arranged back of the link 59 and the shaft part 53*b* on guide 20 (FIG. 5) co-operates with the shaft part 68. The operating elements 20, 22 are then replaced in the guides and the leads are reconnected with the cylindrical bosses 26, 37 being received in the cylindrical recesses 28 and 31 instead of in the cylindrical recesses 27 and 30; the pivot pin will engage in the slot 59*a* of the link 59.

The operation of the arrangement shown in FIGURE 3 is identical to that shown in FIGURE 1 except that at full forward throttle the detent ball 71 is engaged in the notch 74.

It will be seen that the invention provides an operating control comprising a small number of parts which are easy to manufacture and assemble. Accurate machining is not necessary; the metal parts may be die cast and the parts of synthetic resin may also be cast, e.g. of nylon. As has been mentioned above, disc 43 and gear wheel 44; the first and second operating elements and the link 59 may all be made of nylon, while the guides 20, 21, the Geneva cam member 47, the quadrant 51, the gear wheel 54 and crank 55 and the plate 60 may be die cast from metal. In the construction described there is no metal to metal contact between relatively moving parts. Thus the shafts 41 and 45, the quadrant 51 and the gear wheel 54 are all supported in nylon bearing 41*a*, 45*a*, 51*a* and 54*a* respectively. Moreover the metal Geneva cam contacts the nylon disc 43; the nylon gear 44 meshes with the metal gear 54; the nylon link 59 engages the metal pins 56 and 59 and the metal surfaces of the guide 20 and the plate 60; the nylon operating elements 22 and 33 contact the metal

guides 20 and 21; and finally the metal quadrant 51 meshes with the nylon rack teeth 38. This lack of metal to metal contact is an especially advantageous feature in an outboard motor control since it gives the control good resistance against damage and seizing due to corrosion incident upon prolonged exposure to the weather.

The engagement of the detent ball 71 with one of the notches 74 or 76 at full forward throttle is a safety factor for water-skiing and similar sports where the engine is run at full throttle and the vibration tends to cause the throttle to close, which is undesirable, so that it is normally necessary to hold the throttle in the fully open positoin. Most outboard motors have a throttle detent at an economy setting and further notches could be provided in the disc 43 for engagement with the ball 71 at this setting since the detent on the engine does not always hold the throttle in the desired position.

The operating control is also versatile in that it may be mounted on either side of a boat when being used for an outboard motor without any special or additional parts. All that is required to change the control from being suitable for mounting on one side of the boat to be suitable for mounting on the other side is to rearrange some of the parts as hereinbefore described.

It will be understood that the form of the invention herewith shown and described is a preferred example and that various modifications may be carried out without departing from the spirit of the invention or from the scope of the appended claims.

What I claim as my invention is:

1. A single lever operating control for two operating leads of the type having telescoped inner and outer parts which are relatively movable; the control comprising a first housing part having a base and a peripheral wall upstanding from the base to define an enclosure; separate first and second channel section guides, each having opposed walls and a bottom, mounted between opposed portions of the peripheral wall in spaced relation to the base and with the open sides of the channels facing away from the base, the first guide being reversible so as to be mounted between said opposed portions in either of two opposite orientations and having a slot in the bottom of its channel adjacent to one end of the guide; first and second operating elements slidably mounted in the first and second guides respectively; means on each operating element for securing the inner part of one of said leads; means adjacent to ends of the guides to anchor the outer parts of said leads; a second housing part secured against said peripheral wall and retaining the operating elements in the channels in the guides; an operating lever journalled for rotation in the housing to either side of a neutral position; and mechanism in said enclosure and interposed between the lever and said elements to move the elements sequentially when the lever is moved from its neutral position, said mechanism including a pair of spaced alternative mounts on said first housing part to support a crank, a crank rotatably supported on one of the mounts between the base and the first guide, and releasable interconnecting means between the crank and the first operating element and passing through said slot; and wherein, when the first guide is in one of said orientations, said slot is located to pass the interconnecting means when the crank is supported on one of said mounts whereas, when the first guide is in the other of said orientations, said slot is located to pass the interconnecting means when the crank is supported on the other of said mounts.

2. A single lever operating control according to claim 1, wherein the interconnecting means includes a pivot pin on the first operating element and projecting through said slot, and a link pivotally interconnected between the crank and the pivot pin; and wherein a cranked plate is secured to the first guide, a portion of the plate lying opposite to the slot and spaced between the guide and the base to support the link in engagement with said pivot pin.

3. A single lever operating control according to claim 2, including gear teeth on said crank, a gear wheel meshing with said gear teeth and rotatably mounted on the base for rotation by the lever, said gear wheel, said operating elements and said link all being formed of one of a metal and a synthetic resin and said guides, said crank and said pivot pin being made of the other of a metal and a synthetic resin.

4. A single lever operating control for two operating leads of the type having telescoped inner and outer parts which are relatively movable; the control comprising a first housing part having a base and a peripheral wall upstanding from the base to define an enclosure; first and second channel section guides, each having opposed walls and a bottom, mounted between opposed portions of the peripheral wall in spaced relation to the base and with the open sides of the channels facing away from the base, the second guide having an aperture in one wall thereof and an extension of the bottom of the channel opposite to the aperture; first and second operating elements slidably mounted in the first and second guides respectively, the second element being in the form of a toothed rack, the teeth of which face said aperture; means on each operating element for securing the inner part of one of said leads; means adjacent to ends of the guides to anchor the outer parts of said leads; a second housing part secured against said peripheral wall and retaining the operating elements in the channels in the guides; an operating lever journaled for rotation in the housing to either side of a neutral position; and mechanism in said enclosure interposed between the lever and said elements to move the elements sequentially when the lever is moved from its neutral position, said mechanism including a toothed quadrant meshing with the teeth of the rack through said aperture, supporting means on the first housing part to support the quadrant, said extension and said supporting means preventing movement of the quadrant towards the base, a driving member rotatably mounted on the base to rotate in response to rotation of the lever and movable towards and away from the base, and disengageable interengaging means on the member and quadrant which are disengaged by moving the member towards the base and away from the quadrant.

5. A single lever operating control for two operating leads of the type having telescoped inner and outer parts which are relatively movable; the control comprising a first housing part having a base and a peripheral wall upstanding from the base to define an enclosure; separate first and second channel section guides, each having opposed walls and a bottom, mounted between opposed portions of the peripheral wall in spaced relation to the base and with the open sides of the channels facing away from the base; the first guide being reversible so as to be mounted between said opposed portions in either of two opposite orientations and having a slot in the bottom of its channel adjacent to one end of the guide, the second guide having an aperture in one wall thereof and an extension of the bottom of the channel opposite to the aperture; first and second operating elements slidably mounted in the first and second guides respectively, the second element being in the form of a toothed rack, the teeth of which face said aperture; means on each operating element for securing the inner part of one of said leads; means adjacent to ends of the guides to anchor the outer parts of said leads; a second housing part secured against said peripheral wall and retaining the operating elements in the channels in the guides; an operating lever journalled for rotation in the housing to eithr side of a neutral position; and mechanism in said enclosure and interposed between said lever and said elements to move the elements sequentially when the lever is moved from its neutral position, said mechanism including a pair of spaced alternative mounts on said first

housing part to support a crank, a crank rotatably supported on one of the mounts between the base and the first guide, releasable interconnecting means between the crank and the first operating element and passing through said slot; when the first guide is in one of said opposite orientations, said slot being located to pass the interconnecting means when the crank is supported on one of said mounts whereas, when the first guide is in the other of said orientations, the slot is located to pass the interconnecting means when the crank is supported on the other of said mounts; a toothed quadrant meshing with the teeth of the rack through the aperture, supporting means on the first housing part to support the quadrant, said extension and said supporting means preventing movement of the quadrant towards the base, a driving member rotatably mounted on the base to rotate in response to rotation of the lever and movable towards and away from the base, and disengageable interengaging means on the member and quadrant which are disengaged by moving the member towards the base and away from the quadrant.

6. A single lever operating control according to claim 5, wherein the interconnecting means includes a pivot pin on the first operating element and projecting through said slot, and a link pivotally interconnected between the

crank and the pivot pin; and wherein a cranked plate is secured, to the first guide, a portion of the plate lying opposite to the slot and spaced between the guide and the base to support the link in engagement with said pivot pin.

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