July 21, 1964 L. A. BEVACQUA ETAL 3,141,350

CONTROL SYSTEM

Filed May 12, 1961

FIG. 1

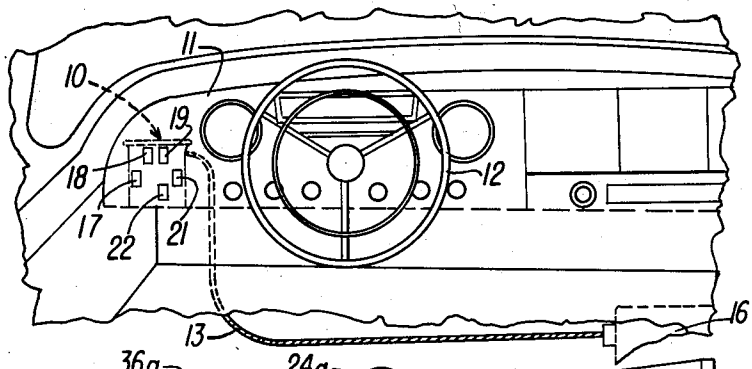


FIG. 2

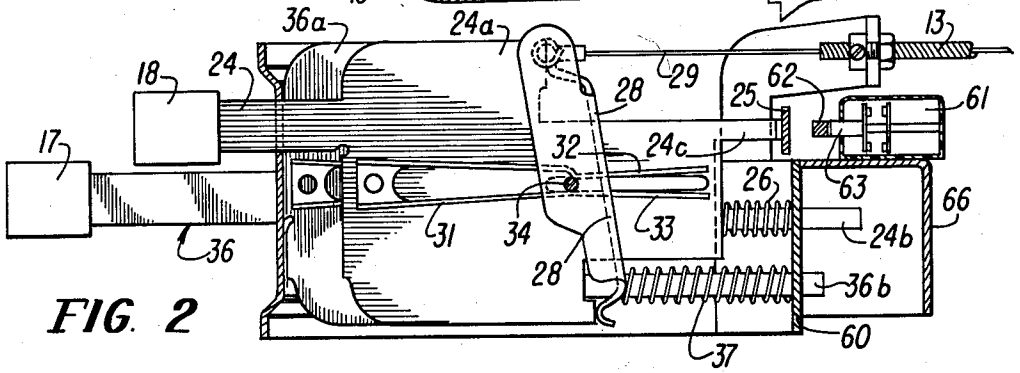
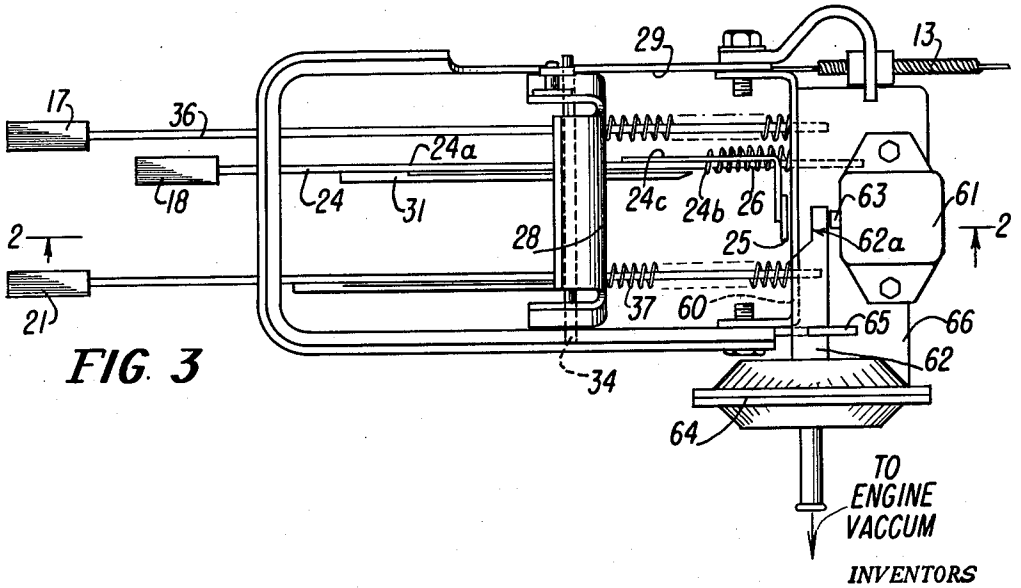


FIG. 3



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CONTROL SYSTEM

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This invention relates in general to selector devices, and in particular to for a selector device for controlling automatic transmissions in automotive vehicles to prevent inadvertent engagement of the starter motor during the engine operation.

A substantial majority of present day automotive vehicles now incorporate automatic transmissions which are controlled by a selector mechanism located on the steering wheel or the dashboard of the vehicle. Selector devices for steering wheel mounting usually consist of a movable lever operatively connected to a control cable for adjusting the setting of the transmission in accordance with the setting of the lever. Those devices for dashboard mounting usually include appropriate pushbutton controls for selecting the desired transmission setting through a control cable, upon actuation of the proper pushbutton. Typical controls include; neutral, low, reverse, first drive and second drive. The neutral setting is normally used during starting of the engine and during idling.

In pushbutton selector devices, actuation of the neutral pushbutton may also actuate the starter motor for the engine. The neutral control still provides the normal function of setting the transmission in the neutral condition. But on further depressing the pushbutton to its forward most limit, an electrical switch may be closed to complete the electrical circuit for the starter motor. Without further provision, however, inadvertent depressment of the neutral pushbutton while the engine is running would necessarily reactivate the starter motor with the attendant high degree of probability that the sudden engagement of the engine fly wheel and the drive shaft of the starter motor may cause serious damage to the meshing gears of one or the other, or both.

In the past, a common solution to the above problem has been the provision of still an additional electrical switch, controlled by the vacuum of the engine, to interrupt electrical continuity of the starter motor circuit upon activation of the engine. This prevents inadvertent reactivation of the starter motor by the conventional starter switch. A problem, however, has been presented in cases where the vacuum-controlled switch "shorts" or "sticks" in the actuated position. In the former, no protection is operative to prevent inadvertent actuation of the starter motor with the engine running; in the latter with the engine shut off, the starter motor cannot be reactivated by operation of the neutral pushbutton.

It is therefore an object of the present invention to provide a pushbutton selector for an automatic transmission in an automatic vehicle which can be operated with minimum possibility of damage to the component parts of the automobile.

Another object of the invention is to provide a selector mechanism for automatic transmissions which effectively prevents the actuation of the starter motor during the operation of the engine without requiring an additional electrical switch.

A feature of the invention is the provision of an automatic transmission selector control device having a transverse bar interposed between the starter motor switch and a portion of the neutral pushbutton arm, and which is retractible to prevent inadvertent reactivation of the starter motor during operation of the engine.

Another feature of the invention is the provision of a retractible bar for the starter switch of an engine, connected to a vacuum-operated mechanism coupled to the manifold vacuum system of the engine which automatically retracts the bar to prevent operation of the starter switch upon operation of the automotive engine.

In the drawings:

FIG. 1 is a view of the dashboard of an automobile showing a multi-pushbutton selector mechanism with appropriate control cables;

FIG. 2 is an enlarged view partly in section taken along the line 2—2 of FIG. 3 showing the operation of the neutral pushbutton arm in detail; and

FIG. 3 is a top view of the pushbutton selector device.

In practicing the invention, a selector device for automatic transmission control in an automotive vehicle is provided with a transverse bar interposed between an electrical switch for actuating the starter motor for the engine of the vehicle and a part of the neutral pushbutton arm. Depressing the neutral pushbutton to its forward most limit activates the starter motor by the engagement of a movable slide member on the neutral pushbutton arm and the transverse bar, which in turn engages the electrical starter motor switch, thereby starting the engine. The transverse bar is mechanically attached to a vacuum-operated mechanism which is coupled to the manifold vacuum system of the engine. Upon starting of the engine, the resultant vacuum developed therein actuates the vacuum mechanism to mechanically retract the transverse bar thereby preventing subsequent actuation of the starter switch by the slide member on the neutral pushbutton arm.

In FIG. 1 of the drawings, a pushbutton selector device **10** is shown positioned on the dashboard **11** of an automobile. Although the selector **10** is shown located to the left of the steering wheel **12**, it will be understood that it may be positioned in any other convenient location on the dashboard **11** or elsewhere. Control cable **13**, shown in dotted lines, is connected to the automobile transmission generally indicated at **16**. Cable **13** serves to control the various transmission settings.

Selector mechanism **10** is shown as including five pushbuttons **17**, **18**, **19**, **21** and **22** which selects second drive, neutral, reverse, low, and first drive transmission settings respectively.

As shown in FIG. 2, neutral pushbutton **18** is positioned on an actuating arm **24**, which includes a camming portion **24***a*, a primary slide member **24***b*, and a secondary slide member **24***c*. Cam portion **24***a* is adapted to engage treadle bar **28** when arm **24** is actuated. Treadle bar **28** is further connected to the control cable **13** through a suitable connector **29**. Actuating arm **24** works against return spring **26** positioned upon primary slide member **24***b*. Cam portion **24***a* further carries on its side surface a resilient clip **31** including arms **32** and **33** which engage transverse treadle bar shaft **34**. This spring exerts a latching action to hold slide **24** actuated which must be overcome when any other pushbutton is depressed.

Actuating arm **24** may be further depressed against the action of spring **26** to its forward limit, whereupon projection **25** on secondary slide member **24***c*, contacts transverse bar **62**, and moves it into engagement with plunger rod **63** which actuates starter switch **61** to activate the starter motor of the engine.

The second drive pushbutton **17** operatively controls actuating arm **36** which works against return spring **37**. Actuating arm **36** includes a camming portion **36***a* adapted to engage treadle bar **28**. Cam portion **36***a* carries on its side surface a resilient metal clip similar to the pin **31**. The remaining three pushbuttons (**19**, **21** and **22**) likewise operate corresponding actuating arms having similar camming portions for engaging treadle bar **28** and work against corresponding return springs, and

generally function in the same manner as described for second drive pushbutton 17.

As stated previously, when neutral pushbutton 18 is in the actuated position, a slight overtravel is inherent in actuating arm 24 such that, upon depressing neutral pushbutton 18 to its forward most limit, projection 25 on the forward end of secondary slide member 24c engages transverse bar 62 and causes it to operate plunger rod 63 of starter switch 61, rendering the starter motor operative to start the engine. As shown in FIG. 3, the transverse bar 62 is mechanically attached at one end of vacuum device 64 which in turn is coupled to the manifold vacuum system of the engine. Upon starting of the engine, the vacuum developed therein is sufficient to cause vacuum device 64 to mechanically retract transverse bar 62 in the position shown. Depressed lip portion 62a is thus positioned such that projection 25 on secondary slide member 24c cannot engage transverse bar 62 to actuate the starter switch 61. Upon cessation of engine operation, the manifold vacuum pressure drops to permit vacuum device 64 to physically reposition transverse bar 62 in operative engagement with projection 25 on secondary slide member 24c. Guide member 65 insures correct positioning of transverse bar 62.

The invention therefore provides an automatic transmission selector mechanism with an important safety feature which prevents the reactivation of the starter motor during engine operation thereby eliminating the attendant damage to the meshing gears of the fly wheel and the starter shaft.

We claim:

1. A pushbutton selector device for controlling the automatic transmission in an automotive vehicle and for energizing the starter motor for the engine of such vehicle, said selector device including in combination; a longitudinally movable pushbutton arm having first and second slide portions, vacuum operated means including a transverse bar interposed in the forward path of said second slide portion, and electrical switch means having an actuating portion positioned to be engaged by said transverse bar, said first slide portion of said movable arm being adapted for setting the transmission in the neutral condition when said movable arm is in actuated position, said movable arm having an inherent overtravel in said actuated position whereby said second slide portion engages said transverse bar which in turn engages said actuating portion of said switch means to energize said starter motor and start the engine, said vacuum operated means further including means for retracting said transverse bar from operative engagement with said second slide portion upon starting of the engine thereby preventing inadvertent reactivation of said starter motor while the engine is running.

2. A pushbutton selector device for controlling an automatic transmission in an automative vehicle and for actuating the starter motor for the engine of such vehicle, said selector device including in combination, a pushbutton arm for setting said transmission in the neutral position and mounted for limited longitudinal motion, said arm having a slide portion thereon, electrical switch means for controlling an energizing circuit for the starter motor, said electrical switch means having an actuating member positioned beyond the limits of motion of said arm, an elongated slidable member having a portion interposed in the path of movement of said slide portion of said arm to be engaged thereby upon actuation of said arm, said actuating member being positioned to be engaged by said slidable member for actuation thereby responsive to said arm engaging said slidable member, and vacuum means responsive to operation of the engine for moving said slidable member from the path of movement of said arm, thereby rendering said actuating member unresponsive to movement of said arm during operation of the engine of the automotive vehicle.

3. A pushbutton selector device for controlling an automatic transmission in an automotive vehicle and for actuating the starter motor for the engine of such vehicle, said selector device including in combination, a longitudinally movable pushbutton arm supported for a predetermined path of movement for setting said transmission in the neutral position, vacuum operated coupling means including an elongated slidable member having a portion transversely positioned in the forward path of movement of said movable arm, and electrical switch means for energizing the starter motor, said switch means having an actuating portion positioned to be engaged by said slidable member but positioned outside the path of movement of said movable arm, whereby said movable arm operatively engages said slidable member which in turn engages said actuating portion of said starter switch means upon actuation of said pushbutton arm, said vacuum operated coupling means further including means to mechanically retract said transversely slidable member from the path of said movable arm upon starting of the engine, thereby preventing the engagement of said starter switch means during said engine operation.

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