Jan. 3, 1961 J. F. MORSE 2,966,969

THROTTLE OPERATING MECHANISM FOR SINGLE LEVER CONTROL

Filed Aug. 5, 1958 3 Sheets-Sheet 1

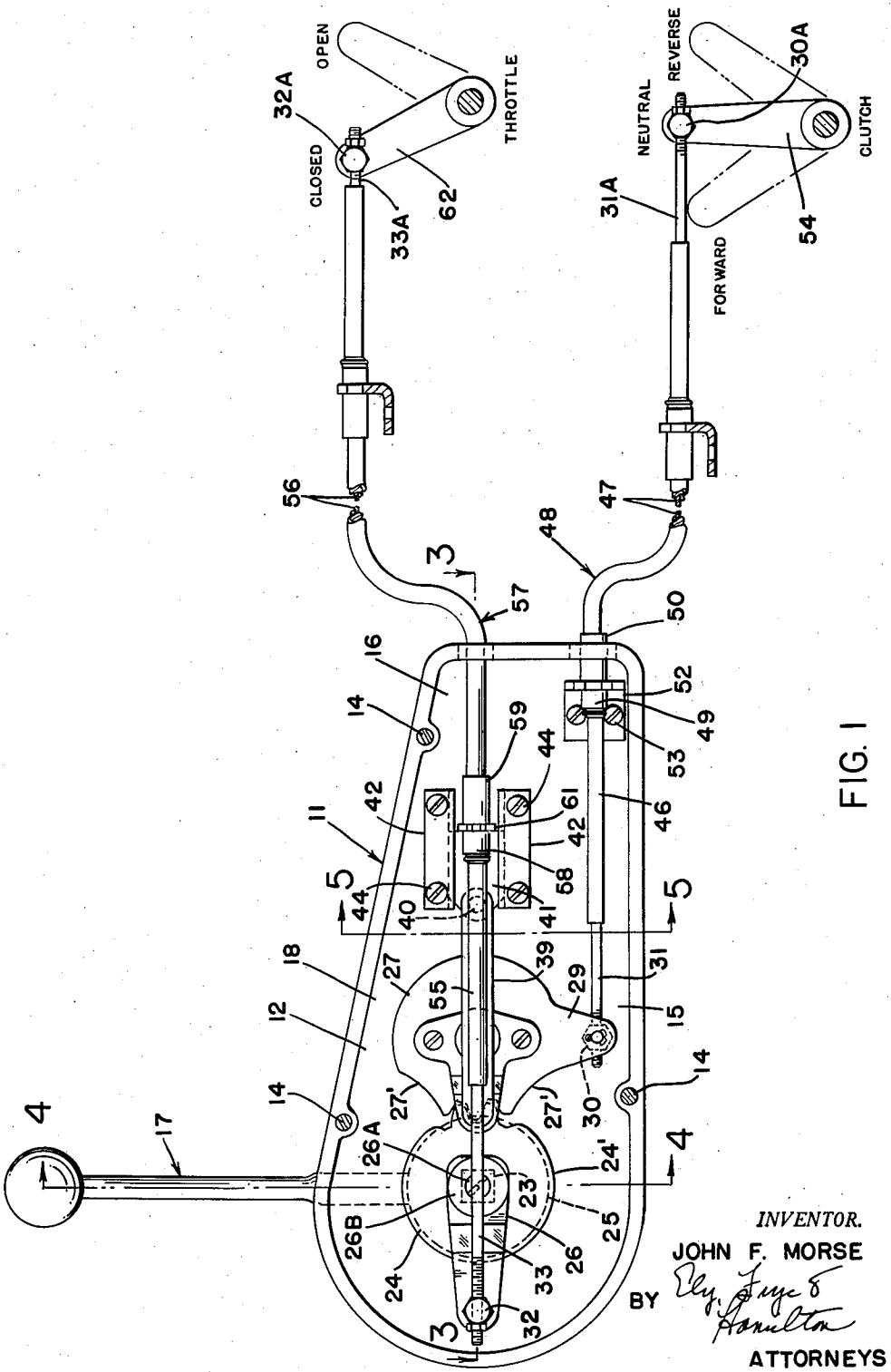


FIG. 1

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Filed Aug. 5, 1958 3 Sheets-Sheet 2

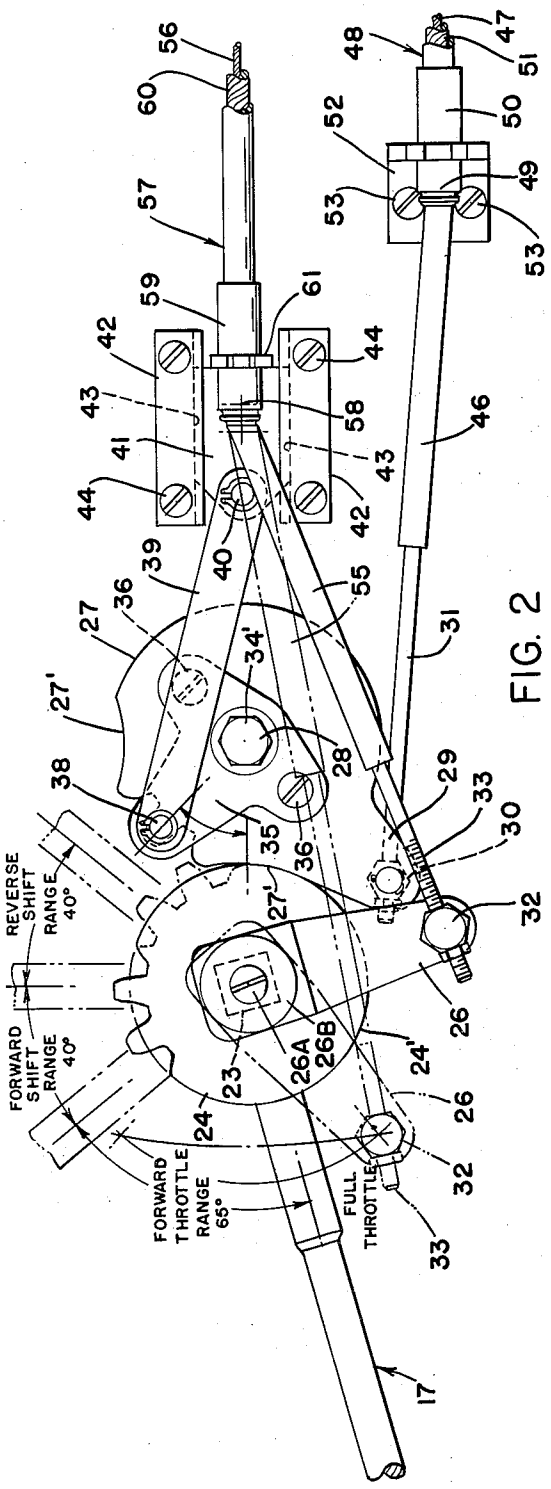


FIG. 2

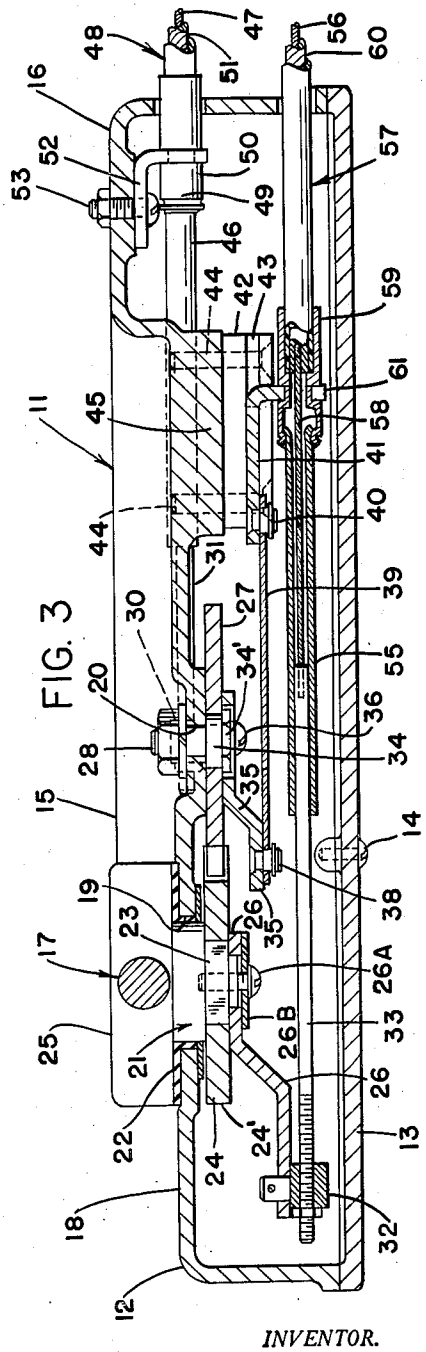


FIG. 3

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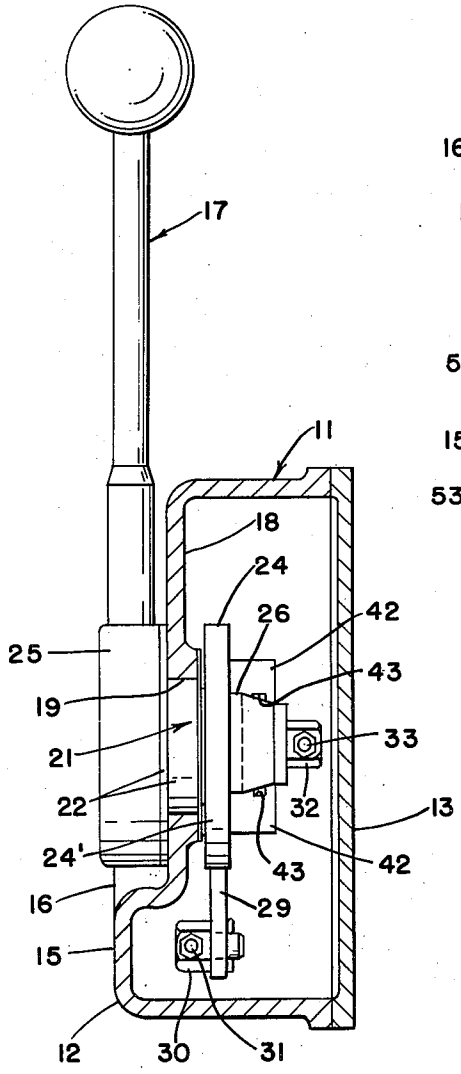


FIG. 4

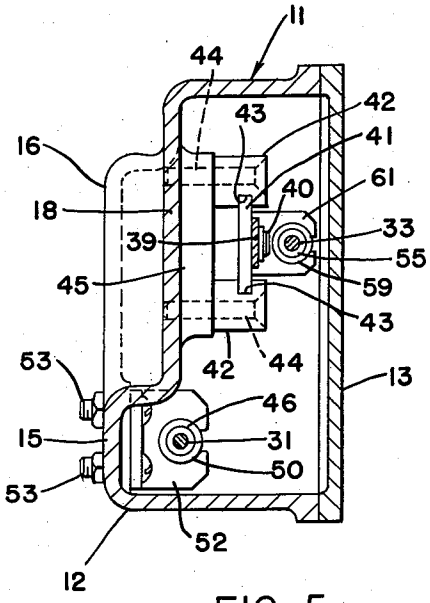


FIG. 5

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2,966,969

THROTTLE OPERATING MECHANISM FOR SINGLE LEVER CONTROL

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7 Claims. (Cl. 192—.098)

The invention relates generally to single lever control units for operating both the clutch and throttle of an internal combustion engine or other mechanism requiring sequencing controls. More particularly, the invention relates to an improved mechanism for operating the throttle of a marine engine in such manner as to eliminate throttle movement during the initial movement from neutral of the control lever, which is required to engage the engine clutch.

In certain types of single lever controls for marine engines, the clutch and throttle control arms are operatively connected by mechanism such as intermittent or interrupted gears so that movement of the control lever in either direction first engages the clutch, and then advances the throttle as the boat moves in either direction. The clutch and throttle control arms are connected to the engine clutch and throttle by linkages which may comprise push-pull cables, and as the control lever is rotated the control arms swing on arcs around their centers of rotation.

This arcuate movement of the throttle control arm during clutch engagement results in some displacement of the linkage attached thereto, and while the backlash in the push-pull cable system absorbs some of the displacement, a slight advance of the engine throttle may still take place as the clutch is being engaged, and the engine can not be driven at minimum forward or reverse speeds substantially at or slightly above idling speed.

Various mechanisms have been propsed for eliminating or minimizing the throttle advance during clutch engagement in a single lever control, but most of these mechanisms have been complicated and relatively expensive.

The purpose of the present invention is to provide an extremely simple and inexpensive throttle operating mechanism in a single lever control whereby no advance of the engine throttle takes place until the engine clutch is fully engaged in forward or reverse.

This object, and others which will appear from the following description, are accomplished by the parts, improvements, constructions and arrangements comprising the present invention, a preferred embodiment of which is shown by way of example in the accompanying drawings.

Referring to the drawings:

Fig. 1 is a rear side elevation of a single lever control unit with the cover plate removed, embodying the improved throttle operating mechanism, and showing the control lever in neutral position.

Fig. 2 is an enlarged schematic view similar to Fig. 1 showing the position of the trottle control mechanism at full forward in solid lines, and at the end of the forward shift range in phantom lines.

Fig. 3 is an enlarged horizontal sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a vertical sectional view on line 4—4 of Fig. 1.

Fig. 5 is an enlarged vertical sectional view on line 5—5 of Fig. 1.

The control unit has a housing indicated generally at 11 comprising a peripherally flanged face plate 12 and a cover plate 13, held together by a series of bolts 14 passing through registering holes in both plates. Suitable means (not shown) may be provided for attachment of the housing 11 to a mounting pad or the like on the side of the boat at the control station therefor.

The housing plate 12 preferably has a lower vertical wall portion 15 merging with a vertical wall 16 at the rear end of the housing opposite to the single control lever 17 mounted in the forward end of the housing. Above wall portion 15 and forwardly of wall portion 16 is a recessed outer face wall 18 permitting recessed mounting of the lever 17.

The recessed face wall 18 has longitudinally aligned bores 19 and 20 in which are journaled the shafts for the rotatable intermittent gear members for the throttle and clutch controls, respectively. The hub shaft 21 is journaled in a bushing 22 in bore 19, and the shaft preferably has a squared portion 23 on its inner end on which an intermittent gear 24 is nonrotatively mounted. The front or outer end of shaft 21 carries the hub 25 of operating lever 17. The inner end of shaft 21 has a further reduced portion on which a throttle control arm 26 is non-rotatively mounted by a screw 26A and washer 26B.

The intermittent gear 24 meshes in the neutral position of operating lever 17 with a second intermittent gear 27 rotatably mounted on a bolt 28 in the bore 20. The gear 27 has a radial arm 29 which is preferably integral with the gear, and a swivel connector 30 is carried on the front side of the outer end of arm 29 for connection with a clutch control push rod 31. Similarly, a swivel connector 32 is carried on the rear side of the outer end of arm 26 for connection with a throttle control push rod 33.

The gear 27 is rotatably mounted on the journal portion 34 of the bolt 28 behind the bolt head 34'. The inner end of a radially extending T-shaped arm 35 is secured to gear 27 on opposite sides of bolt head 34' by means of screws 36. The arm 35 has a laterally offset outer end carrying a pivot pin 38 to which is connected the forward end of a link 39, the rear end of which is pivoted at 40 to a slide plate 41, slidable longitudinally in the guide bars 42. Preferably, the opposite edges of the slide plate 41 are slidably engaged in registering slots 43 on the inner surfaces of the guide bars 42, and the guide bars are secured by screws 44 in spaced apart relation to a boss 45 on the inner surface of the housing front plate 12.

The gears 24 and 27 have substantially the same pitch, and are meshed for about 45° of rotation in either direction from the neutral position of Fig. 1. Movement of the control lever 17 and gear 24 in either direction through 45° rotates gear 27 through a corresponding number of degrees in the opposite direction to engage the clutch in forward or reverse. Beyond 45°, the gears become unmeshed and further rotation of gear 24 advances the engine throttle, while one of the arcuate faces 27' on gear 27 slidably engages the circular edge 24' on gear 24 to hold the clutch control gear 27 stationary with the clutch engaged.

Other well-known mechanisms, such as Geneva mechanisms, may be substituted for the gears 24 and 27 to obtain similar relative movement of the engine clutch and throttle controls.

The clutch control push rod 31 telescopes within a sleeve 46 and is connected to the core 47 of a push-pull cable indicated generally at 48. The opposite end of sleeve 46 has a pivot connection at 49 in one end of a bushing 50, the other end of which is secured to the end of the cable casing 51. The bushing is mounted in

an L-shaped bracket clip 52 secured to the wall 16 of the housing by bolts 53. As shown in Fig. 1, the push-pull cable 48 may be connected at its remote end to the clutch lever 54 of the engine by a similar push rod 31A attached to a swivel connector 30A on the clutch lever.

The throttle control push rod 33 telescopes within a sleeve 55 and is connected to the core 56 of a push-pull cable indicated generally at 57. The other end of sleeve 55 has a pivot connection at 58 in one end of a bushing 59, the other end of which is secured to the end of the cable casing 60. The bushing is secured in a flange 61 extending outwardly from the rear end of the slide 41, preferably at right angles thereto. As shown in Fig. 1, the push-pull cable 57 may be connected at its remote end to the throttle lever 62 of the engine by a push rod 33A and swivel connector 32A.

As shown in Figs. 1 and 2, a counterclockwise rotation of lever 17 forwardly of the control unit through about 40° will move the engine clutch control lever 54 to the forward position. When the lever 17 has been rotated about 45° the gears 24 and 27 are unmeshed, as shown in Fig. 2, and the arm 26 has reached the position shown in chain lines. During this 45° of rotation of swivel 32 on arm 26 the push rod 33 pushes rearwardly on cable 57, but at the same time rotation of gear 27 rotates the arm 35 and its pivot 38, causing link 39 to move the slide 41 rearwardly substantially the same amount.

Since both the swivel connector 32 and the slide 41 are moving rearwardly at the same time, there is no relative movement between the cable core and casing, and the motion is absorbed by the slack indicated in Fig. 1 in the flexible cable between the housing 11 and the engine.

After the gear 27 is unmeshed, the link 39 holds the slide 41 in a fixed position, and further rotation of the gear 24 and arm 26 pushes rearwardly on the core 56 of the cable while the slide holds the cable casing stationary, thus moving the throttle lever 62 to the full open position when the arm 26 reaches the full line position of Fig. 2.

The mechanism of the present invention provides a very simple and practical means of eliminating throttle movement during the shifting range. While the invention has been shown as applied to a push-open throttle, by reversing the actions of lever arms 26 and 35, it is equally applicable to pull-open throttles.

What is claimed is:

1. In a single lever control unit for the clutch and throttle of an engine, said unit having a housing, a first rotatable member in said housing for throttle control, a second rotatable member for clutch control operatively connected to said first member for cooperative rotation only during the first portion of movement of the control lever in forward or reverse direction from neutral, and a push-pull cable having a casing and a core, the core being operatively connected to the engine throttle, the improvement comprising linkage means operatively connecting said first member to one end of the core of said cable, a slide mounting the casing of said cable on said housing for movement toward and away from said first member, and linkage means operatively connecting said slide to said second rotatable member for moving said cable casing with the core and in the same direction only during rotative movement of said second member.

2. In a single lever control unit for the clutch and throttle of an engine, said unit having a housing, a first rotatable member in said housing for throttle control, a second rotatable member for clutch control operatively connected to said first member for cooperative rotation only during the first portion of movement of the control lever in forward or reverse direction from neutral and a push-pull cable having a casing and a core, the core being operatively connected to the engine throttle, the improvement comprising linkage means operatively connecting said first member to one end of the core of said cable, a bracket attached to the casing of said cable, means slidably mounting said bracket on said housing for movement toward and away from said first member, and means connecting said bracket to said second rotatable member for moving said cable casing with the core and in the same direction during rotative movement of said second member and for holding said bracket stationary when said second member stops rotating.

3. In a single lever control unit for the clutch and throttle of an engine, said unit having a housing, a first rotatable member in said housing for throttle control, a second rotatable member for clutch control operatively connected to said first member for cooperative rotation only during the first portion of movement of the control lever in forward or reverse direction from neutral and a push-pull cable having a casing and a core, the core being operatively connected to the engine throttle, the improvement comprising an arm on said first member, a push rod connecting said arm to the core of said cable, a slide connected to the casing of said cable, means mounting said slide on the housing for movement toward and away from said first member, and linkage means connecting said slide to said second rotatable member for moving said cable casing with said core and in the same direction only during rotation of said second member.

4. In a single lever control unit for the throttle and clutch of an engine, said unit having a housing, intermeshing first and second rotatable members for operating the throttle and clutch controls, said second member rotating only during the first portion of rotation of the first member by the control lever in forward or reverse direction from neutral, and a push-pull cable having a casing and a core, the core being operatively connected to the engine throttle, the improvement comprising linkage means operatively connecting said first member to the core of said cable, a slide mounting the casing of said cable on said housing for movement toward and away from said first member, an arm on said second member, and a link pivotally connecting said arm to said slide for moving said cable casing with said core and in the same direction only during rotative movement of said second member.

5. In a single lever control unit for the throttle and clutch of an engine, said unit having a housing, intermeshing first and second rotatable members for operating the throttle and clutch controls, said second member rotating only during the first portion of rotation of the first member by the control lever in forward or reverse direction from neutral, and a push-pull cable having a casing and a core, the core being operatively connected to the engine throttle, the improvement comprising linkage means operatively connecting said first member to the core of said cable, a bracket attached to the casing of said cable, means slidably mounting said bracket on said housing for movement toward and away from said first member, and a link pivotally connecting said bracket to said second member eccentrically thereof for moving said cable casing with said core and in the same direction during rotation of said second member and for holding said bracket stationary when said second member is stationary.

6. In a single lever control unit for the throttle and clutch of an engine, said unit having a housing, intermeshing first and second rotatable members for operating the throttle and clutch controls, said second member rotating only during the first portion of rotation of the first member by the control lever in forward or reverse direction from neutral, and a push-pull cable having a casing and a core, the core being operatively connected to the engine throttle, the improvement comprising an arm on said first member, a push rod connecting said arm to the core of said cable, a slide connected to the casing of said cable, means mounting said slide on the housing for movement toward and away from said first member, an arm on said second member, and a link pivotally connecting said arm to said slide for moving said casing with said

core and in the same direction during rotation of said second member and for holding said bracket stationary when said second member is stationary.

7. In a single lever control unit for the clutch and throttle of an engine, said unit having a support, a first rotatable member on said support for throttle control, a second rotatable member for clutch control operatively connected to said first member for cooperative rotation only during the first portion of movement of the control lever in forward or reverse direction from neutral, and a push-pull cable having a casing and a core, the core being operatively connected to the engine throttle, the improvement comprising linkage means operatively connecting said first member to one end of the core of said

cable, means mounting the casing of said cable on said support for movement toward and away from said first rotatable member, and linkage means operatively connecting said mounting means to said second rotatable member for moving said cable casing with the core and in the same direction only during rotative movement of said second member.

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