Aug. 2, 1960 D. W. WANER 2,947,191

SINGLE LEVER MARINE ENGINE CONTROL

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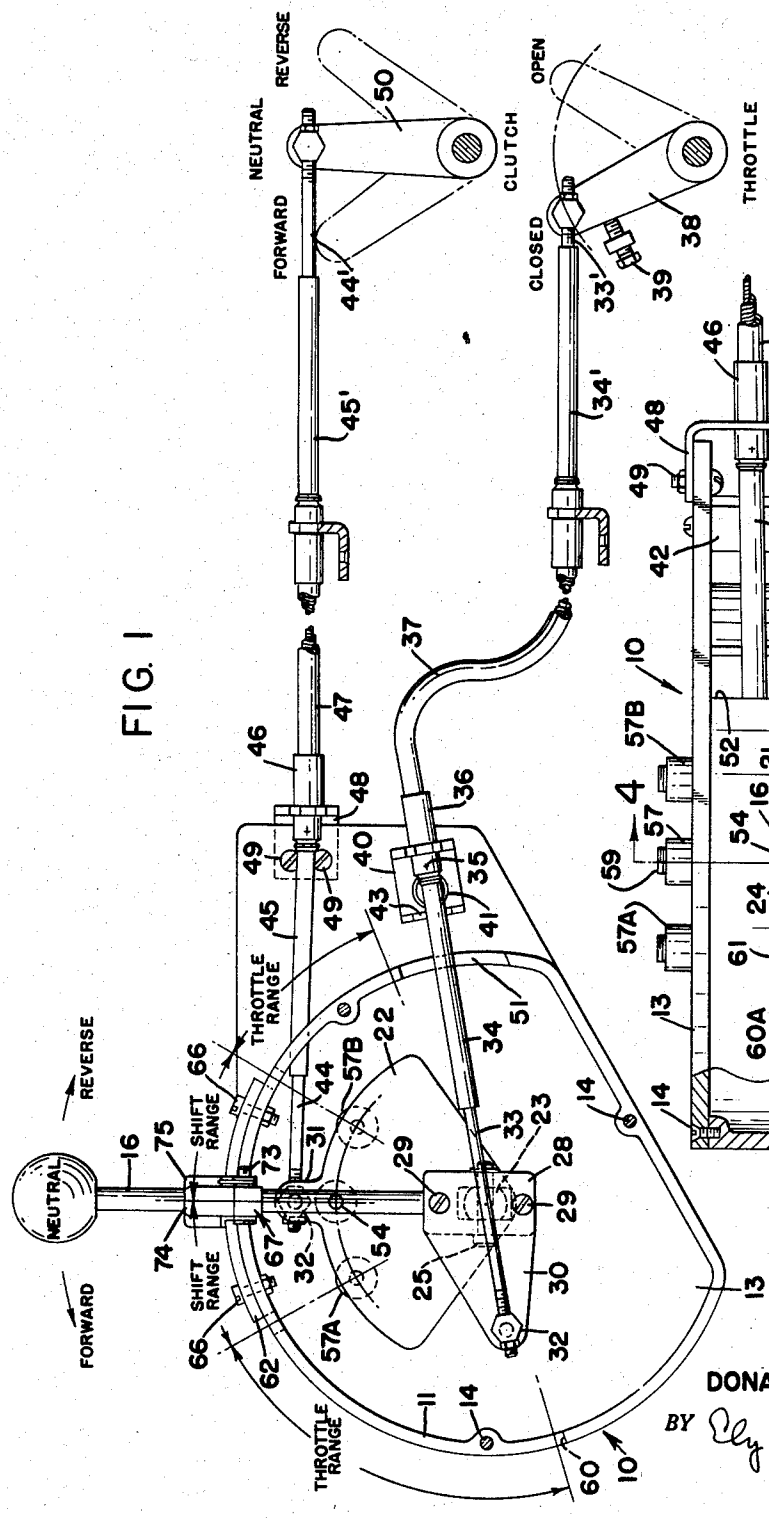


FIG. 1

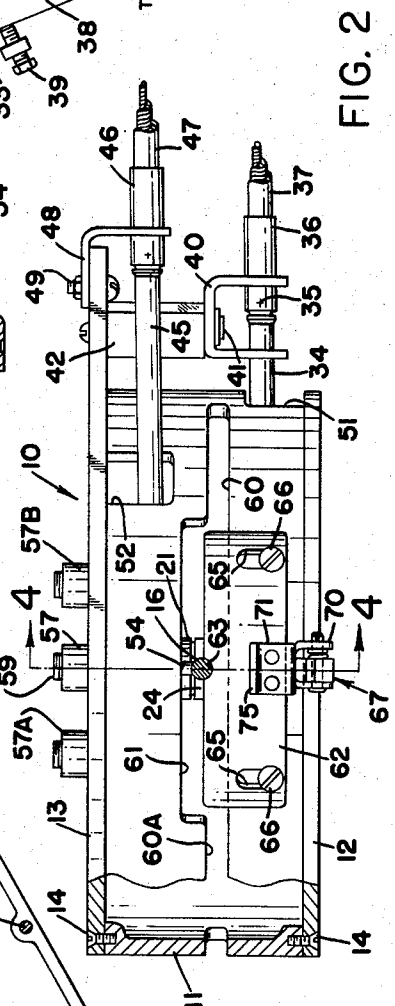

FIG. 2

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FIG. 3

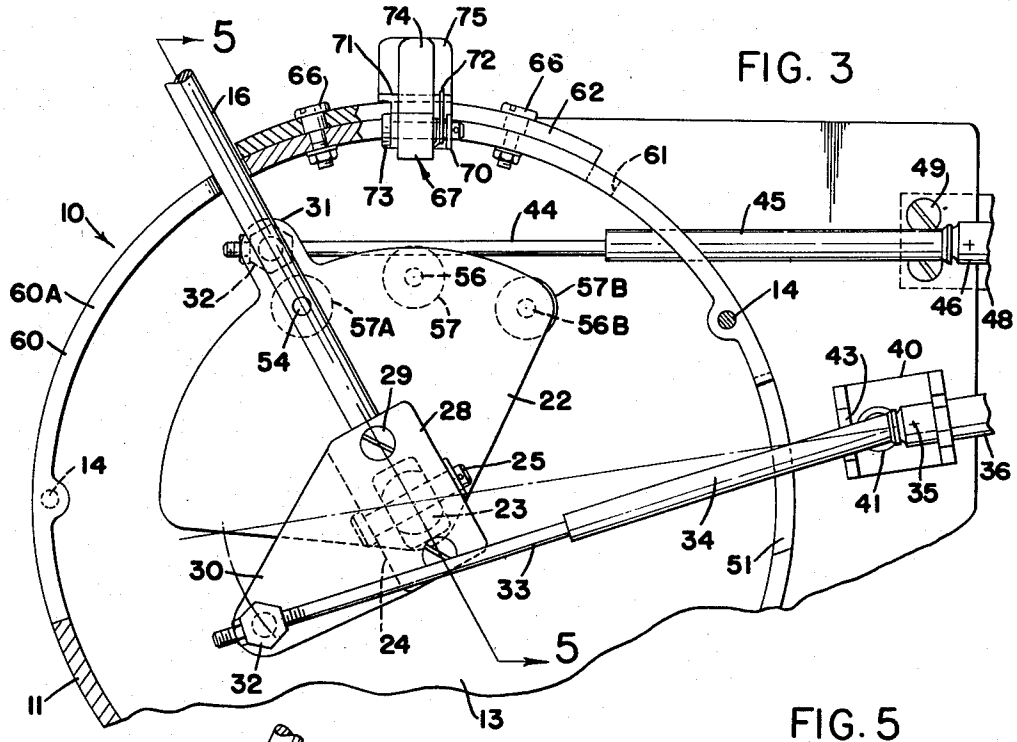


FIG. 5

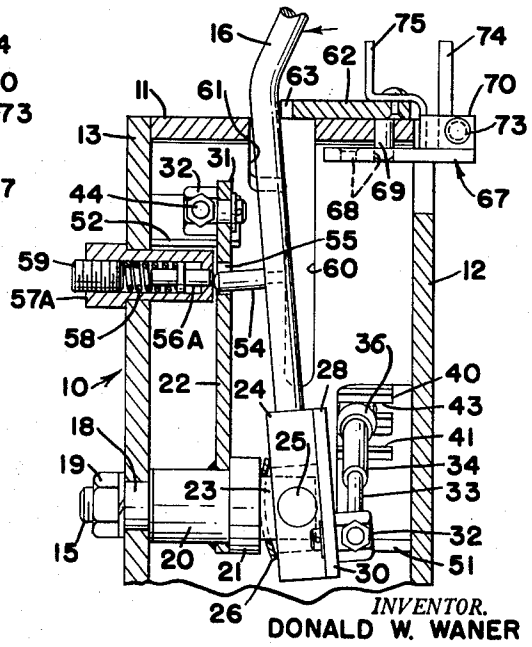


FIG. 4

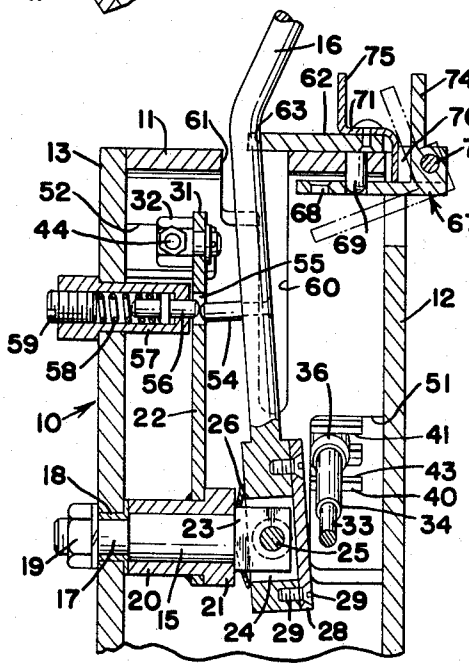


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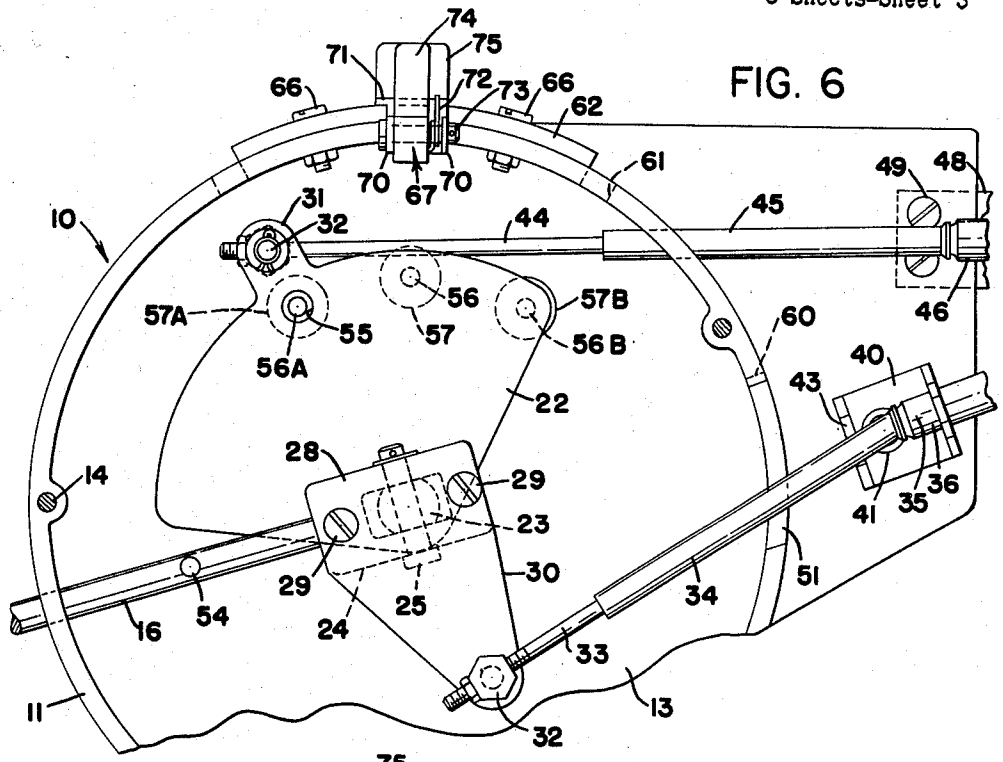
FIG. 6



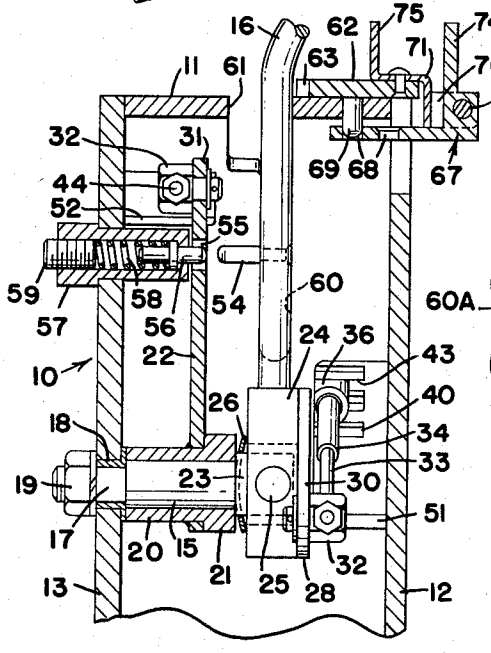
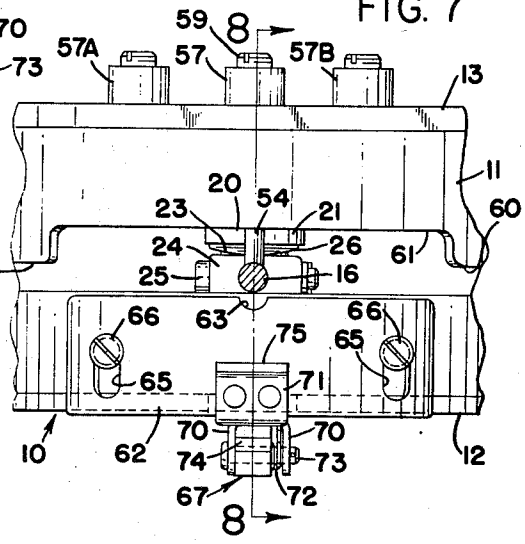




FIG. 8

FIG. 7

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2,947,191

# SINGLE LEVER MARINE ENGINE CONTROL

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15 Claims. (Cl. 74—471)

The invention relates generally to a single lever control for the clutch and throttle of an engine or for other mechanism requiring sequenching controls. The invention is particularly adapted for single lever controls for outboard marine engines, although it may be applied to inboard marine engines as well.

A single lever control is desirable for outboard marine engines, for example, because it is simple and easy to operate by inexperienced operators. Such a control has three major requirements: (1) ability to shift the engine to forward or reverse gear without materially advancing the throttle; (2) ability to open the throttle a desired amount in either direction beyond the shift range; and (3) permit opening the throttle in neutral position of the control for starting and warming up the engine.

In marine engine single lever controls, movement of the control lever forward from neutral first engages the clutch in forward position and then opens the throttle as the boat moves forward, while movement of the control lever rearward from neutral first engages the clutch in reverse position and then opens the throttle as the boat moves astern.

In certain prior conventional single lever controls, the throttle operating lever is directly connected to the control lever and the clutch operating lever is connected to the throttle operating lever by intermittent or interrupted gearing or similar mechanism. Such a mechanism is shown, for example, in Higgins U.S. Patent No. 2,254,144. This indirect drive to the clutch operating lever causes a substantial loss in efficiency as compared with a direct drive. Moreover, the type of linkage shown in said Higgins patent causes substantial opening movement of the throttle during the clutch-shifting movement of the control lever, and lost-motion connections are provided in the Higgins patent to absorb this initial movement of the throttle operating lever.

Another disadvantage of the type of linkage shown in said Higgins patent is that after the clutch has been fully engaged the initial opening movement of the throttle operating lever is too abrupt, causing too rapid acceleration of the engine. This makes it difficult to control engine speeds just above idling speeds, as most gasoline engines are very sensitive in this range to throttle adjustments.

The main purpose of the present invention is to provide an improved single lever control which satisfies the foregoing major requirements for single lever outboard engine controls, and which overcomes the disadvantages of prior conventional single lever controls.

More specifically, it is an object of the present invention to provide an improved single lever control which has a positive direct drive between the control lever and both the throttle operating and clutch operating levers.

Another object is to provide improved linkage connecting the control lever to the throttle mechanism, which linkage will minimize throttle movement during the clutch-shifting movement of the control lever, thereby



eliminating the need for a lost-motion connection or other compensating device.

A further object is to provide an improved single lever control which makes the initial opening movement of the throttle beyond the clutch-shifting range more gradual, resulting in finer throttle adjustment at low speeds.

The foregoing objectives are fully accomplished by the improvements comprising the present invention, without complicating the control mechanism, as embodied in a simply constructed and easily operated control. A preferred embodiment of the invention as applied to a single lever outboard engine control is shown by way of example in the accompanying drawings and described in detail herein. Other embodiments of the invention, including those applied to other engines or mechanisms requiring similar controls, are included in the scope of the appended claims, as are changes in details of construction and arrangement.

In the drawings:

Fig. 1 is a front elevational view, with the front cover plate removed, of a preferred embodiment of the improved single lever control latched in neutral position, showing schematically the throttle and clutch operating levers of the control connected by push-pull cables to the throttle and clutch control levers of the engine.

Fig. 2 is a plan view of the improved control in Fig. 1, partly in section.

Fig. 3 is an enlarged view similar to Fig. 1 partly in section, showing the control at the end of the forward shift range and the beginning of the forward throttle range.

Fig. 4 is a fragmentary sectional view on line 4—4 of Fig. 2.

Fig. 5 is a fragmentary sectional view on line 5—5 of Fig. 3.

Fig. 6 is a view similar to Fig. 3, showing the control at full forward throttle position.

Fig. 7 is an enlarged fragmentary plan view similar to Fig. 2, showing the control lever unlatched in neutral position to permit opening the throttle for starting and warm up.

Fig. 8 is a fragmentary sectional view on line 8—8 of Fig. 7.

In the embodiment shown in the drawings, the control unit includes a housing indicated generally at 10, having a substantially cylindrical side wall 11 and front and rear cover plates 12 and 13, respectively, attached to the side wall 11 by screws 14. Suitable means (not shown) may be provided for attaching the housing to a mounting pad or the like on the side of a boat or at the control station.

The rear mounting plate 13 has mounted therein a pivot post or shaft 15 (Fig. 4) for the control lever 16 which extends upwardly from the inner end of the post. Preferably, the shaft 15 has a shouldered portion 17 journaled in a bushing 18 in plate 13, the rear end of the shaft having a clamp nut 19 screwed thereon against the rear side of the plate. The front part of the shaft 15 is journaled in a sleeve bushing 20 having a shouldered portion 21 at its inner end. The apex of a quadrant plate 22 is secured on the bushing 20 against the back of the shouldered portion 21, as by welding.

The front end 23 of shaft 15 projects beyond the sleeve bushing 20, and is preferably flatted on opposite sides. The bottom end of the control lever 16 is provided with a rectangular socket 24 which fits over the end 23, and a pivot pin 25 extends through the end 23 and the sides of the socket 24 to permit limited rocking movement of the lever 16 in a front to back direction relative to the housing. Means is provided to yieldingly urge the upper end of the lever 16 outwardly toward cover plate 12, and

such means may comprise a dished resilient washer 26 between the socket 24 and portion 21 of the sleeve bushing.

On othe front side of the socket is a plate 28 secured thereto by screws 29, and having a triangular portion 30 extending to the left as viewed in Fig. 1, or forwardly of the control. The triangular portion 30 is the throttle operating arm or lever of the control unit. At the upper edge of the quadrant plate, opposite the apex to which the bushing 20 is connected, is an ear 31 which is connected to the clutch lever of the engine, and thus the quadrant plate is the clutch operating lever of the control unit.

The throttle operating lever and the clutch operating lever are connected to the throttle and clutch levers of the engine by suitable and well-known means, such as push-pull cables. As seen in Fig. 1, the throttle operating lever 30 has a swivel connection 32 with the forward end of a push rod 33 which telescopes in a sleeve 34 pivotally mounted at 35 in a bushing 36 in which the end of a cable 37 is mounted. The push rod 33 is secured to the core of the cable for transmitting motion to a similar push rod 33' secured to the remote end of the cable core and telescoped within a sleeve 34' in which the remote end of the cable is mounted. The push rod 33' is connected to the throttle lever 38 of the engine, and an adjustable idle limit stop 39 is preferably provided on the engine for abutting the lever 38 in closed position.

Since the pivot connection at 35 between sleeve 34 and bushing 36 permits only limited pivoting without binding between the cable core and its casing, the bushing 36 is preferably mounted in a U-shaped bracket 40 pivoted at 41 on a block 42 projecting outwardly from a rearward extension of cover plate 13. The forward leg of the bracket 40 has a notch 43 through which the sleeve 34 extends, so that when the sleeve swings due to rotation of the lever arm 30 it abuts one side or the other of the notch, and further swinging of the sleeve swivels the bracket 40 on its pivot 41 (Fig. 6) and prevents binding of the cable core in its casing.

The clutch operating lever or plate 22 has a swivel connection 32 with the forward end of a push rod 44 which telescopes in a sleeve 45 pivotally mounted in the forward end of a bushing 46 in which the forward end of a cable 47 is mounted. The bushing 46 is preferably mounted in an angle bracket 48 secured to the extension of cover plate 13 by bolts 49. Since the push rod 44 and sleeve 45 swing through a small arc it is not necessary to swivel the bracket 48 on the plate 13.

The push rod 44 is secured to the core of cable 47 at its forward end for transmitting motion to a similar push rod 44' secured to the remote end of the cable core and telescopsed within a sleeve 45' in which the remote end of the cable is mounted. The push rod 44' is connected to the clutch lever 50 of the engine. The push rod sleeves 34 and 45 extend through slots 51 and 52, respectively, in the side wall 11 of the housing.

The control lever 16 is selectively connected to the quadrant plate 22 for rotating the plate about the shaft 15 as a center during the shift range. Preferably, a pick-up pin 54 extends rearwardly from the control lever for entry into a hole 55 provided in the mid peripheral portion of plate 22. As shown in Figs. 1 and 4, in the neutral position of the plate 22 and control lever 16, the hole 55 is aligned with the pin 54 so that pushing the upper end of the control lever toward the rear plate 13 against the yielding pressure of spring washer 26 enters the pin 54 into the hole 55 in the plate. A spring plunger pin 56 mounted behind the plate 22 on the plate 13 also registers with the hole 55 in the neutral position of plate 22, and abuts the end of pin 54.

The pin 56 is preferably movably mounted in a housing sleeve 57 secured in the plate 13, and the front end of the pin projects from the housing and is urged outwardly by a compression spring 58 adjustably contained in the housing by a screw 59. When the pin 56 is entered into the hole 55, the pin prevents rotation of the plate about the shaft 15, but by pushing the lever 16 farther inward, the pin 54 pushes the pin 56 out of the hole 55, as shown in Fig. 5, so that the plate may be rotated with the lever 16.

Similar spring plunger pins 56A and 56B are mounted in housing sleeves 57A and 57B, respectively, to register with the hole 55 at the ends of the forward and reverse shift range, and, as shown in Fig. 6, the pin 56A retains the plate 22 at the end of the forward shift range while the lever 16 is moved forward to move the throttle operating lever 30 to full open position. On returning the control lever 16 to neutral, it is pushed inwardly through hole 55 to disengage the pin 56A, as shown in Fig. 5, whereupon the plate 22 is returned with the lever 16 to the neutral position of Fig. 1.

Preferably, means is provided for guiding the control lever 16 as it is moved through the shifting and throttle range. Such means may comprise a circumferential slot 60 in the side wall 15 through which the control lever extends at all times. Opposite the shifting range of the control lever 16, the slot 60 is widened inwardly at 61 to allow the lever to be pushed inwardly far enough to cause the pin 54 selectively to disengage the pins 56, 56A and 56B from the plate 22, as indicated in Fig. 5, and a guide plate 62 is preferably mounted on the side wall 11 normally to hold the lever 16 substantially against the inner edge of the slot 61. A notch 63 may be provided in plate 62 to yieldingly retain the lever 16 in neutral position with the pins 54 and 56 projecting into the hole 55 in abutment with each other.

The guide plate 62 is slidable outwardly on the side wall 11 to the position shown in Figs. 7 and 8 to allow swinging the control lever through the widened portion 61 of the slot without moving the plate 22 from its neutral position of Fig. 1, so that the throttle can be moved to full open position without affecting the clutch for starting or warming up the engine. The plate 62 is preferably provided with two slots 65 receiving screw studs 66 secured in the wall 11, so that the guide plate can be moved from the position of Fig. 2 to the position of Fig. 8.

A locking plate or latch 67 is preferably provided to lock the plate 62 in either position. The latch 67 may extend under the wall 11 and has spaced holes 68 for receiving a pin 69 depending from wall 11, one hole for the position of Figs. 2 and 4, and the other hole for the position of Figs. 7 and 8. The latch is pivoted on bracket ears 70 extending outwardly from a clip 71 secured to the upper side of plate 62, and a torsion spring 72 around the pivot pin 73 urges the latch to the locking position. The latch 67 has an upwardly extending finger piece 74 to allow moving the latch to unlocked position as indicated in Fig. 4. The clip 71 also has an upwardly extending finger piece 75 to facilitate moving the plate 62 when the latch 67 is unlocked.

In the operation of the improved control unit, assuming that the guide plate 62 is pushed inwardly to its normal position of Figs. 2 and 4, and the control lever 16 is in neutral position in notch 63, as the lever 16 is moved forwardly or rearwardly out of the notch the inner edge of guide plate 62 pushes the lever inwardly and causes pick-up pin 54 to release pin 56 from the plate 22. As the lever 16 is swung forwardly, for example, about 30° to the end of portion 61 of the slot it rotates the plate 22 along with it and the push rod 44 transmits a pull to the engine clutch lever 50 to shift it into forward position. This swing of the lever 16 also rotates the throttle operating arm 30 about the shaft 15 as a center, but as seen in Fig. 3, the push rod 33 is displaced a very slight amount because the connection 32 is moved substantially along the tangent of an arc centered at the point 35 where the sleeve 34 pivots. Thus the throttle

lever 38 is not opened a substantial amount, and, moreover, the opening movement of the throttle is desirably gradual due to the substantially tangential movement of push rod connection 32.

When the lever 16 has reached the end of slot portion 61, it is moved into the forward portion 60A of slot 60 by the action of spring washer 26, and the pin 54 moves out of hole 55 and allows pin 56A to enter said hole and retain plate 22 in position. Further forward movement of the lever 16 to the position of Fig. 6 displaces the push rod 33 to move the throttle lever to full open position without changing the position of plate 22.

When the lever 16 is moved from neutral toward reverse the clutch lever 50 is first shifted to reverse position, and then further reverse movement of lever 16 moves the throttle lever 38 toward open position without disturbing plate 22. The reverse end of slot 60 need not be as long as the forward end because full open throttle is not needed in reverse. When the guide plate is moved outwardly to the neutral throttle position of Figs. 7 and 8, the control lever 16 may be swung without restriction from neutral position to open the throttle any desired amount for starting or warm up, while the clutch is held in neutral by engagement of pin 56 in hole 55 in plate 22.

The improved unit provides a direct positive drive between the control lever 16 and the push rod connected to the clutch lever, thus avoiding any loss of efficiency as results from gearing and the like. The throttle opening movement is minimized during the shifting range so that lost-motion compensating connections are not required, and the initial opening movement of the throttle is gradual, resulting in finer throttle adjustment at low speeds.

What is claimed is:

1. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft, pick-up means secured on said lever to selectively engage said clutch operating plate for rotating said plate with said lever, and means on said mounting plate to retain said clutch operating plate in neutral position, said retaining means releasable by said pick-up means.

2. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft and having a hole, a pick-up pin on said lever to enter said hole for rotating said plate with said lever, and means on said mounting plate to engage in said hole for retaining said clutch operating plate in neutral position, said retaining means releasable by said pick-up pin.

3. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft and having a hole, a pick-up pin on said lever to enter said hole for rotating said plate with said lever, and a spring-biased pin on said mounting plate to engage in said hole for retaining said clutch operating plate in neutral position, said spring-biased pin being releasable by abutment with said pick-up pin.

4. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft, pick-up means on said lever to selectively engage said clutch operating plate for rotating said plate with said lever, and means on said mounting plate to retain said clutch operating plate at neutral, forward and reverse positions, said retaining means at each position releasable by said pick-up means.



5. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft and having a hole, a pick-up pin on said lever to enter said hole for rotating said plate with said lever, and means on said mounting plate at neutral, forward and reverse clutch-shifted positions to retain said clutch operating plate, each of said retaining means being selectively releasable by said pick-up pin.

6. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft and having a hole, a pick-up pin on said lever to enter said hole for rotating said plate with said lever, and spring-biased pins on said mounting plate at neutral, forward and reverse clutch-shifted positions to retain said clutch operating plate, each of said spring-biased pins being releasable by abutment with said pick-up pin.

7. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft, pick-up means on said lever to selectively engage said clutch operating plate for rotating said plate with said lever, means on said mounting plate to retain said clutch operating plate in neutral position, said retaining means releasable by said pick-up means, and guide means to maintain said pick-up means engaged with said clutch operating plate and in position to release said retaining means only during the forward and reverse clutch shifting range.

8. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft and having a hole, a pick-up pin on said lever to enter said hole for rotating said plate with said lever, means on said mounting plate to engage in said hole for retaining said clutch operating plate in neutral position, said retaining means releasable by said pick-up pin, and guide means to maintain said pick-up pin in said hole and in position to release said retaining means only during the forward and reverse clutch shifting range.

9. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft and having a hole, a pick-up pin on said lever to enter said hole for rotating said plate with said lever, a spring-biased pin on said mounting plate to engage in said hole for retaining said clutch operating plate in neutral position, said spring-biased pin being releasable by abutment with said pick-up pin, and guide means to maintain said pick-up pin in said hole and in position to release said spring-biased pin only during the forward and reverse clutch shifting range.

10. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said

plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft, pick-up means on said lever to selectively engage said clutch operating plate for rotating said plate with said lever, means on said mounting plate to retain said clutch operating plate in neutral position, said retaining means releasable by said pick-up means, and guide means to maintain said pick-up means engaged with said clutch operating plate and in position to release said retaining means only during the forward and reverse clutch shifting range, said guide means being adjustable to disengage said pick-up means from said clutch operating plate during the forward and reverse clutch shifting range.

11. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft and having a hole, a pick-up pin on said lever to enter said hole for rotating said plate with said lever, means on said mounting plate to engage in said hole for retaining said clutch operating plate in neutral position, said retaining means releasable by said pick-up pin, and guide means to maintain said pick-up pin in said hole and in position to release said retaining means only during the forward and reverse clutch shifting range, said guide means being adjustable to disengage said pick-up pin from said hole during the forward and reverse shifting range.

12. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured to said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft and having a hole, a pick-up pin on said lever to enter said hole for rotating said plate with said lever, a spring-biased pin on said mounting plate to engage in said hole for retaining said clutch operating plate in neutral position, said spring-biased pin being releasable by abutment with said pick-up pin, and guide means to maintain said pick-up pin in said hole and in position to release said spring-biased pin only during the forward and reverse clutch shifting range, said guide means being adjustable to disengage said pick-up pin from said hole during the forward and reverse shifting range.

13. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured at one end to said shaft for axially rotating said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft, pick-up means on said control lever to selectively engage said clutch operating plate for rotating said plate with said lever, means on said mounting plate to retain said clutch operating plate at neutral forward and reverse positions, said retaining means at each position being releasable by said pick-up means, and guide means to maintain said pick-up means engaged with said clutch operating plate during the forward and reverse shifting range, said guide means being adjustable to disengage said pick-up means from said clutch operating plate.

14. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured at one end to said shaft for axially rotating said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft and having a hole, a pick-up pin on said control lever to enter said hole for rotating said plate with said lever, means on said mounting plate at neutral, forward and reverse clutch-shifted positions to retain said clutch operating plate, each of said retaining means being selectively releasable by said pick-up pin, and guide means to maintain said pick-up pin engaged with said clutch operating plate during the forward and reverse shifting range, said guide means being adjustable to release said pick-up pin from said hole during the forward and reverse shifting range.

15. A single lever control unit for the clutch and throttle lever of an engine and the like, comprising a stationary mounting plate, a pivot shaft journaled on said plate, a control lever rockably secured at one end to said shaft for axially rotating said shaft, a throttle operating arm connected to said shaft, a clutch operating plate journaled on said shaft and having a hole, a pick-up pin on said control lever to enter said hole for rotating said plate with said lever, and spring-biased pins on said mounting plate at neutral, forward and reverse clutch-shifted positions to retain said clutch operating plate, each of said spring-biased pins being releasable by abutment with said pick-up pin, and guide means to maintain said pick-up pin in said hole and in position to release said spring-biased pins only during the forward and reverse shifting range, said guide means being adjustable to disengage said pick-up pin from said hole during the forward and reverse shifting range.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 675,517 | Merrick et al. | June 4, 1901 |
| 2,227,696 | Blaylock | Jan. 7, 1941 |
| 2,388,079 | Rhodes | Oct. 30, 1945 |
| 2,588,650 | Morse | Mar. 11, 1952 |
| 2,613,547 | Stewart | Oct. 14, 1952 |
| 2,804,782 | Exleben | Sept. 3, 1957 |