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SPEED AND CLUTCH CONTROL DEVICE INCLUDING AUXILIARY MEANS FOR ADVANCING ENGINE SPEED

Filed March 22, 1962

Fig. 1.

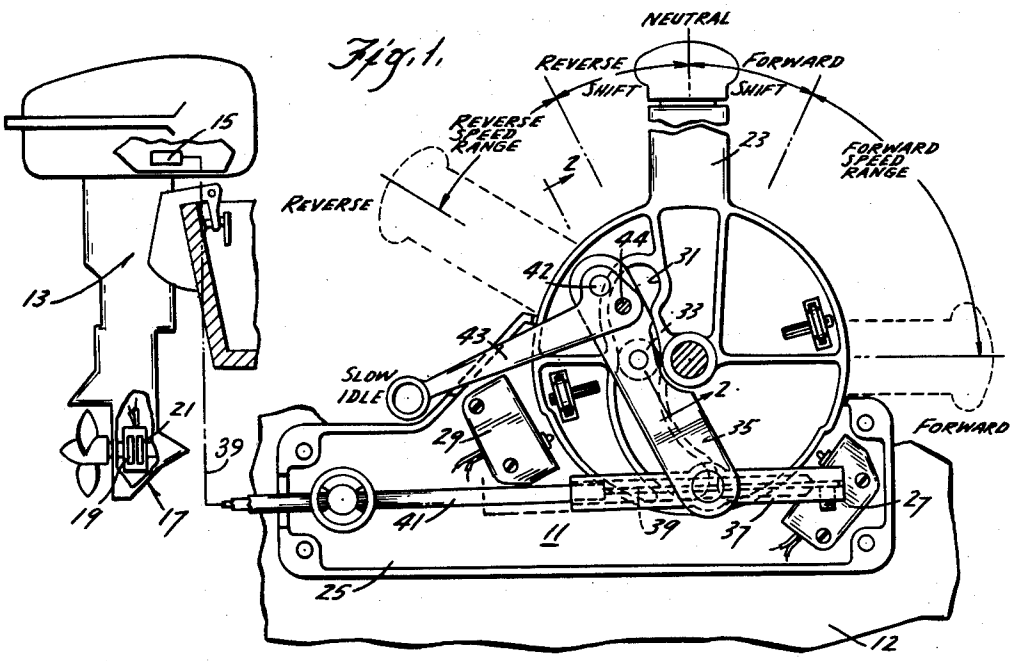


Fig. 3.

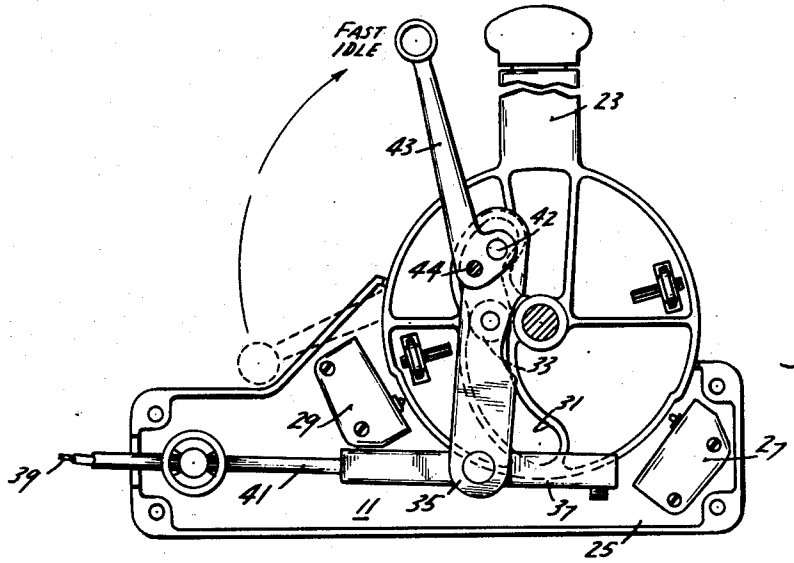
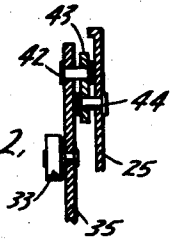


Fig. 2.



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SPEED AND CLUTCH CONTROL DEVICE INCLUDING AUXILIARY MEANS FOR ADVANCING ENGINE SPEED

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23 Claims. (Cl. 74—472)

The invention relates generally to speed and shift control devices for engines such as internal combustion and turbine engines. More particularly, the invention relates to single lever speed and shift control devices for engines incorporating electrically actuated shift or clutch means. Still more particularly, the invention relates to arrangements for permitting advancement of an engine throttle setting when such clutch means is in neutral, whereby the engine can be readily warmed up before being placed under load.

The invention herein disclosed constitutes a further development of the control device disclosed in the Shimanckas application entitled "Single Lever Electrical Control," Serial No. 177,018 filed March 2, 1962, and assigned to the assignee of this application.

The invention provides for advancement of the throttle by an auxiliary control member without recourse to shifting of an inner core relative to an outer sleeve of a push-pull cable, as disclosed in said copending application. Specifically, the invention provides an auxiliary control member which is movably mounted on the frame of the device and is connected to a throttle adjusting arm, such as the arm indicated by reference numeral **41** in the Shimanckas device referred to above, for the two-fold purpose of affording throttle adjusting movement of the arm incident to movement of the main control lever and of affording throttle adjusting movement of the arm incident to movement of the auxiliary control member when the main lever is in a predetermined position. Thus, there is provided an arrangement for advancing the engine throttle setting, preferably through a limited range, when the main control lever is in its neutral position.

The principal object of the invention is the provision of a control device of the type generally referred to above, which device includes an arrangement for controlling the engine throttle setting, at least through a limited range, independently of any movement of the main control lever. Another object of the invention is the provision of such a control device in association with a boat having mounted thereon an engine adapted for propulsion thereof. Other objects and advantages of the invention will become known by the following description and the accompanying drawings of one embodiment. In the drawings:

FIGURE 1 is a fragmentary view, partially in section and partially diagrammatic on a reduced scale, of a boat incorporating a control device in accordance with the invention;

FIGURE 2 is a fragmentary sectional view taken generally along line **2**—**2** of FIGURE 1; and

FIGURE 3 is a view similar to FIGURE 1 showing the device with the auxiliary control member positioned to effect limited throttle advancement when the clutch means is in neutral.

The speed and clutch control device **11** illustrated in FIGURE 1 is one example of various arrangements that can be employed for engine control. The device **11** is mounted on the hull **12** of a boat and is intended for control of an engine **13** (shown schematically) having an adjustable throttle **15** and an electrically actuated clutch **17** including a pair of energizable coils **19** and **21**, for enabling operation of the engine in neutral, in forward drive, and in rearward drive. Forward drive of the engine **13** is provided incident to energizing of the coil **19** and rearward drive is provided incident to energizing of the coil **21**. When neither of the coils **19** and **21** is energized, the engine **13** is in neutral. However, the invention in its broader aspects is not limited to control of an engine having an electrically operated clutch.

One example of an engine incorporating an electrically actuated reversing clutch is fully disclosed in the copending Shimanckas application entitled "Marine Propulsion Device With Electromagnetic Reversing Clutch," Serial No. 143,773, filed on October 9, 1961, and assigned to the assignee of this application.

In the disclosed device **11**, as already discussed in the first-mentioned Shimanckas application, a main control lever **23** is pivotally mounted on a frame **25** for control, incident to pivotal movement thereof, of a pair of electrical switches **27** and **29**, which switches are mounted on the frame **25** and are respectively connected to the coils **19** and **21**. Adjustment of the engine throttle setting incident to movement of the main control lever **23** is provided by the inclusion in the control lever **23** of a cam slot **31** in which there is engaged a follower **33** mounted on an arm **35**. The arm, in turn, is pivotally connected, at its lower end, to an anchor block **37** which is fixed to one end of the core **39** of a push-pull cable **41** connected at its other end to the engine throttle **15**. Accordingly, movement of the lower end of the arm **35** in directions lengthwise of the anchor block will effect adjustment of the engine throttle setting.

As set forth in said co-pending application Serial No. 177,018, the cam slot **31** is designed to maintain the throttle at an idle setting when the main control lever **23** is in its neutral position and during movement through both shift ranges. Thus, advancement of the throttle is prevented until after shifting of the engine clutch from neutral to forward or rearward drive.

In the first-mentioned Shimanckas application, the arm was pivotally mounted on the frame so that throttle adjusting movement thereof occurred in response to pivotal movement of the main control lever. In the disclosed construction, the arm **35** is mounted so as to provide throttle adjusting movement thereof in response to movement of the main control lever **23** and, in addition, to afford throttle controlling movement independently of any movement of the main control lever **23**, as for instance, when the main control lever **23** is in its neutral position. Specifically, in the disclosed construction, the arm **35** is pivotally mounted to an auxiliary control member or lever **43** by a stud **42**. In turn, the auxiliary arm **43** is pivotally mounted on the frame **25** about a pivot **44** located in spaced relation to the pivotal connection of the arm **35** to the auxiliary lever **43**. Preferably, the mounting on the frame **25** of the auxiliary lever **43** relative to the pivotal connection between the auxiliary lever **43** and the arm **35** is such as to effect a minimum of movement of the cam follower **33** in the cam slot **31** incident to movement of the auxiliary lever **43**, and a maximum of pivotal movement of the adjusting arm **35** about the axis of the follower **33** in the cam slot **31**. By comparison of FIGURES 1 and 3, it will be seen that when the main control lever **23** is in neutral, movement of the auxiliary lever **43** from its slow idle position (FIGURE 1) to its fast idle position (FIGURE 3) effects advancement of the engine throttle setting by displacement to the left of the anchor block **37**.

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 having a throttle

and electrically operated clutch means, the combination of

a frame,

a lever movably mounted on said frame,

means for electrically controlling operation of the engine clutch means incident to movement of said lever and including electrical switch means adapted to be electrically connected to the engine clutch means,

arm means adapted to be connected to the engine throttle for adjusting the setting thereof incident to movement of said arm means,

means connecting said arm means and said lever for pivotal displacement therebetween,

an auxiliary control member mounted on said frame, and pin means directly pivotally connecting said auxiliary control member and said arm means to afford movement of said arm means in response to movement of said lever and for actuating said arm means to adjust the engine throttle setting independently of any movement of said lever.

2. A combination in accordance with claim 1 wherein said means connecting said arm means and said lever includes means preventing advancement of the engine throttle setting until after actuation of said means for electrically controlling operation of the engine clutch means from a neutral position to either of forward and rearward drive conditions, whereby said auxiliary control member provides advancement of the engine throttle when the engine clutch means is in neutral.

3. A combination in accordance with claim 2 wherein said lever is pivotally mounted on said frame,

said auxiliary control member is pivotally mounted on said frame, and

said means connecting said lever and said arm means includes a cam slot in said lever and a follower on said arm means, said follower being engaged in said cam slot.

4. The combination of

a boat,

an engine on said boat, said engine including electrically operated clutch means for shifting said engine and a throttle for controlling the speed of said engine, and

a control device located on said boat remotely from said engine, said device including

a lever movably mounted thereon,

means including electrical switch means connected to said clutch means for electrically controlling operation thereof incident to movement of said lever,

arm means connected to said engine throttle for adjusting the setting thereof incident to movement of said arm means,

means connecting said lever and said arm means for effecting throttle adjusting movement of said arm means in response to movement of said lever,

an auxiliary control member mounted on said device, and

pin means directly connecting said arm means and said auxiliary control member for affording throttle adjusting movement of said arm means in response to movement of said lever and for actuating said arm means in response to movement of said auxiliary control member to adjust the engine throttle setting independently of movement of said lever.

5. A combination in accordance with claim 4 wherein said lever is pivotally mounted on said frame, said auxiliary control member is pivotally mounted on said frame, and

said means connecting said lever and said arm means includes a cam slot in said lever and a follower on said arm means engaged in said cam slot.

6. In a control device for an engine having a throttle, the combination of a frame, a control lever movably mounted on said frame, arm means adapted to be connected to the engine throttle for adjusting the setting thereof, means connecting said arm means and said control lever for affording pivotal displacement therebetween, an auxiliary control member movably mounted on said frame, and means directly pivotally connecting said auxiliary control member and said arm means to afford movement of said arm means to adjust the engine throttle setting in response to movement of said control member independently of movement of said lever and for actuating said arm means to adjust the engine throttle setting in response to movement of said control lever independently of any movement of said control member.

7. A control device in accordance with claim 6 wherein said means connecting said arm means and said lever for affording pivotal displacement therebetween includes a cam slot in said lever and a follower on said arm means engaged in said cam slot.

8. A control device in accordance with claim 6 including means mounting said auxiliary control member on said frame for pivotal movement relative thereto generally between said means directly pivotally connecting said control member and said arm means and said means connecting said arm means and said lever.

9. In a control device for an engine having a throttle, the combination of a frame, a control lever pivotally mounted on said frame and including a cam slot therein, arm means adapted to be connected to the engine throttle for adjusting the setting thereof, a follower on said arm means engaged in said slot whereby pivotal movement of said arm means relative to said lever is afforded, an auxiliary control member, a pin pivotally connecting said auxiliary control member and said arm means to afford movement of said arm means in response to movement of said control lever independently of movement of said auxiliary control member and to afford movement of said arm means in response to movement of said auxiliary control member independently of any movement of said control lever, and means mounting said auxiliary control member on said frame generally between said pin and said follower on said arm means for pivotal movement of said auxiliary control member relative to said frame.

10. A control device for an engine having a throttle and electrically operated clutch means, said device including a frame, a lever movably mounted on said frame, means on said frame actuated by movement of said lever for electrically controlling operation of the engine clutch means, arm means adapted to be connected to the engine throttle, means connecting said arm means and said lever at a point spaced from the part of said arm means adapted for connection to the engine throttle for affording relative pivotal displacement between said arm means and said lever, an auxiliary control member movably mounted on said frame, and pin means directly pivotally connecting said auxiliary control member and said arm means at a point spaced from said means connecting said arm means and said lever and from the part of said arm means adapted to be connected to the engine throttle, said pin means affording movement of said arm means to adjust the engine throttle setting in response to movement of said control member independently of movement of said lever and in response to movement of said lever independently of any movement of said control member.

11. A control member in accordance with claim 10 wherein said means connecting said arm means and said lever for affording pivotal displacement therebetween includes a cam slot in said lever and a follower on said arm means engaged in said cam slot.

12. A control device in accordance with claim 10 including means mounting said auxiliary control member

on said frame for pivotal movement relative thereto generally between said means directly pivotally connecting said control member and said arm means and said means connecting said arm means and said lever.

13. A control device for an engine having a throttle and electrically operated clutch means shiftable relative to a neutral position, said device including a frame, a lever pivotally mounted on said frame and including a cam slot therein, means on said frame actuated by movement of said lever for electrically controlling the operation of the engine clutch means, arm means having a part adapted to be connected to the engine throttle to control the setting of the throttle in response to movement of said arm means, a follower on said arm means engaged in said cam slot to afford pivotal movement of said arm means relative to said lever; an auxiliary control member, a pin pivotally connecting said auxiliary control member and said arm means at a point spaced from said follower and from said part of said arm means adapted to be connected to the engine throttle, and means mounting said auxiliary control member on said frame for pivotal movement relative thereto generally between said pin and said follower on said arm means.

14. A control device in accordance with claim 13 wherein said cam slot includes means for preventing advancement of the throttle setting prior to actuation of the engine clutch means from a neutral position and for advancing the throttle setting after the actuation of said engine clutch means.

15. A control device for an engine having a throttle, an electrically operated clutch means for shifting said engine between neutral and forward and rearward drive conditions, said device comprising a frame, a lever movably mounted on said frame, means on said frame actuated by movement of said lever for electrically controlling operation of the engine clutch means, movable arm means adapted to be connected to the engine throttle, means connecting said arm means and said lever for preventing advancement of the throttle prior to actuation of the engine clutch means from a neutral position to either of said forward and rearward drive conditions, and for advancing the throttle after said actuation of the engine clutch means, and auxiliary means on said frame including a control member movably mounted on said frame and means directly pivotally connecting said arm means and said control member for actuating said arm means independently of the movement of said lever to thereby effect adjustment of the setting of the engine throttle.

16. A control device in accordance with claim 15 including means mounting said auxiliary control member on said frame for pivotal movement relative thereto generally between said means directly pivotally connecting said control member and said arm means and said means connecting said arm means and said lever.

17. A control member in accordance with claim 15 wherein said means connecting said arm means and said lever for affording pivotal displacement therebetween includes a cam slot in said lever and a follower on said arm means engaged in said cam slot.

18. In a control device for an engine having a throttle, the combination of a control lever, a housing, means pivotally mounting said lever on said housing, arm means adapted to be connected to the engine throttle for adjusting the setting thereof in response to arm means movement, means connecting said arm means and said control lever for affording pivotal displacement therebetween, an auxiliary control member, means swingably mounting said auxiliary control member on said housing with a part extending exteriorly of said housing, and means directly pivotally connecting said auxiliary control member and said arm means to afford movement of said arm means to adjust the engine throttle setting in response to movement of said control member independently of movement of said control lever and for actuating said arm means to adjust the engine throttle setting in response to movement of said control lever independently of movement of said control member.

19. In a control device for an engine having an throttle, the combination of a control lever, a frame, means pivotally mounting said lever on said frame, arm means adapted to be connected to the engine throttle for adjusting the setting thereof in response to arm means movement, means connecting said arm means and said control lever for affording pivotal displacement therebetween, an auxiliary control member, means swingably mounting said auxiliary control member on said frame about an axis parallel to the axis of said means pivotally mounting said control lever, and means directly pivotally connecting said auxiliary control member and said arm means to afford movement of said arm means to adjust the engine throttle setting in response to movement of said control member independently of movement of said control lever and for actuating said arm means to adjust the engine throttle setting in response to movement of said control lever independently of movement of said control member.

20. In a control device for an engine having a throttle and a clutch, the combination of a housing, a control lever, means pivotally mounting said lever on said housing, means adapted to be connected to the engine clutch for operation thereof, means connecting said control lever and said means adapted to be connected to the engine clutch for actuating said last mentioned means to operate the engine clutch in response to control lever movement, arm means adapted to be connected to the engine throttle for adjusting the setting thereof in response to arm means movement, means connecting said arm means and said control lever for affording pivotal displacement therebetween, an auxiliary control member, means swingably mounting said auxiliary control member on said housing with a part extending exteriorly of said housing, and means directly pivotally connecting said auxiliary control member and said arm means to afford movement of said arm means to adjust the engine throttle setting in response to movement of said control member independently of movement of said control lever and for actuating said arm means to adjust the engine throttle setting in response to movement of said control lever independently of movement of said control member.

21. In a control device for an engine having a throttle and a clutch, the combination of a frame, a control lever, means pivotally mounting said lever on said frame, means adapted to be connected to the engine clutch for operation thereof, means connecting said control lever and said means adapted to be connected to the engine clutch for actuating said last mentioned means to operate the engine clutch in response to control lever movement, arm means adapted to be connected to the engine throttle for adjusting the setting thereof in response to arm means movement, means connecting said arm means and said control lever for affording pivotal displacement therebetween, an auxiliary control member, means swingably mounting said auxiliary control member on said frame about an axis parallel to the axis of said means pivotally mounting said control lever, and means directly pivotally connecting said auxiliary control member and said arm means to afford movement of said arm means to adjust the engine throttle setting in response to movement of said control member independently of movement of said control lever and for actuating said arm means to adjust the engine throttle setting in response to movement of said control lever independently of movement of said control member.

22. In a control device for an engine having a throttle, the combination of a control lever, a housing, means pivotally mounting said lever on said housing, arm means adapted to be connected to the engine throttle for adjusting the setting thereof in response to arm means movement, means connecting said arm means and said control lever for affording pivotal displacement therebetween, an

auxiliary control member, means swingably mounting said auxiliary control member on said housing with a part extending exteriorly of said housing, and a pin directly pivotally connecting said auxiliary control member and said arm means to afford movement of said arm means to adjust the engine throttle setting in response to movement of said control member independently of movement of said control lever and for actuating said arm means to adjust the engine throttle setting in response to movement of said control lever independently of movement of said control member.

23. In a control device for an engine having a throttle, the combination of a control lever, a frame, means pivotally mounting said lever on said frame, arm means adapted to be connected to the engine throttle for adjusting the setting thereof in response to arm means movement, means connecting said arm means and said control lever for affording pivotal displacement therebetween, an

auxiliary control member, means swingably mounting said auxiliary control member on said frame about an axis parallel to the axis of said means pivotally mounting said control lever, and a pin directly pivotally connecting said auxiliary control member and said arm means to afford movement of said arm means to adjust the engine throttle setting in response to movement of said control member independently of movement of said control lever and for actuating said arm means to adjust the engine throttle setting in response to movement of said control lever independently of movement of said control member.

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