Feb. 28, 1961 J. F. MORSE 2,973,069

NEUTRAL THROTTLE STOP FOR SINGLE LEVER ENGINE CONTROL

Filed Aug. 15, 1958 2 Sheets-Sheet 1

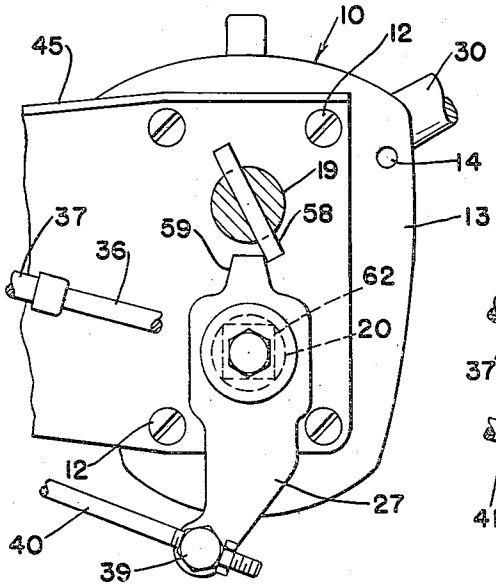


FIG. 3

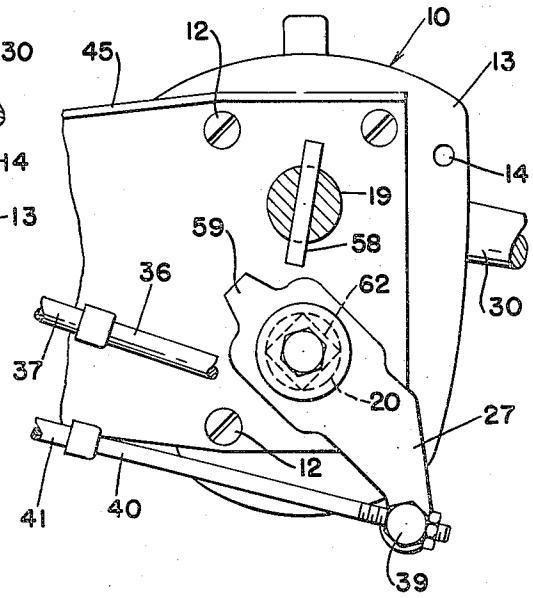


FIG. 4

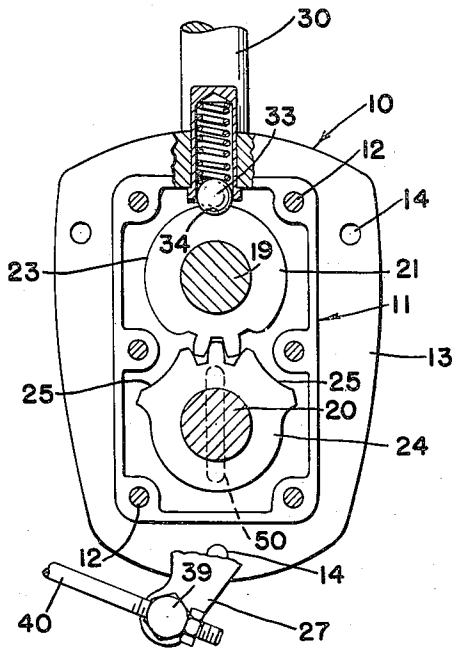


FIG. 6

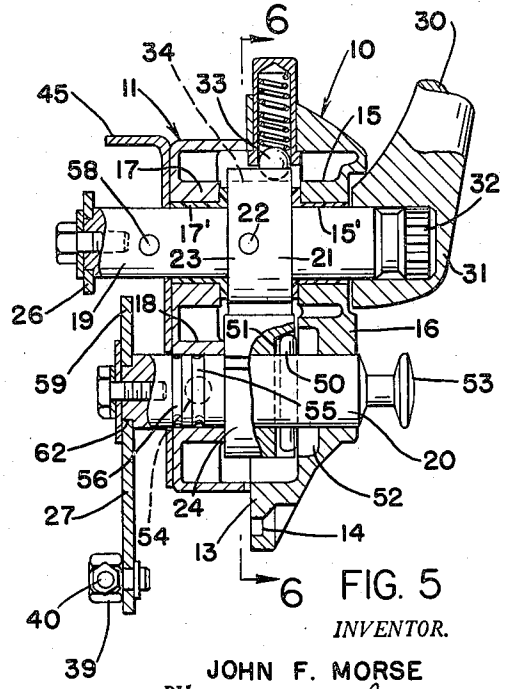


FIG. 5

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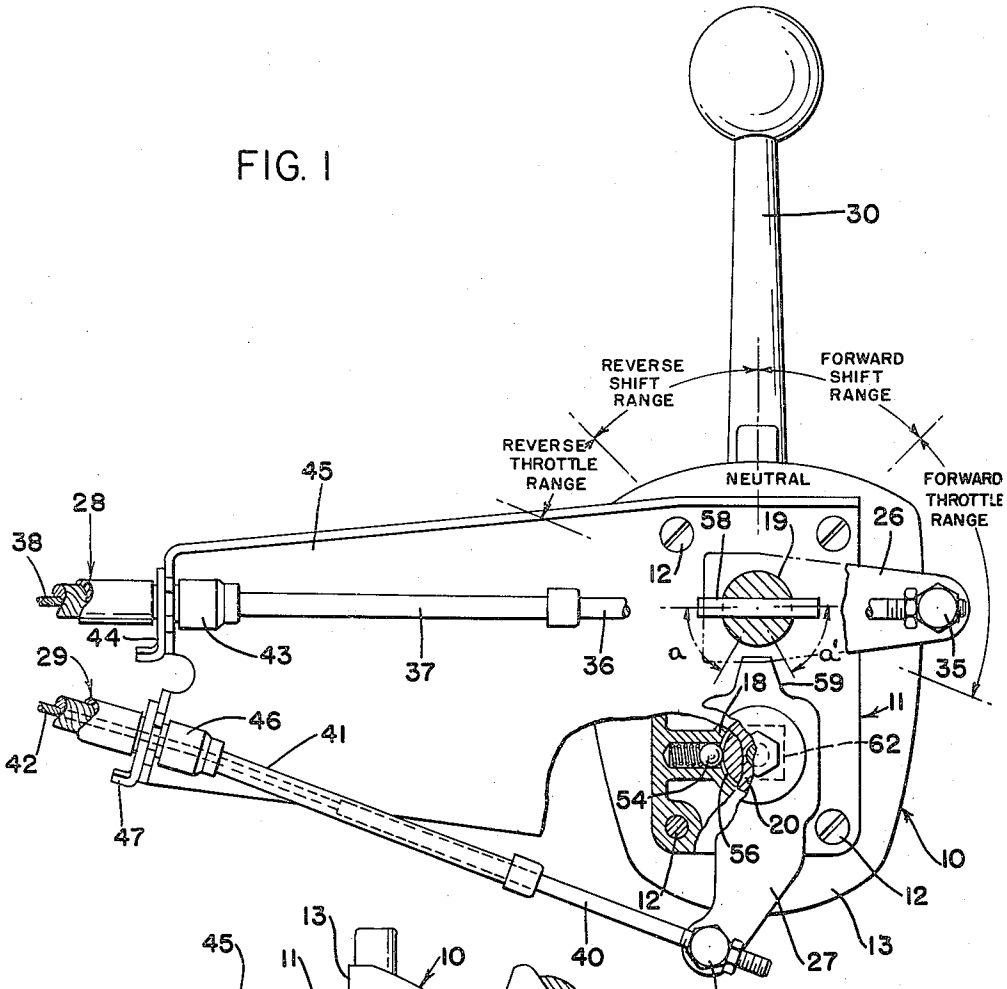
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NEUTRAL THROTTLE STOP FOR SINGLE LEVER ENGINE CONTROL

Filed Aug. 15, 1958 2 Sheets-Sheet 2

FIG. 1



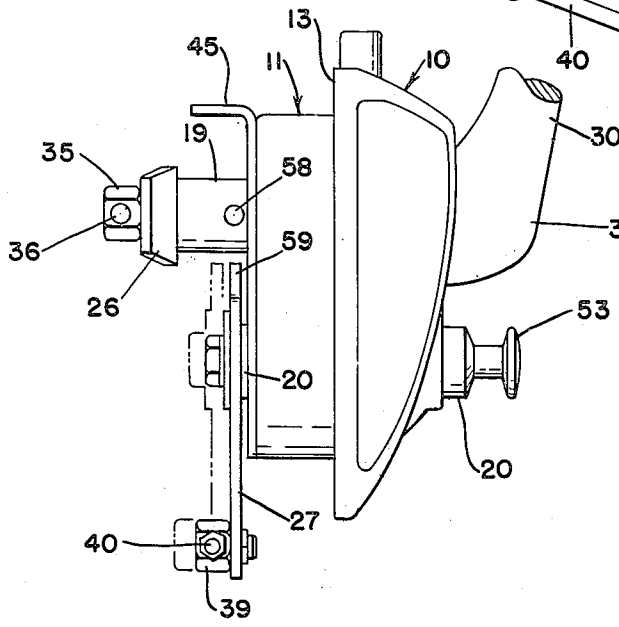


FIG. 2

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United States Patent Office

2,973,069

Patented Feb. 28, 1961

2,973,069

NEUTRAL THROTTLE STOP FOR SINGLE LEVER ENGINE CONTROL

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Filed Aug. 15, 1958, Ser. No. 755,258

6 Claims. (Cl. 192—.096)

The invention relates generally to a single lever control unit for normally operating the clutch and throttle of an engine cooperatively and adapted selectively to operate the throttle alone. More particularly, the invention relates to improved mechanism for automatically limiting movement of the throttle control when it is operated independently of the clutch control.

In the copending application of myself and Donald W. Waner, Serial No. 688,183, now Patent No. 2,907,421 dated October 6, 1959, there was disclosed a unit having parallel rotatable shafts adapted for operative connection with the throttle and clutch of a marine engine, the shafts being cooperatively connected within the unit for rotating the clutch control shaft during only part of the rotation of the throttle control shaft, and the clutch control shaft being disconnectible from the throttle control shaft only in the neutral position to allow independent operation of the throttle throughout its full range. Such construction enables using the engine for operating deck machinery, compressors, generators and the like when the boat is not under way.

In many applications for single lever remote controls, especially in the case of outboard motors, the use of full throttle in neutral is not necessary or desirable, and because of the nature of a two cycle motor such as is used in outboard motors, full throttle in neutral is apt to produce dangerously high engine speeds when the engine is not under load. While most outboard engines have built-in stops to limit engine speeds in neutral, these stops are usually removed where remote controls are used because they develop substantial extra load at the control lever during shifting.

It is an object of the present invention to provide a single lever control unit in which the throttle control is selectively operable when the control is in neutral position, and having novel and improved mechanism for limiting throttle control movement in neutral.

A further object is to provide neutral throttle limiting mechanism which is simple and compact in construction, and inexpensive to manufacture.

These objects and others which will be apparent from the following description, 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.

Referring to the drawings:

Fig. 1 is a rear side elevation of the improved unit in neutral position, with parts broken away and in section.

Fig. 2 is a right end elevation, showing the clutch control in disengaged position in full lines.

Fig. 3 is a fragmentary view similar to Fig. 1, with the throttle control arm removed, showing the control lever entering the forward throttle range with the clutch control disengaged.

Fig. 4 is a similar view showing the control lever at full forward throttle with the clutch engaged.

Fig. 5 is a fragmentary vertical sectional view showing the control lever in neutral and the clutch control engaged.

Fig. 6 is a sectional view substantially on line 6—6 of Fig. 5, with parts broken away.

The control unit preferably comprises a housing having a front plate 10 and a rear plate 11, the plates being clamped together in abutment by bolts 12 passing through registering countersunk holes in both plates. The inner abutting portion of the front plate 10 may have a laterally extending flange 13 around its periphery provided with bolt holes 14 for mounting the unit on a suitable support.

The front plate 10 has upper and lower journal bosses 15 and 16 formed therein, and the rear plate 11 has upper and lower journal bosses 17 and 18 registering therewith. A throttle control shaft 19 is journaled in the upper bosses 15 and 17, preferably in bushings 15' and 17', and a clutch control shaft 20 is journaled in the lower bosses 16 and 18.

The shafts 19 and 20 are operatively connected to each other by suitable means such as interrupted or mutilated gears, so that rotation of shaft 19 in either direction from neutral will rotate shaft 20 in the opposite direction during only a part of the rotation of shaft 19, and the shaft 20 is held stationary during further rotation of shaft 19 beyond a predetermined point. Other well-known mechanisms, such as Geneva mechanisms, may be used to obtain substantially the same result.

A mutilated gear 21 is keyed on shaft 19 by a pin 22 between the bushings 15' and 17' (Fig. 5) and has a toothed segment on its lower portion. A mutilated gear 24 is mounted on shaft 20 between the journal bosses 16 and 18 and has an upper toothed segment for meshing with the segment of gear 21. Preferably, the gear segments have substantially the same pitch diameter, and are designed so that rotation of gear 21 from neutral position 40° to 45° in either direction will rotate gear 24 in the opposite direction about 45°.

Beyond the point where the gears become unmeshed, the gear 24 is held stationary by rotative engagement of one of the arcuate faces 25 on the gear with the cylindrical outer surface 23 of gear 21. A throttle control arm 26 is attached to the rear end of shaft 19 and a clutch control arm 27 is attached to the rear end of shaft 20. The lever arms 26 and 27 are operatively connected to the throttle and clutch of the engine by suitable and well-known means such as push-pull cables indicated generally at 28 and 29, respectively.

The single operating lever 30 has a socket portion 31 fixed on the splined front end 32 of throttle shaft 19 at the face of front plate 10, and the lever 30 is in vertical upright position in the neutral position of the control shafts, as shown in Figs. 1 and 6. Preferably, a spring-biased ball detent 33 is mounted in the upper portion of the front plate 10 for frictionally engaging a notch 34 in gear 21 in neutral position.

Lever arm 26 carries a swivel connector 35 connected to a push rod 36 slidable within a sleeve 37 and connected to the core 38 of cable 28. Similarly, lever arm 27 carries a swivel connector 39 connected to a push rod 40 slidable within a sleeve 41 and connected to the core 42 of cable 29. The core 38 is connected at its remote end to the throttle operating lever (not shown) on the engine and the core 42 is connected at its remote end to the clutch operating lever (not shown) on the engine. The sleeve 37 has a pivot connection substantially at 43 with a mounting clip 44 attached to the rear end of a mounting plate 45 attached at its forward end to housing plate 11 by screws 12. The sleeve 41 has a pivot connection substantially at 46 with a mounting clip 47 attached to plate 45.

The lever 26 preferably extends forwardly of shaft 19 so that the swivel connector 35 is on the opposite side of the shaft from the pivot connection 43 of the push rod sleeve 37. This arrangement exerts a pull on the cable core 30 as the arm 26 is rotated in either direction from neutral, and is used to operate a pull-open throttle. The result is that as the arm swings through the first 40° to engage the clutch the displacement of the throttle control connector 35 is minimized, so that little or no actuation of the throttle lever at the engine occurs. This arrangement is disclosed and claimed in the copending application of myself and Donald W. Waner, Serial No. 715,933, filed February 18, 1958, now abandoned.

The gear 24 is journaled on shaft 20, and means is provided for selectively keying the gear to the shaft so that rotation of the gear 24 by gear 21 will either rotate the clutch control shaft 20 or allow the gear to idle on the shaft, as desired. This means comprises a pin 50 extending diametrically through the shaft 20 with its ends projecting radially therefrom, and slots 51 and 52 in the gear 24 and the journal boss 16, respectively, for receiving the pin selectively as the shaft and pin are moved axially of the gear. A knob 53 may be provided on the front end of shaft 20 to facilitate grasping the shaft to move it axially, and a spring-biased ball detent 54 is provided in boss 18 to frictionally engage one or the other of two annular grooves 55 and 56 in shaft 20 in its alternate positions.

The slots 51 and 52 are in register, permitting axial shifting of the pin 50, only when the gears 21 and 24 are in neutral position, as shown in Figs. 5 and 6, in which position the throttle is at idling speed and the clutch is disengaged. Thus, if it is desired to operate the throttle independently of the clutch, the control lever 30 is positioned at neutral and the shaft 20 pulled outwardly, as shown in Fig. 2, to enter the pin 50 in slot 52, whereupon rotation of gear 21 will cause gear 24 to idle on shaft 20. This adjustable clutch control shaft construction is disclosed and claimed in said copending application Serial No. 688,183.

The improved mechanism for limiting movement of the throttle control shaft 19 with the clutch shaft disconnected comprises a pin 58 projecting from shaft 19 in the plane of the clutch control arm 27 in the idling or disconnected position of clutch control shaft 20, as seen in Fig. 2. The pin cooperates with an upstanding ear 59 on the arm 27, and the pin extends horizontally while the ear preferably extends vertically upward in the neutral position of clutch control lever 27, as shown in Fig. 1.

When the clutch control shaft 20 is pulled outwardly as in Fig. 2 to disconnect gear 24 from the shaft, the ear 59 is in the same vertical plane as pin 58, so that when the lever 30 is rotated slightly beyond the clutch shift range of about 40°–45° from neutral in either forward or reverse direction the pin will strike the stop ear 59 and prevent further rotation of shaft 19 to advance the throttle. The stop ear 59 is constructed to allow the pin to rotate through angles a and a' of about 60°, for example, to allow advance of the throttle slightly above idling speeds when the clutch is disengaged. The stop ear is held stationary because the arm 27 is keyed on the squared end 62 of shaft 20, and rotation of the shaft is prevented by engagement of the pin 50 in slot 52.

The pin 58 and stop ear 59 constitute interlocking means between the shafts 19 and 20 for selectively limiting rotation of the throttle control shaft 19 from the neutral position when the clutch control shaft is disengaged.

When the shaft 20 is pushed in to engage pin 50 in slot 51 in gear 24, the pin is positioned in front of the plane of arm 27, as seen in Fig. 5. However, in this position of shaft 20, rotation of shaft 19 immediately starts rotating the arm 27 to swing projection 59 out of the way of pin 58 so that in any event the shaft 19 can rotate to full forward position, after the arm rotates through the clutch shifting range, as seen in Fig. 4.

Accordingly, the improved construction permits full advance of the throttle when the clutch is engaged, and automatically limits the throttle to a small advance for starting and warm up when the clutch control is disengaged in neutral position.

What is claimed is:

1. In a single lever control unit for the throttle and clutch of an engine, said unit having a housing, throttle and clutch control shafts journaled in said housing and operatively connected for cooperative rotation only during a portion of rotation of said throttle control shaft, and said clutch control shaft being axially shiftable to operatively disconnect it from said throttle control shaft, the improvement comprising interlocking means on said shafts for engaging with each other when said clutch control shaft is shifted selectively to operatively disconnected position to selectively limit rotation of the throttle control shaft from neutral position in either direction.

2. In a single lever control unit for the throttle and clutch of an engine, said unit having a housing, throttle and clutch control shafts journaled in said housing and operatively connected for cooperative rotation only during a portion of rotation of said throttle control shaft, and said clutch control shaft being axially shiftable to operatively disconnect it from said throttle control shaft, the improvement comprising projecting means on said shafts movable into engageable relation by shifting said clutch control shaft selectively to operatively disconnected position, and said projecting means adapted to interlock when said throttle control shaft is rotated in either direction from neutral, to limit rotation of said throttle control shaft.

3. In a single lever control unit for the throttle and clutch of an engine, said unit having a housing, throttle and clutch control shafts journaled in said housing and operatively connected for cooperative rotation only during a portion of rotation of said throttle control shaft, and said clutch control shaft being axially shiftable to operatively disconnect it from said throttle control shaft, the improvement comprising a projection on said throttle control shaft, and a lever arm on said clutch control shaft normally rotatable past said projection and selectively positioned in interengaging relation with said projection by shifting said clutch control shaft to operatively disconnected position, to limit rotation of said throttle control shaft in either direction.

4. In a single lever control unit for the throttle and clutch of an engine, said unit having a housing, throttle and clutch control shafts journaled in said housing and operatively connected for cooperative rotation only during a portion of rotation of said throttle control shaft, and said clutch control shaft being axially shiftable to operatively disconnect it from said throttle control shaft, the improvement comprising a projection on said throttle control shaft, a lever arm on said clutch control shaft normally rotatable past said projection and selectively positioned in interengaging relation with said projection by shifting said clutch control shaft to operatively disconnected position, and a projection on said lever arm engageable by said throttle control shaft projection to limit rotation of said throttle control shaft in either direction.

5. In a single lever control unit for the throttle and clutch of an engine, said unit having a housing, throttle and clutch control shafts journaled in said housing and operatively connected for cooperative rotation only during a portion of rotation of said throttle control shaft, and said clutch control shaft being axially shiftable to operatively disconnect it from said throttle control shaft, the improvement comprising a transverse pin projecting from said throttle control shaft in opposite directions, a lever

arm on said clutch control shaft normally rotatable past said pin and selectively positioned in interengaging relation therewith by shifting said clutch control shaft to operatively disconnected position, and a projection on said lever arm engageable by said pin to limit rotation of said throttle control shaft in either direction.

6. In a single lever control unit for the throttle and clutch of an engine, said unit having a housing, throttle and clutch control shafts journaled in said housing and operatively connected for cooperative rotation only during a portion of rotation of said throttle control shaft, and said clutch control shaft being axially shiftable to operatively disconnect it from said throttle control shaft, the improvement comprising a transverse pin projecting from

said throttle control shaft in opposite directions, and a projection on said clutch control shaft normally in a different plane from the plane of the pin, said projection movable into coplanar relation with said pin by shifting said clutch control shaft to operatively disconnected position and engageable with said pin to limit rotation of said throttle control shaft in either direction.

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