April 28, 1959 J. F. MORSE 2,884,109

SINGLE LEVER OUTBOARD MOTOR CONTROL

Filed May 23, 1958 3 Sheets-Sheet 1

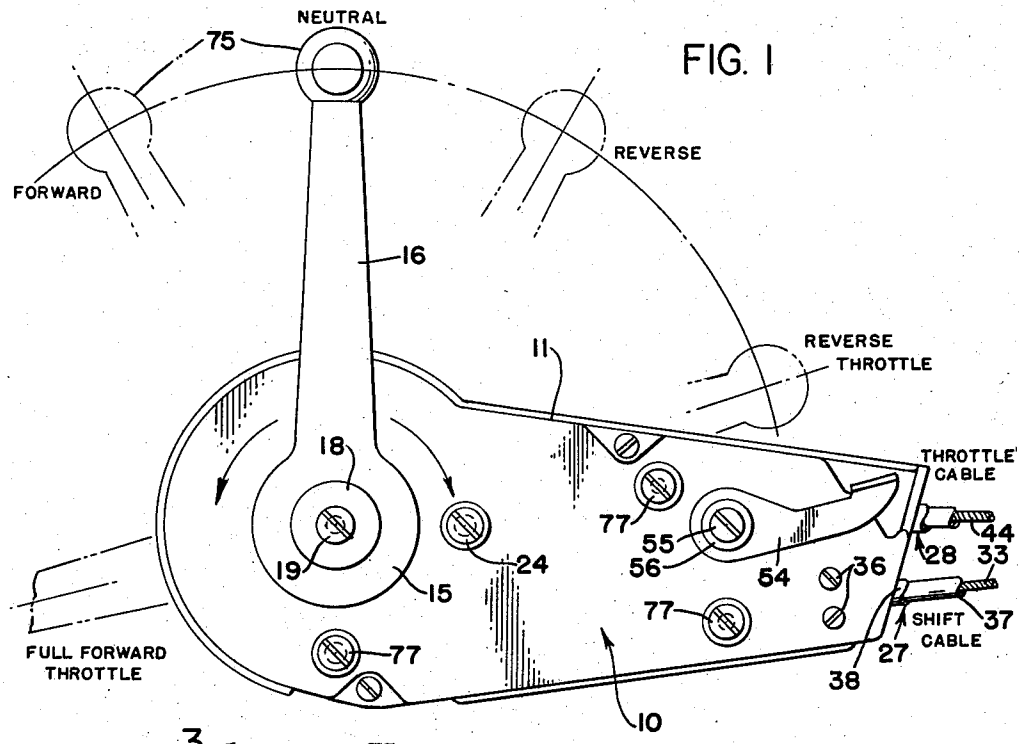


FIG. 1

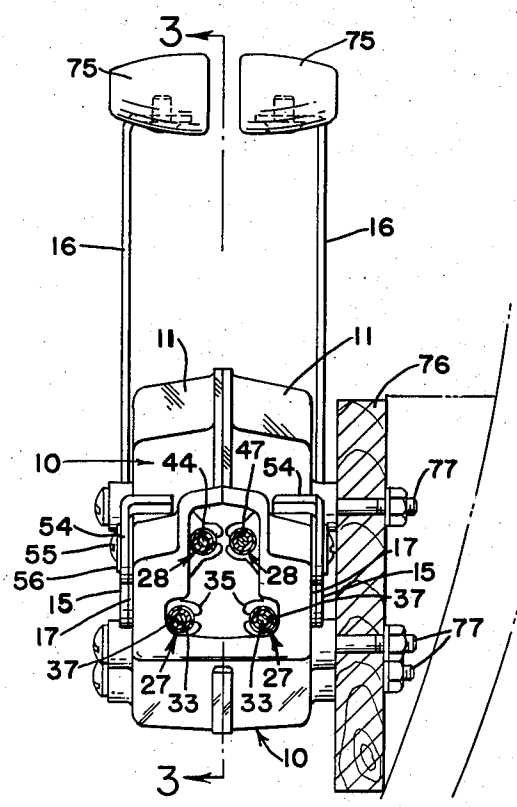


FIG. 2

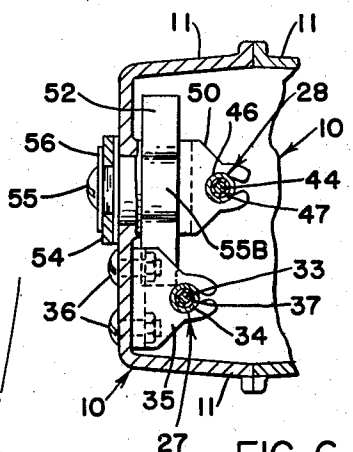


FIG. 6

INVENTOR.
JOHN F. MORSE
BY Cleveland, Frye & Hamilton
ATTORNEYS

April 28, 1959 J. F. MORSE 2,884,109

SINGLE LEVER OUTBOARD MOTOR CONTROL

Filed May 23, 1958 3 Sheets-Sheet 2

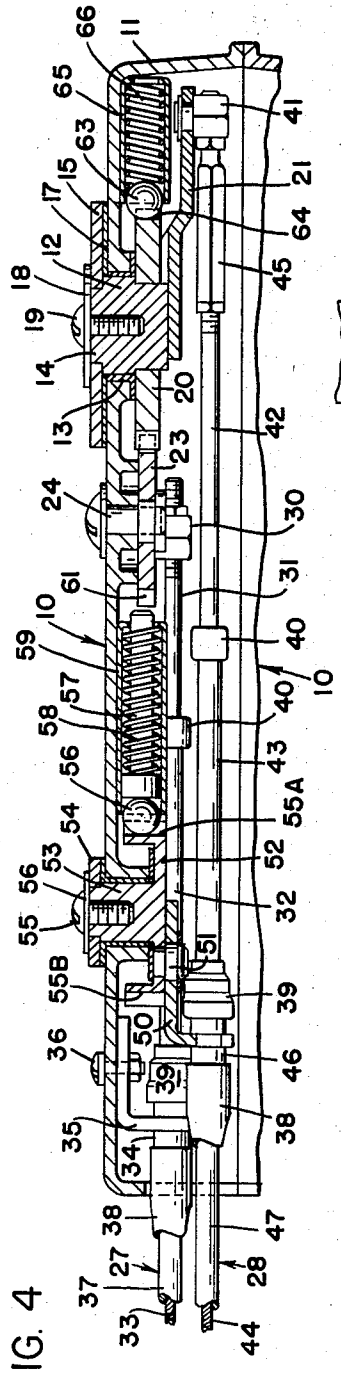


FIG. 4

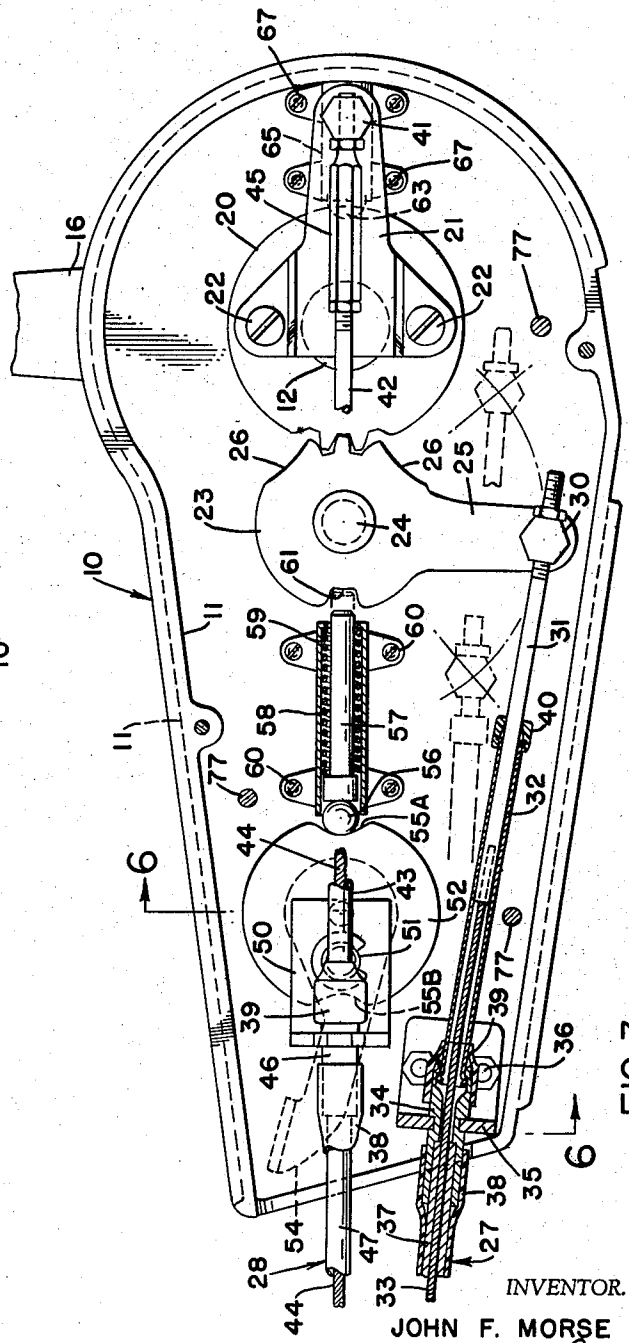


FIG. 3

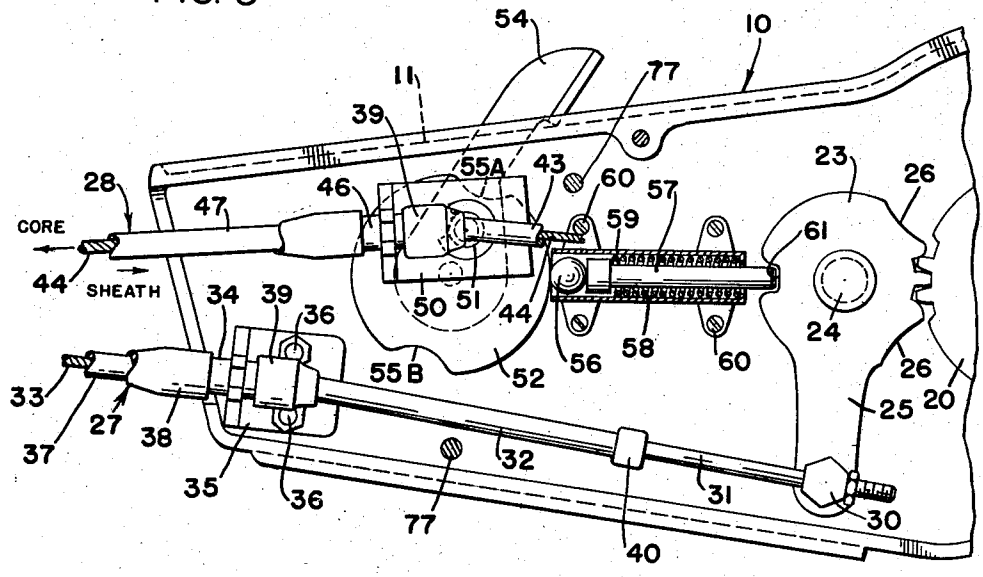
INVENTOR.
JOHN F. MORSE
BY Clay, Fryer & Hamilton
ATTORNEYS

April 28, 1959 J. F. MORSE 2,884,109

SINGLE LEVER OUTBOARD MOTOR CONTROL

Filed May 23, 1958 3 Sheets-Sheet 3

FIG. 5



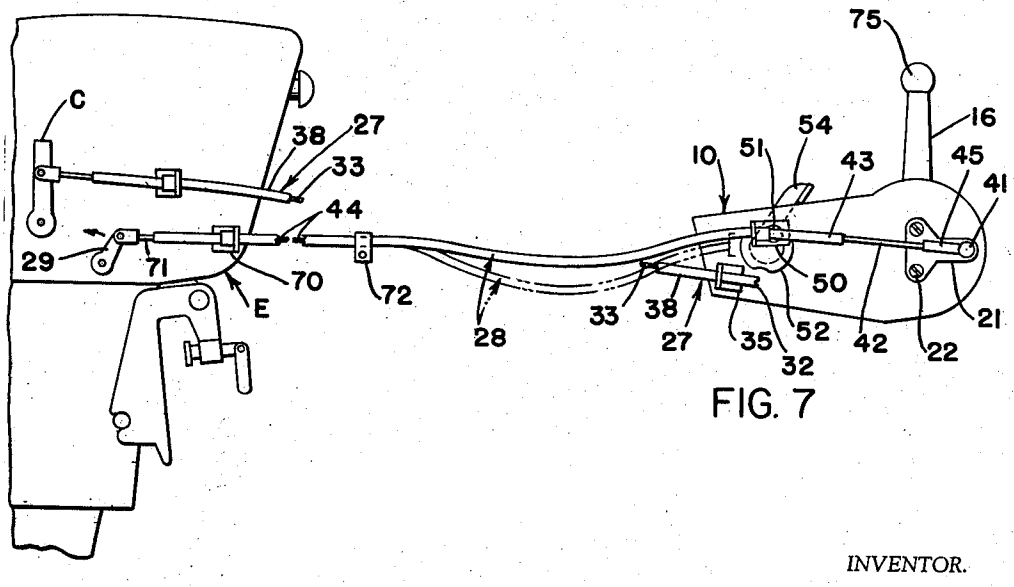


FIG. 7

INVENTOR.
JOHN F. MORSE
BY Elg, Fryer & Hamilton
ATTORNEYS

United States Patent Office 2,884,109 Patented Apr. 28, 1959

2,884,109

SINGLE LEVER OUTBOARD MOTOR CONTROL

John F. Morse, Hudson, Ohio

Application May 23, 1958, Serial No. 737,314

15 Claims. (Cl. 192—.098)

The invention relates generally to single lever controls for marine engines, and more specifically to an improved single lever remote control for an outboard marine engine.

Outboard marine engines must be designed for operation by inexperienced operators, and a single lever control for such engines is desirable because of its simplicity and ease of operation. A satisfactory single lever control has three basic functions to perform: (1) it must shift the engine to forward or reverse while moving through a shift range, without materially advancing the throttle; (2) it must open the throttle a desired amount when moved beyond the shift range in either direction through a throttle range; and (3) it should allow some opening of the throttle without shifting for starting and warming up the engine.

Outboard engines are frequently provided with interlocking devices to prevent excessive throttle opening in neutral or in entering the shift range but it is desirable to remove such devices when the engines are operated by remote single lever controls in order to minimize the loads on the control lever. When this is done positive means must be provided in the control to limit the throttle opening in neutral, and also in the reverse shift range since excessive speeds in reverse are dangerous as well as unnecessary.

It is an important object of the present invention to provide an improved single lever control for outboard engines which performs the foregoing basic functions, and which has novel means to limit the throttle opening in the neutral position of the lever.

Another object is to provide a self-contained control unit of extremely thin construction and adapted to be easily paired with a like unit for controlling twin engines with one hand.

A further object is to provide a novel neutral throttle mechanism within the control unit for opening the throttle a predetermined limited amount in the neutral position of the control lever.

A still further object is to provide a novel interlock between the neutral throttle mechanism and the single lever control mechanism which permits operation of the neutral throttle mechanism only when the control lever is in neutral position, and which prevents operation of the control lever when the neutral throttle mechanism is advancing the throttle.

These and other objects are accomplished by the improvements comprising the present invention, a preferred embodiment of which is shown by way of example in the accompanying drawings, and described in detail herein. Various modifications and changes in details of construction are comprehended within the scope of the invention as set forth in the appended claims.

In the present invention the motion of the control lever is transmitted to the clutch and throttle of the engine by push-pull cables, and as the control lever moves through the shift range it moves the core of one cable in either direction to engage the clutch in forward or reverse,

while movement of the lever in either direction into the throttle range moves the core of the other cable in one direction to advance the throttle. With the control lever in neutral position a limited amount of throttle advance is accomplished by providing auxiliary means moving the casing of the throttle cable in the opposite direction to the normal throttle opening movement of the core.

Referring to the drawings:

Fig. 1 is a front elevation of the improved control unit with the control lever and neutral throttle mechanism in neutral position, various other positions of the control lever being shown in phantom lines.

Fig. 2 is a rear end elevation of two of the improved control units of opposite hand assembled as a pair for controlling twin engines and mounted in a boat.

Fig. 3 is an inside elevation of one of the units, parts being broken away and in section, with the control lever and neutral throttle mechanism in neutral position.

Fig. 4 is a plan sectional view of the unit shown in Fig. 3.

Fig. 5 is a fragmentary inside elevation similar to Fig. 3, showing the advanced position of the neutral throttle mechanism in full lines.

Fig. 6 is a vertical sectional view substantially on line 6—6 of Fig. 3.

Fig. 7 is a schematic view illustrating the manner in which the neutral throttle mechanism advances the throttle a limited amount by applying a reverse movement to the casing of the throttle cable.

The casing 10 has a closed front plate with a rearwardly extending peripheral flange 11 forming an open rear side adapted to mate with a similar casing of opposite hand in the manner shown in Fig. 2. The operating shaft 12 extends laterally through the forward end portion of the casing and is journaled in a bearing bushing 13 therein. The outer portion 14 of shaft 12 is squared and has the inner end plate 15 of the main single control lever 16 keyed thereon. A thrust washer 17 may be interposed between the plate 15 and the casing 10, and the plate is held on the squared end of the shaft by a washer 18 and screw 19.

The inner end of shaft 12 has an interrupted or intermittent gear plate 20 secured thereon, as by brazing or staking, and an offset throttle arm 21 is attached to the inner face of the gear plate by screws 22 and extends forwardly therefrom at right angles to the upright neutral position of the lever 16. The gear plate 20 in neutral position meshes with an intermittent shifting gear plate 23 mounted for rotation on a stud 24 extending into the casing.

As shown, the gear 23 is of smaller pitch than gear 20, and in this embodiment is designed so that a 30° movement of gear 20 in either direction from neutral will rotate the gear 23 through 45° in the opposite direction. However, the relative pitches of the two gears may be changed as desired. A shifting arm 25 is secured to gear 23 and extends downwardly therefrom. In order to minimize the overall thickness of the unit to better adapt it for mating with another unit of opposite hand, the shifting arm is made integral and co-planar with the gear 23.

When the gear 20 is rotated beyond the 30° movement in either direction, the gear segment on gear 20 becomes unmeshed from the gear segment on gear 23, so that the arm 25 remains at its 45° position on either side of neutral. However, one of the arcuate faces 26 of gear 23 rotatively engages the circular edge of gear 20 as it continues to rotate, so that the arm 25 is maintained in its 45° position. The arm 25 is connected by a push-pull cable 27 to the usual shift lever or clutch lever C of an outboard engine, and the arm 21 is connected by a push-pull cable 28 to the throttle lever 29 (Fig. 7) of the

engine. These cables are of the "swivel-end" type, in which the end of the cable casing is rigidly mounted on the control unit, and an extension of the cable swivels on the bracket to compensate for the arcuate motion or the shifting and throttle arms.

As shown, the outer end of shifting arm **25** has a swivel connection **30** with the end of a push rod **31** which telescopes within a sleeve **32** and is secured to the end of the core **33** of push-pull cable **27**. The opposite end of the sleeve **32** has a swivel connection permitting limited swinging thereof in the front end of a mounting bushing **34** secured in a clip **35** anchored to the inner surface of the front casing plate by bolts **36**. The rear end of the bushing **34** is swaged or otherwise secured to the casing or sheath **37** of cable **27**. A rubber or neoprene covering **38** may be provided over cable sheath **37** as a moisture seal. Resilient sleeves **39** and **40** may be provided at the joint between the bushing **34** and sleeve **32**, and around the forward end of the sleeve **32**, respectively.

The outer end of throttle arm **21** has a swivel connection **41** with the end of a push rod **42** which telescopes within a sleeve **43** and is secured to the end of the core **44** of push-pull cable **28**. Preferably, an extension rod **45** is provided between the push rod **42** and swivel connection **41** so that by removing the extension the arm **21** can be reversed or turned 180° for connection with a pull rod for operating the throttle, without changing the position of shaft **12**.

The sleeve **43** has a swivel connection with the front end of a mounting bushing **46** which is identical with the mounting bushing **34** and the rear end of the bushing **46** is secured to the sheath **47** of cable **28** in the same manner as bushing **34** is secured to the sheath **37** of cable **27**. Resilient sealing sleeves **39** and **40** are provided at the joints, in the same manner as in connecting cable **27**.

The mounting bushing **46** is secured in a swiveling clip **50** which is swiveled on a pin **51** eccentrically mounted in a plate **52** which has a concentric shaft extension **53** journaled in the front plate of casing **10**, and the shaft has a squared end on which an auxiliary throttle lever **54** is keyed. The lever **54** is held on the shaft by means of a screw **55** and a washer **56**.

Preferably, the plate **52** is substantially circular and has two diametrically opposite detent notches **55A** and **55B**. In the neutral position of the throttle arm **21**, as shown in Fig. 3, the notches **55**, **55A**, **55B** and eccentric pin are aligned and in the plane of the push rod **42** connected to the throttle arm **21**. The detent notch **55A** receives a spring-biased ball **56** in the neutral position of the throttle arm, and the notch **55B** is provided to receive the ball if a pull rod is used for a pull-open throttle, in which case the plate **52** is reversed as well as the throttle arm **21**.

The ball **56** is yieldingly pressed against the plate **52** by a plunger **57** urged by a spring **58**. The casing **59** for the spring and plunger may be secured to the inside of the casing **10** by screws **60**. The forward end of the plunger projects through the sleeve, and when the plate **52** is rotated and the ball rides out of the detent notch, the forward end of the plunger enters a notch **61** in the gear **23** in the neutral position of the control lever **16** as shown in Fig. 5.

Accordingly, in the position of Fig. 5, wherein the plate **52** has been rotated by turning the lever **54**, the gear **23** is locked in neutral position, and the control lever **16** cannot be operated until the plate **52** is returned to the neutral position of Fig. 3 to retract the plunger from the notch **61** in gear **23**. Conversely, if the control lever is moved out of neutral position, thus moving the notch **61** out of alignment with plunger **57**, the auxiliary throttle lever **54** is locked in the idle position of Fig. 3 because the plunger cannot be extended to allow the ball **56** to ride out of detent notch **55A**.

Preferably, the control lever **16** is yieldingly held in neutral position by a spring-biased ball **63** received in a detent notch **64** in the gear **20**. As shown in Fig. 3, the casing **65** for the spring **66** is attached to the front plate of casing **10** by screws **67**.

When the control lever **16** is rotated 30° from neutral in either direction with the lever **54** in the idle position of Fig. 3, the shifting arm moves the swivel connection **30** through 45° in the opposite direction to either of the phantom positions shown in Fig. 3. In this range the push rod **31** and core **33** to which it is connected moves the shifting lever of the engine to fully engage the clutch of the engine in forward or reverse. In this range the 30° movement of the throttle arm **21** on its arc causes very slight displacement of the push rod **42** and cable core **44** because the arm **21** and push rod are swinging in the same general direction on different arcs. This slight displacement of the push rod is normally absorbed by the backlash in the cable and in the throttle linkage in the motor, without causing any advance of the throttle.

Further movement of the control lever beyond 30° into the forward or reverse throttle range causes sufficient displacement of the push rod **42** to progressively advance the throttle.

Referring to Fig. 7, with the lever **54** in its idle position, and the sheath of cable **28** secured at one end to the clip **50** on the control unit and at the other end to a clip **70** on the engine E, movement of the throttle lever beyond the shift range exerts sufficient displacement of push rod **42** to correspondingly displace the push rod **71** connected to the throttle lever **29** on the engine.

If it is desired to advance the throttle of the engine sufficiently to start or warm up the engine without entering the shifting range, the control lever **16** is left in neutral as shown in Fig. 3, while the auxiliary lever **54** is moved forwardly toward the position of Fig. 5. As lever **54** is moved forwardly, the eccentric pin **51** is rotated by plate **52** forwardly and upwardly and carries with it the clip **50** and the mounting bracket **46** secured to the cable sheath **47**, pulling the sheath forwardly.

As shown in Fig. 7, some slack is provided in cable **28** between the clip **50** and the first clip **72** secured to the cable two or three feet to the rear. Accordingly, when the cable sheath is pulled forwardly by the throttle lever **54** the slack in the cable is partly taken up as indicated by the dotted lines, and since the core is held rigid at the forward end by push rod **42**, a differential rearward movement of the core is exerted on the throttle lever **29** to advance the throttle.

The total amount the throttle can be advanced by movement of the lever **54** can be predetermined by the amount of eccentricity of the pin **51**, and this should be limited to a small percentage of full throttle opening to prevent excessive speeds of the engine in neutral. The forward movement of the lever **54** is limited by engagement of the flanged end of the lever with the housing flange **11** as indicated in Figs. 2 and 3.

If a pull-open type of throttle is used, the arm **21** and plate **52** are rotated through 180° as previously described, and rotation of plate **52** moves the eccentric pin **51** on the forward side of the shaft **53**. The relative position of lever **54** is kept the same by replacing it on the squared end of the rotated shaft **53**. Forward movement of the lever **54** will then rotate the pin **51** downwardly and rearwardly, causing a rearward push on the cable sheath and a differential pull on the throttle lever.

As shown in Figs. 2, 4 and 6, because of the arrangement and construction of the various parts, and particularly the one-piece construction of the shifting gear **23** and arm **25**, the thickness of the unit is greatly minimized so that a pair of units can be mounted back-to-back for controlling twin engines. The handles **75** on the control levers **16** are turned toward each other so that they can be grasped and operated together with one hand, as seen in Fig. 2.

When two of the control units are placed back-to-back, as in Fig. 2, they may be mounted on a mounting pad

76 in a boat indicated in phantom lines by mounting bolts 77.

Since excessive speed in reverse is not desirable, the reverse movement of control lever 16 in the throttle range is limited by engagement of the handle 75 with the top of the casing 10, as indicated in Fig. 1.

The normal operation of the improved unit by means of the single lever control shifts the engine into forward or reverse and advances the throttle when the lever is moved beyond the shifting range in either direction. The novel auxiliary throttle mechanism provides for a limited advance of the throttle while the single lever control is in neutral, and the interlocking mechanism prevents operation of the auxiliary throttle except when the control lever is in neutral position, and prevents operation of the control lever while the auxiliary throttle is being operated.

What is claimed is:

1. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, means movably mounting said clip on said housing, and means for moving said mounting means to move said clip in a direction substantially opposite to the direction of movement of the cable core normally caused by said throttle arm.

2. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, means pivotally mounting said clip on said housing, and means for moving said pivot means relative to said throttle arm to move said cable casing in a direction substantially opposite to the direction of movement of the cable core normally caused by said throttle arm.

3. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, a plate rotatably mounted in said housing, means pivotally mounting said clip eccentrically on said plate, and means for rotating said plate to move said casing clip in a direction substantially opposite to the direction of movement of the cable core normally caused by said throttle arm.

4. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, a shaft journaled in said housing, means eccentrically mounting said casing clip on said shaft, and a lever on said shaft to swing said casing clip in a direction substantially opposite to the direction of movement of the cable core normally caused by said throttle arm.

5. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, means movably mounting said clip on said housing, means for moving said mounting means to move said clip in a direction substantially opposite to the direction of movement of the cable core normally caused by said throttle arm, and detent means yieldingly holding said clip mounting means stationary during operation of the cable core by said throttle arm.

6. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, a plate rotatably mounted in said housing, means pivotally mounting said clip eccentrically on said plate, means for rotating said plate to move said casing clip in a direction substantially opposite to the direction of movement of the cable core normally caused by said throttle arm, and detent means yieldingly holding said plate stationary during operation of the cable core by said throttle arm.

7. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, means movably mounting said clip on said housing, means for moving said mounting means to move said clip in a direction substantially opposite to the direction of movement of the cable core normally caused by said throttle arm, and interlocking means preventing movement of said clip mounting means when the clutch control arm is not in neutral position, said interlocking means being operated by movement of said clip mounting means to lock the clutch control arm in neutral position.

8. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, means pivotally mounting said clip on said housing, means for moving said pivot means relative to said throttle arm to move said cable casing in a direction substantially opposite to the direction of movement of the cable core normally caused by said throttle arm, and interlocking means preventing movement of said clip mounting means when the clutch control arm is not in neutral position, said interlocking means being operated by movement of

said pivot means to lock the clutch control arm in neutral position.

9. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, a plate rotatably mounted in said housing, means pivotally mounting said clip eccentrically on said plate, means for rotating said plate to move said casing clip in a direction substantially opposite to the direction of movement of the cable core normally caused by said throttle arm, and interlocking means operated by rotation of said plate to lock the clutch control arm in neutral position.

10. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, a shaft journaled in said housing, means eccentrically mounting said casing clip on said shaft, a lever on said shaft to swing said casing clip in a direction substantially opposite to the direction of movement of the cable core normally caused by said throttle arm, and interlocking means operated by rotation of said shaft to lock the clutch control arm in neutral position.

11. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, means movably mounting said clip on said housing, detent means yieldingly holding said mounting means stationary, means for moving said mounting means to move said clip in a direction substantially opposite to the direction of movement of the cable core caused by operation of said throttle arm, and said detent means having an element actuated by movement of said clip mounting means to lock the clutch arm in neutral position.

12. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control arm and a clutch control arm operatively connected thereto for rotation only during the first portion of rotation of the throttle control arm, said arms adapted for connection to the cores of push-pull cables for operating the throttle and clutch of the engine, auxiliary throttle mechanism for operating the throttle when said throttle control arm is in neutral position comprising a mounting clip for attachment to the casing of said throttle cable, a plate rotatably mounted in said housing, means pivotally mounting said clip eccentrically on said plate, detent means yieldingly holding said plate stationary, means for rotating said plate to move said casing clip in a direction substantially opposite to the direction of movement of the cable core caused by operation of said throttle arm, said detent means having an element operated by rotation of said plate to engage the clutch control arm and lock said clutch control and throttle control arms in neutral position, and the engagement of said clutch control arm with said detent element acting to prevent rotation of said plate when said arms are moved out of neutral position.

13. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control shaft and a clutch control shaft, said shafts adapted for operating the throttle and clutch of the engine by means of push-pull cables having their casings secured at one end to said housing, said throttle control and clutch control shafts having inter-engaging rotatable elements thereon whereby said clutch control shaft is rotated only during the first part of rotation of the throttle shaft in either direction from neutral, and lever arms on said rotatable elements for connection to the cores of said cables, at least one of said lever arms being integral and co-planar with the element to which it is connected.

14. In a single lever control unit for an outboard engine, said control unit having a housing, a throttle control shaft and a clutch control shaft, said shafts adapted for operating the throttle and clutch of the engine and having their casings secured at one end to said housing, said throttle control and clutch control shafts having inter-engaging rotatable elements thereon whereby said clutch control shaft is rotated only during the first part of rotation of the throttle shaft in either direction from neutral, a lever arm mounted on said throttle control shaft for connection to the core of the throttle-operating cable, and a lever arm integral with the rotatable element on said clutch control shaft for connection to the core of the clutch-operating cable.

15. A single lever outboard engine control unit of minimum thickness adapted to be paired in back-to-back relation with a similar unit of opposite hand for twin engine control, said unit having a housing comprising a front plate and rearwardly extending flanges for abutting like flanges on said other unit, a throttle control shaft and a clutch control shaft journaled in said front plate, inter-engaging elements on said shafts whereby said clutch control shaft is rotated only during the first part of rotation of the throttle shaft in either direction from neutral, said elements abutting the inside of said front plate, lever arms associated with said throttle and clutch control shafts, at least one of said arms being integral and co-planar with said interengaging element on the shaft associated therewith, mounting clips on the inside of said front plate for securing push-pull cables adapted for connection to said throttle and clutch arms to operate the throttle and clutch of the engine.

References Cited in the file of this patent

UNITED STATES PATENTS

2,254,144	Higgins	Aug. 26, 1941
2,759,578	Manzolillo	Aug. 21, 1956