May 26, 1964 W. J. SHIMANCKAS 3,134,269

SINGLE LEVER CONTROL

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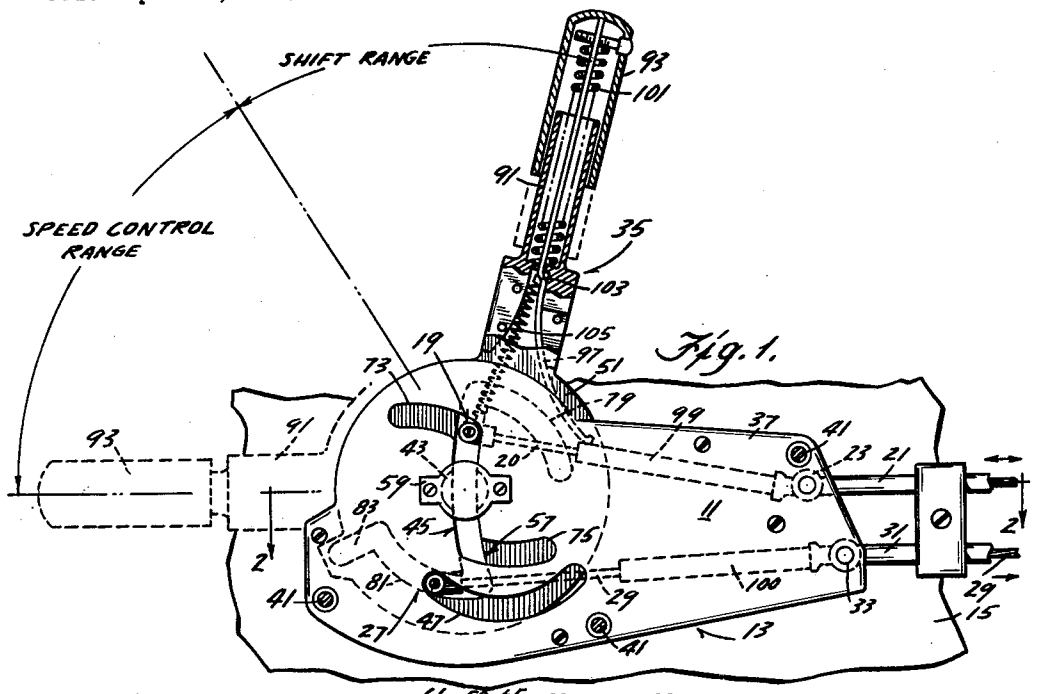


Fig. 1.

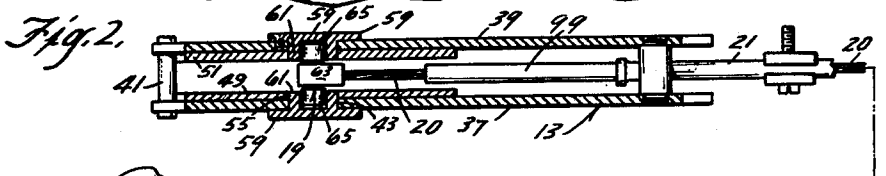


Fig. 2.

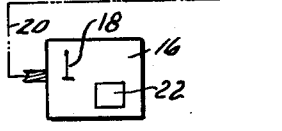


Fig. 3.

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Fig. 4.

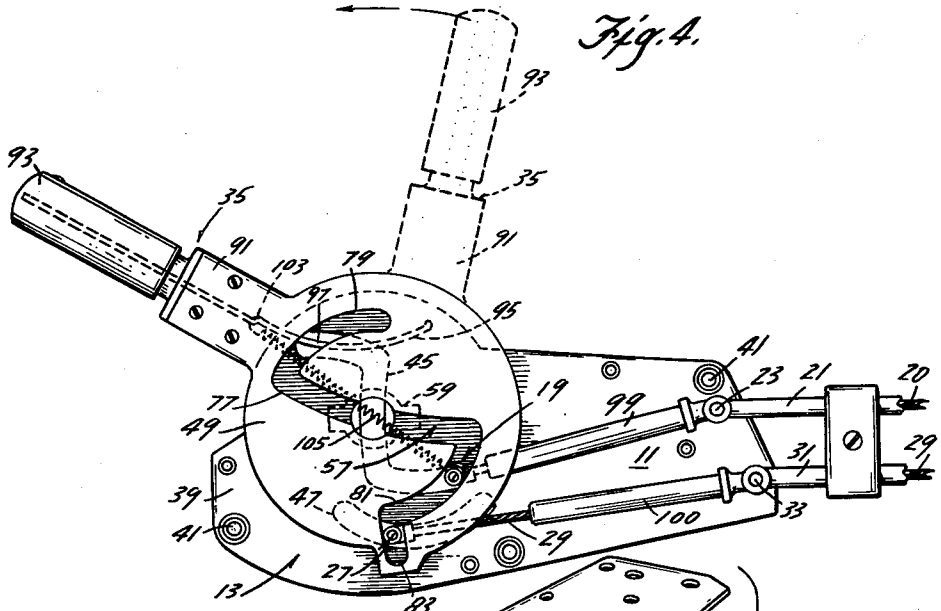
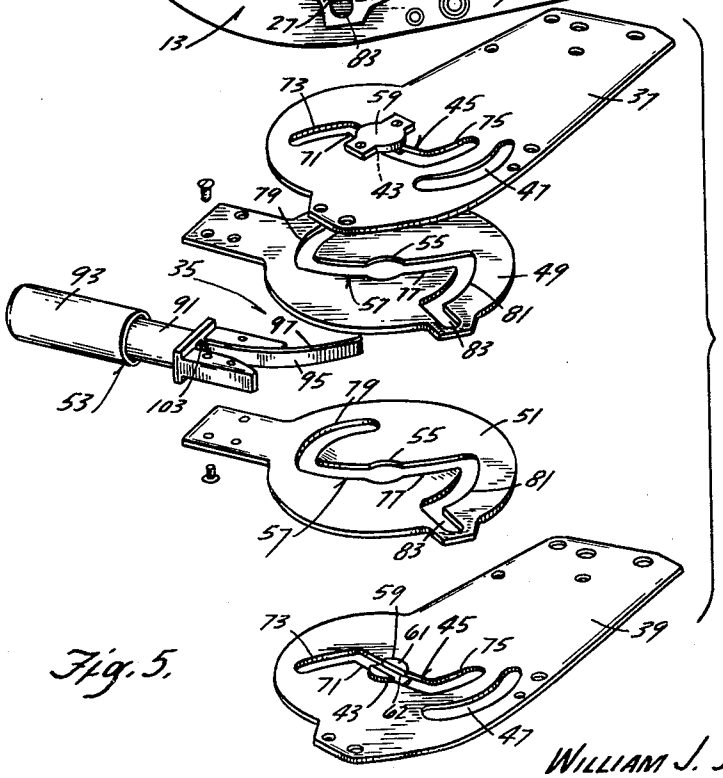


Fig. 5.



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SINGLE LEVER CONTROL

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8 Claims. (Cl. 74—472)

The invention relates generally to control devices for a remotely located engine having a throttle and a mechanically shiftable clutch. More particularly, the invention relates to control devices having a single control lever for operably regulating both the throttle and the clutch of an associated engine.

The disclosed invention contemplates a single control lever which is movably operable in a single direction from a predetermined control lever position in which the clutch is in neutral and in which the throttle is set at idle, through a shift range and then through a speed control range. In addition, the invention contemplates clutch control means movably carried on the control lever for effecting disposition of certain components of the control device to effect selective engagement of the clutch in forward and rearward drive positions as a consequence of subsequent movement of the control lever through the shift range from its predetermined or neutral position and prior to movement of the control lever through its speed range.

The preferred embodiment utilizes a pivotally mounted control lever and clutch control means movable radially of the pivotal mounting of the control lever. In addition, the preferred embodiment makes provision for advancement of the engine throttle by combined operation of the control lever and clutch control means when the clutch is in neutral.

In general, the principal object of the invention is the provision of a single lever control device for an engine having a throttle and a mechanically actuated clutch. Other objects and advantages of the invention will become known by reference to the following description and the accompanying drawings of one embodiment of the invention. In the drawings:

FIGURE 1 is a fragmentary, elevational view, partially broken away and in section, of a boat having mounted thereon an engine control device embodying various of the features of the invention;

FIGURE 2 is a sectional view taken generally along line 2—2 of FIGURE 1 and including a schematic representation of an engine connected to the control device shown in FIGURE 1;

FIGURE 3 is a view generally similar to FIGURE 1 showing the control device in forward drive condition with the throttle at idle;

FIGURE 4 is a view similar to FIGURE 3, with certain parts omitted, showing the control device in half-speed rearward drive disposition; and

FIGURE 5 is an exploded, perspective view of the components of the control device shown in FIGURES 1 through 4.

A control device 11 in accordance with the invention includes a frame 13 which is adapted to be enclosed in a protective and/or decorative housing (not shown) and which may be attached to the hull 15 (see FIGURE 1) or other part of a boat or other vehicle at a point removed from an engine 16 (shown schematically in FIGURE 2) having a mechanically operable throttle or speed controlling member 18 and a mechanically operable clutch 22.

Carried by the frame 13 is a clutch actuating or controlling means which includes a follower 19 attached to one end of a core 20 of a push-pull cable 21, which core

20 passes through a bearing 23 pivotally supported on the frame 13. At its other end, the core 20 is operably connected to the engine clutch. Also carried by the frame 13 is a throttle controlling or actuating means which includes a follower 27 attached to one end of a core 29 of a second push-pull cable 31, which core 29 passes through a second bearing 33 pivotally supported by the frame 13. At its other end the core 29 is attached to the engine throttle or speed controlling member.

Additionally carried by the frame 13 is a single control lever 35 which is movable through a predetermined path extending on one side only of a predetermined position shown in FIGURE 1, in which position the throttle is set at idle and the clutch is in neutral. More specifically, the lever 35 is movable from said predetermined position through a shift range, or first part of its path, and then through a speed range, or second part of its path. In the disclosed construction, as will appear, the control lever 35 is pivotally mounted on the frame 13 and is movable solely in the counter clockwise direction from said predetermined position.

More particularly, the frame 13 comprises a pair of spaced plates 37 and 39 (see especially FIGURES 2 and 5) which plates are joined together in aligned parallel relation by suitable dowels and screw connections indicated generally at 41. Each of the frame plates, as shown best in FIGURE 5, is generally of identical construction and includes a central circular opening 43 through which passes a generally Z-shaped guideway 45 in which the clutch follower 19 is carried. Each of the frame plates also includes a cam slot 47 in which the throttle follower 27 is engaged. The guideways 45 and the cam slots 47 will be described in greater detail hereinafter.

The control lever 35 comprises a pair of spaced plates 49 and 51 (shown best in FIGURE 5) which plates are secured to one end of a generally hollow, radially extending handle part 53. Each of the lever plates is of generally identical construction and includes a central opening 55 corresponding to the opening 43 in the frame plates, and a reversed Z-shaped guideway 57 in which are engaged the clutch follower 19 and the throttle follower 27. The guideways 57 will be more fully described hereinafter.

The control lever 35 is carried for pivotal movement relative to the frame 13 and with the lever plates 49 and 51 located inwardly with respect to the frame plates 37 and 39 by means of a pair of split bushings 59 which are secured to the frame plates 37 and 39 and which have inwardly extending slotted hubs 61 projecting through and mating with the respective circular openings 43 and 55 in the frame plates 37 and 39 and in the lever plates 49 and 51. The slotted condition of the bushings 59, as indicated at 62 in FIGURE 5, provides for continuity of the frame guideways 45, and for continuity of the lever guideways 57 when the control lever 35 is in its neutral, predetermined position.

The clutch follower 19 and throttle follower 27 are both of generally identical construction and, as seen best in FIGURE 2, include a center part 63 in which the adjacent end of the core of the associated push-pull cable is anchored, and a pair of rollers 65 which are mounted on the center part 63 about a common axis for travel in the respective guideways 45 and 57 in the flange plates 37 and 39 and in the lever plates 49 and 51.

Returning now to the frame guideways 45, each includes, as seen best in FIGURE 5, a slightly arcuate central portion 71 having a uniform radius extending from the pivotal bearing 23 through which the core 20 of the clutch push-pull cable 21 passes. As a result, the core 20 of the push-pull cable 21 is not longitudinally actuated

and the engine consequently remains in its neutral condition during shifting of the clutch follower 19 through the central portion 71 of the frame guideways 45. In other words location of the clutch follower 19 in any position between the two ends of the central guideway portion 71 does not affect the neutral condition of the controlled clutch.

Extending from each of the ends of each of the central portions 71 are arcuate terminal portions 73 and 75 which project in the counter clockwise directions, as seen in FIGURES 1, 3, 4, and 5, and at a progressively increasing radial distance from the center of the openings 43, i.e., the center of rotation of the control lever 35. Preferably, the terminal portions 73 are arranged so that they approach straight paths leading from the upper ends of the central guideway portions 71 away from and in generally radial relation to the pivot bearing 23. The terminal portions 75 are arranged so that they approach straight paths leading from the lower ends of the central guideway portions 71 toward and in generally radial relation to the pivot bearing 23. Thus, the upper terminal portions 73 permit outward travel of the clutch follower 19 relative to the pivotal bearing 23 to a position effecting forward drive engagement of the clutch. The lower terminal portions 75 permit movement of the clutch follower 19 toward the pivotal bearing 23 to a position effecting rearward drive engagement of the clutch.

Considering now the lever guideways 57, each includes a central segment 77 and a pair of terminal segments 79 and 81 extending from the ends of the central segment 77. Each of the guideways 57 also includes a segment 83 which extends radially outwardly from the outer end of the lower terminal segment 81. More particularly, the central segments 77 extend through the central openings 55 and are of arcuate form having a uniform radius equal to the radius of the central portions 71 of the frame guideways 45. The lengthwise edges of the central segments 77 constitute means preventing movement of the lever from its neutral position except when the clutch follower 19 is located in positions at the radially outward ends of the segments 77. The lever guideways 57 are disposed so that when the control lever 35 is in its neutral position, the central frame guideway portions 71 and the central lever guideway segments 77 are in general alignment. In order to provide means for effecting movement of the clutch follower 19 through the terminal portions 73 and 75 of the frame guideways 45, incident to movement of the control lever 35 through its shift range, the lever guideway central segments 77 extend beyond the ends of the frame guideway central portions 71 and terminate at a radial distance from said axis of control lever rotation equal to the radial distance between the ends of the frame guideway terminal portions 73 and 75 and said axis.

The terminal segments 79 and 81 of the lever guideways 57 extend from the ends of the center segments 77 in directions opposite from the direction of extension of the frame guideway terminal portions 73 and 75, i.e., in the clockwise direction and at a uniform radius from said control lever rotational axis to provide means for permitting shifting of the control lever 35 through the speed range without displacing the clutch follower 19 from its engaged drive positions at the ends of the frame guideway terminal portions 71 and 73.

The cam slots 47 in each of the frame plates 37 and 39 extend within their respective lower margins to provide for throttle opening and closing movement of the core 29 of the throttle push-pull cable 31, incident to displacement of the throttle follower 27 in the cam slots 47. In order to co-operate with the extension segments 83 of the lever guideways 57 so as to provide positive throttle-controlling movement of the throttle follower 27 through the cam slots, incident to movement of the control lever 35 through the speed control range, the end of the cam slots, seen to the left in the drawings, are disposed at a radial distance from the axis of control lever rotation at a distance equal to the radial distance from said axis of the outer ends of the lower terminal segment 81 of the lever guideways 57, and each of the cam slots 47 has a progressively greater radial distance from the pivotal axis of the control lever 35, as each cam slot proceeds in the counter clockwise direction.

As the throttle follower 27 is engaged in the lower terminal segments 81 when the control lever 35 is in neutral, the lower terminal segments 81 provide means permitting shifting of the control lever 35 relative to the throttle follower 27 during operation of the control lever 35 through the shift range. The radial extension segment 83 of each of the lever guideways constitute means for engaging the throttle follower 27 so as to effect throttle controlling displacement thereof through the cam slots 47 incident to movement of the control lever 35 through the speed control range.

The handle part 53 of the control lever 35 includes an outwardly projecting inner tubular sleeve 91, and a telescopically related outer sleeve 93 which constitutes one component of means for shifting the clutch follower 19 between the ends of the central portions 71 of the frame guideways 45. This means also includes a blade element 95 including a curved portion 97 extending between the lever plates 49 and 51 in position for engagement with a tubular sleeve or sheath 99 which extends fixedly from the pivotal bearing 23 and in enclosing relation to the core 20 of the push-pull cable 21, thereby preventing bending of the core 20 and facilitating displacement of the clutch follower 19 from the upper end to the lower end of the frame guideway central portions 71. A portion of the core 29 of the push-pull cable 31, extending from the pivotal bearing 33 is enclosed in a tubular sheath 100 extending fixedly from the pivotal bearing 33 so as to prevent bending of the core 29, thereby facilitating throttle control.

The blade element 95 also extends inwardly of the inner sleeve 91 and is connected at its upper end to the outer sleeve 93 in such manner as to retain within the sleeves a biasing spring 101 (see FIGURE 1) which normally acts to extend the outer sleeve 93 and connected blade 95 to their outermost position. This position is determined by a shoulder 103 on the blade element 95 engageable with the bottom of the inner sleeve 91.

As a result, when the outer sleeve 93 is displaced radially inwardly, the tubular sheath 99 is pivoted counter clockwise about the bearing 23, thus displacing the clutch follower 19 toward the bottom of the frame guideway central portions 71. Return movement of the clutch follower 19 to the top of the frame guideway portions 71, when the control lever 35 is in its neutral position, is obtained by means of a resilient member in the form of a helical coil spring 105 attached at one end to the center part 63 of the clutch follower 19 and, at its other end, to the blade element 95 in the area of the shoulder 103.

In operation, the clutch follower 19 is normally positioned by the biasing spring 105 at the upper end of the frame guideway central portions 71. Counter clockwise movement of the control lever 35 from its neutral position causes movement of the clutch follower 19 outwardly to the end of the terminal portions 73 of the frame guideways into a position effecting engagement of the clutch in a forward drive position. During this movement of the control lever 35, the clutch follower 19 moves radially outwardly to the associated end of the central segments 77 of the lever guideways 57. At the same time, the lower terminal segments 81 of the lever guideways 57 move relative to the throttle follower 27 which remains at the forward or left end of the cam slots 47 in the frame plates 37 and 39.

As the control lever 35 is moved from the shift range into the speed control range, the control lever 35 moves relative to the clutch follower 19 which travels relative to the terminal sections 79 of the lever guideways 57. At

the same time, as the throttle follower **27** is engaged in the radial extension segments **83** of the lever guideways **57**, rotation of the control lever **35** causes movement of the throttle follower **27** through the cam slots **47** causing related movement of the core **29** of the push-pull throttle control cable **31**.

When it is desired to operate the engine in reverse, the control lever **35** is returned to its neutral position, which movement initially returns the throttle follower **27** to its idle position at the left end of the cam slots **47**. The clutch follower **19** is also returned to the top of the central portions **71** of the frame guideways **45**. The outer sleeve **93** is then depressed to shift the clutch follower **19** through the central guideway portions **71** to the bottom thereof in response to engagement of the blade element **95** with the sheath **99**. Subsequently, when the clutch follower **19** is at the bottom of the frame guideway central portions **71**, the control lever **35** is moved forwardly through the shift range, causing movement of the clutch follower **19** in and to the end of the lower terminal portions **75** of the frame guideway **45**, whereby the core **20** of the push-pull cable **21** is displaced to the right as seen in the drawings, thereby positioning the clutch in rearward drive engagement.

Passage of the guideways **45** and **57** through the center of lever rotation also facilitates advancing the throttle, as when warming up the motor when the engine is in neutral. More specifically, when the outer sleeve **93** is depressed sufficiently to locate the rollers **65** of the clutch follower **19** within the slotted portion of the bushings **59**, the control lever **35** can be rotated counter clockwise through the shift range without actuating the clutch, and then through the speed control range to a desired position of throttle advancement. Moreover, because the lever guideways **57** have been rotated relative to the frame guideways **45**, movement of the clutch follower **19** out of its position within the split bushings **59** is prohibited, thereby preventing shifting of the clutch into a drive position when the engine is at a speed above idle.

Various of the features of the invention are set forth in the following claims.

What is claimed is:

1. In a control device for an engine including a throttle and mechanically actuated clutch means for selectively effecting operation of said engine in a drive condition and in a neutral condition, which device includes

a frame,

means adapted for connection to the throttle of said engine for controlling the setting of the throttle,

means carrying said means for controlling the setting of the throttle on said frame for movement between open throttle and closed throttle positions,

means adapted for connection to the clutch means of said engine for selective actuation of the clutch means to drive the engine in either of said conditions,

means carrying said means for selective actuation of the clutch means on said frame for movement between a first position actuating the engine for operation in one of said conditions and a second position actuating the engine for operation in the other of said conditions,

a lever,

means mounting said lever on said frame for movement relative to a predetermined position, and

means on said lever for displaceably engaging said means for controlling the setting of the throttle between its open and closed throttle positions incident to movement of said lever relative to said predetermined position, the improvement comprising

means carried by said lever for movement relative thereto and for engagement with said means for selective actuation of the clutch means to selectively displace said means for selective actuation of the clutch means relative to its first and second positions when said lever is in its predetermined position.

2. An improvement in accordance with claim 1 wherein said lever is mounted for pivotal movement, and said means engaging said means for selective actuation of the clutch means is movable on said lever radially of the axis of lever rotation.

3. In a control device for an engine including a throttle and mechanically actuated clutch means for selectively effecting operation of said engine in engaged forward and rearward drive conditions and in neutral condition, which device includes

a frame,

means adapted for connection to the throttle of said engine for controlling the setting of the throttle,

means carrying said means for controlling the setting of the throttle on said frame for movement between open throttle and closed throttle positions,

means adapted for connection to the clutch means of said engine for selective actuation of the clutch means to drive the engine in any of said conditions,

means carrying said means for selective actuation of the clutch means on said frame for movement between at least one first position actuating the engine for operation in neutral condition and second and third positions respectively actuating the engine for operation in the engaged forward and rearward drive conditions,

a lever,

means mounting said lever on said frame for movement relative to a predetermined position, and

means on said lever for displaceably engaging said means for controlling the setting of the throttle between its open and closed throttle positions incident to movement of said lever relative to said predetermined position, the improvement comprising

means carried by said lever for movement relative thereto and for engagement with said means for selective actuation of the clutch means to selectively displace said means for selective actuation of the clutch means relative to its first, second, and third positions when said lever is in its predetermined position.

4. An improvement in accordance with claim 3 wherein

said lever is mounted for movement along a predetermined path having a first portion and a second portion extending from one end of said first portion,

said predetermined position is located adjacent the other end of said first portion, and

said means engaging said means for selective actuation of the clutch means is operable to dispose said means for selective actuation of the clutch means in either of two first positions respectively adjacently located with respect to said second and third positions, and including

means on said lever preventing movement thereof from said predetermined position except when said means for selective actuation of the clutch means is in either of said first positions,

means on said lever engaging said means for selective actuation of the clutch means to effect movement thereof between said first positions and said second and third positions incident to movement of said lever through said first path portion,

means on said lever permitting movement of said lever relative to said means displaceably engaging said means for controlling the setting of the throttle during movement of said lever in said first path portion, and

means on said lever permitting movement of said lever relative to said means for selective actuation of the clutch means during movement of said lever in said second path portion.

5. An improvement in accordance with claim 3 wherein

said lever is mounted for pivotal movement along a predetermined path having a first portion and a second portion extending from one end of said first portion,

said predetermined position is located adjacent the other end of said first portion,

said means for selective actuation of the clutch means has only one first position in alignment with the pivotal axis of said lever,

said means engaging said means for selective actuation of the clutch means is operable to dispose said means for selective actuation of the clutch means in either of said first position and two intermediate positions spaced from said first position and respectively associated with said second and third positions, and including

means on said lever preventing movement thereof from said predetermined position except when said means for selective actuation of the clutch means is in either of said first position and said two intermediate positions,

means on said lever engaging said means for selective actuation of the clutch means to effect movement thereof between said two intermediate positions and said first and second positions incident to movement of said lever through said first path portion,

means on said lever permitting movement of said lever relative to said means displaceably engaging said means for controlling the setting of the throttle during movement of said lever in said first path portion, and

means on said lever permitting movement of said lever relative to said means for selective actuation of the clutch means during movement of said lever in said second path portion.

6. A control device according to claim 5 wherein

said means engaging said means for selective actuation of the clutch means is movable on said lever radially of its axis of rotation.

7. A control device for an engine including a throttle and mechanically actuated clutch means for selectively effecting operation of said engine in engaged forward and rearward drive conditions and in neutral condition, said device comprising

means adapted for connection to the clutch means of said engine for actuation of the clutch means to drive the engine in any of said conditions,

a frame,

a lever,

means mounting said lever on said frame for pivotal movement relative to a predetermined postion,

a generally Z-shaped guideway on said frame engaging said means for actuation of the clutch means, said frame guideway having a central portion extending arcuately through the axis of rotation of said lever on a generally uniform radius, and a pair of terminal portions extending from the ends of said central portion along arcs having a progressively increasing radius from said axis of rotation,

a generally reversed Z-shaped guideway on said lever engaging said means for actuation of the clutch means, said guideway having a central segment extending through said axis of rotation along a radius substantially equal to the radius of said central portion of said frame guideway and in alignment therewith when said lever is in said predetermined position, and a pair of terminal segments extending from the ends of said central segment in directions opposite from the direction of projection of said terminal portions of said frame guideway at a uniform radius from said axis of rotation equal to the maximum radius of said frame guideway terminal portions,

means adapted for connection to the throttle of said engine for controlling the setting of the throttle,

means carrying said means for controlling the setting of the throttle on said frame for movement between open throttle and closed throttle positions,

means carried by said lever for movement relative thereto and for engagement with said means for actuation of the clutch means to displace said means for actuation of the clutch means when said lever is in said predetermined position along the central portion of said frame guideway and along a midportion of the central segment of said lever guideway, and

means on said lever for displaceably engaging said means for controlling the setting of the throttle between its open and closed throttle positions incident to movement of said lever relative to said predetermined position.

8. The combination of

an engine including a throttle and mechanically actuated clutch means for selectively effecting operation of said engine in engaged forward and rearward drive conditions and in neutral condition, and

a control device for said engine, said device including

a frame,

means connected to the throttle of said engine for controlling the setting of the throttle,

means carrying said means for controlling the setting of the throttle on said frame for movement between open throttle and closed throttle positions,

means connected to the clutch means of said engine for selective actuation of the clutch means to drive the engine in any of said conditions,

means carrying said means for selective actuation of the clutch means on said frame for movement between a first position actuating the engine for operation in neutral condition and second and third positions respectively actuating the engine for operation in the engaged forward and rearward drive conditions,

a lever,

means mounting said lever on said frame for movement relative to a predetermined position,

means on said lever for displaceably engaging said means for controlling the setting of the throttle between its open and closed throttle positions incident to movement of said lever relative to said predetermined position, and

means carried by said lever for movement relative thereto and for engagement with said means for selective actuation of the clutch means to selectively displace said means for selective actuation of the clutch means relative to its first, second, and third positions when said lever is its predetermined position.

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