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TRANSMISSION CONTROL STRUCTURE

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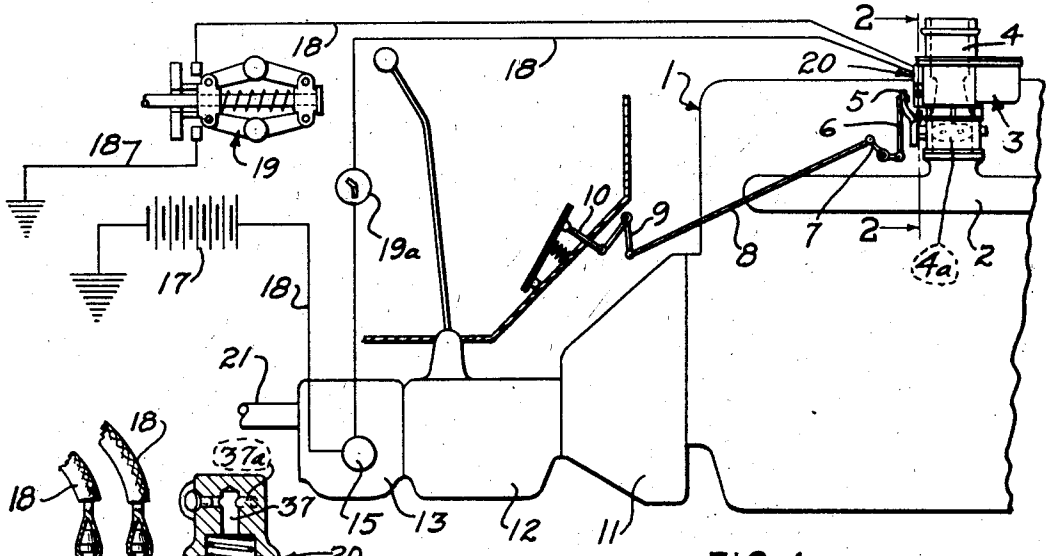


FIG. 1.

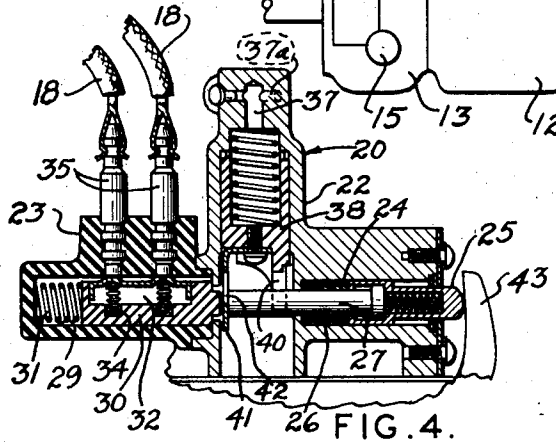


FIG. 4.

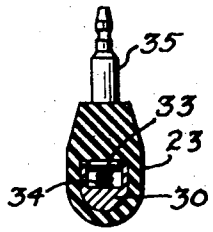


FIG. 5.

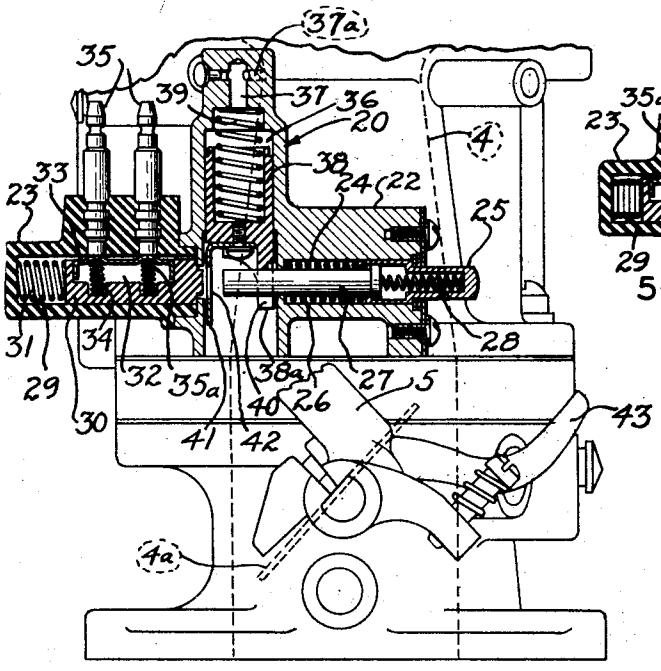


FIG. 2.

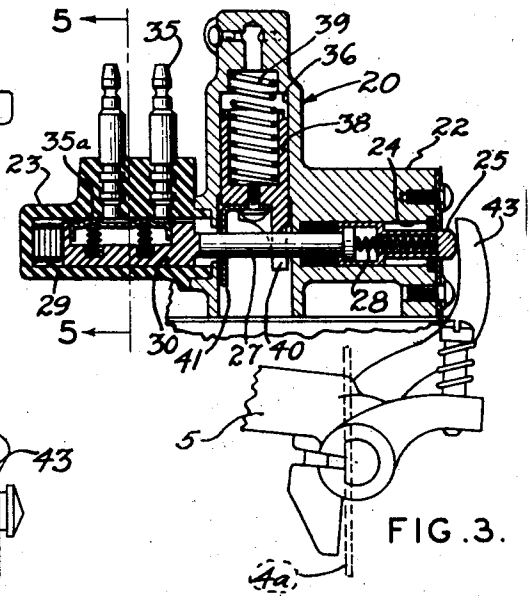


FIG. 3.

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TRANSMISSION CONTROL STRUCTURE

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9 Claims. (Cl. 74—472)

This invention relates to transmission control mechanism for automotive engines and consists particularly in a novel switch device arranged to be jointly controlled by the engine throttling mechanism and the suction in the engine intake manifold.

In automotive vehicles having variable ratio power transmission devices which operate automatically to reduce the ratio as the vehicle speed increases, it has been found desirable to provide means convenient of manipulation by the operator for reverting to a higher ratio (or lower speed gear ratio) when the operator is confronted with an emergency demanding fast acceleration. Such means have usually included an electro magnetic actuator and a control circuit therefor including a switch which is arranged to co-act with the engine carburetor throttle control mechanism so as to cause a shifting to a lower speed gear ratio when the throttle valve operating mechanism is moved slightly beyond a full open throttle position. It has also been found, however, with such arrangements, that under certain conditions as where the vehicle is travelling at a comparatively high rate of speed, the transmission cannot be safely returned to a lower speed gear ratio, as above described, due to the consequent excessive engine speed.

It is, therefor, an object of the present invention to provide a manual control mechanism of the above character which includes means responsive to engine intake velocities for rendering the same inoperative above a predetermined engine speed.

It is a further object of the present invention to provide a generally new and improved throttle actuated switch device which includes pressure responsive means for blocking its operation.

Other objects and advantages will appear upon referring to the following specification and accompanying drawing. Referring to the drawing

Fig. 1 is a diagrammatic view showing a portion of an automotive engine and including a carburetor and a power transmission unit with the present invention applied thereto.

Fig. 2 is a view of a portion of the carburetor shown in Fig. 1, taken on line 2—2, showing in section the switch device constructed in accordance with the present invention.

Figs. 3 and 4 are different operative views of the switch device shown in Fig. 1.

Fig. 5 is sectional view of the switch device taken on line 5—5 of Fig. 3.

Numeral 1 generally indicates an internal combustion engine having an intake manifold 2 on which is mounted a carburetor, generally indicated at 3. The carburetor is provided with a downwardly directed mixture conduit 4 and a mixture control valve 4a to which is attached a throttle operating lever 5. Linkage for the remote control of the throttle is indicated at 6, 7, 8, 9 and 10. A clutch and a set of manually shifted change speed transmission gears are mounted, respectively, in housings 11 and 12 secured to the rear portion of the engine. Rearwardly in a housing 13 is mounted a set of planetary transmission gearing so arranged that when the sun gear is locked against rotation the conventional change-speed transmission will be over-driven. A suitable arrangement of this type is shown in the patent to E. M. Claytor, #2,214,100 issued September 10, 1940. A solenoid actuator 15 mounted on the side of the overdrive housing 13, cooperates with locking mechanism (not shown) to lock the sun gear, and thus effect over-driving, when energized. Suitable means, as spring means, is employed to effect the release of said locking mechanism and permit the return to a lower speed ratio as selected in the conventional transmission when the solenoid circuit is broken.

Electrical energy for the operation of solenoid 15 is supplied by a storage battery 17 through a circuit 18 which comprises a governor switch generally indicated at 19 and a throttle actuated switch generally indicated at 20. The circuit may also include the usual key switch 19a through which ignition devices (not shown) are generally connected. Governor switch 19 may be of any suitable design and is connected to and driven by the vehicle drive shaft 21 or such part of the vehicle having a rotative speed constantly proportional to the vehicle road wheels. The governor switch 19 is calibrated to close the circuit at that point at a predetermined vehicle speed, say, in the order of 15 to 20 M. P. H.

Throttle actuated switch 20 comprises a two section housing structure, section 22 which may be formed as a metal casting and which, in the illustrated form, is cast integral with the carburetor main body member, and section 23 which, in the preferred form the entire section is constructed as a casting of a dielectric material. It will be understood, however, that section 23 may be constructed as a metal casting with suitable necessary insulating inserts. Sections 22 and 23 are attached by any suitable means such as screws (not shown). Section 22 is provided with a horizontal bore 24 within which is slidably fitted a hollow plunger member 25. A coil spring 26 normally urges plunger 25 outward. A reach pin 27

received at one end in hollow plunger 25 is arranged to telescope therein and is normally urged toward an extended position by a coil spring 28.

Section 23 is also provided with a horizontal bore 29, of D shaped section (see Fig. 5) concentric with the bore 24 in section 22. Fitted within bore 29 is a plunger member 30, of D shaped cross section constructed of dielectric material and a coil spring 31 arranged to urge plunger 30 toward the right. Plunger 30 is provided on its upper side with a rectangular recess 32 which receives a switch blade 33. Switch blade 33 is normally urged upward against the upper straight wall of bore 29 by a pair of coil springs 34. Cast as inserts within section 23 are a pair of terminal posts 35 the lower ends of which are flush with the upper wall of bore 29. The upper ends of posts 34 extend substantially from section 23 and are adapted to receive conventional lead connectors. Switch blade 33 is provided with a pair of upwardly extruded bosses 35a which space the remainder of the switch blade from the upper wall of bore 29 and therefore the flush lower ends of posts 35. These bosses are so spaced as to come in contact simultaneously with the lower ends of posts 35 when plunger 30 is moved to its limit of travel to the right.

Switch housing section 22 is further provided with a vertical bore 36 communicating at its lower end with the atmosphere and at its upper end with the carburetor mixture conduit, at a point anterior to the mixture control valve, by means of passageways 37 and 37a. Slidably fitted within bore 36 is a piston 38 which is normally urged downward by a coil spring 39. The lower end of piston 38 is provided with a cut-away skirt portion 38a having a slot 40 formed therein through which passes the outer end of reach pin 27. This arrangement prevents piston 38 from rotating. The piston 38 carries, attached thereto at its lower end, a blocking plate 41 having a perforation 42 therein of sufficient size to permit the passage therethrough of the reach pin 27. The upper end of the slot 40 contacting the reach pin 27 limits the downward travel of piston 38 and when the piston is in its downwardmost position the perforation 42 in blocking plate 41 is in line with the axis of reach pin 27 thus permitting its passage through the blocking plate.

The carburetor mixture control valve lever 5 is provided with an arm 43 which when the valve approaches a full open position contacts the outer end of plunger 25.

The operation of the device is as follows:

Operation of the vehicle above the predetermined speed at which it is desirable to have the overdrive gearing effective will cause the governor switch 19 to close the solenoid circuit at that point. The circuit being normally closed at switch 20 is thus complete effecting the actuation of the sun gear locking mechanism and causing the operation of the overdrive. If now, under these conditions, it is desirable to drop back into a lower speed gear ratio to attain faster acceleration the throttle valve is moved to a full open position, as indicated in Fig. 3, causing throttle lever arm 43 to contact plunger 25 and to move the same and the reach pin 27 and switch blade plunger 30 to the left to a circuit breaking position. The solenoid circuit is thus broken and the overdrive sun gear locking mechanism released rendering the overdrive ineffective. It will be understood that spring 28 in hollow plunger 25 is sufficiently stiffer than spring 31 to cause the shifting of plunger 30 when force is applied to plunger 25.

If, however, the engine is operating at a speed corresponding to a vehicle road speed of say 50 miles per hour or greater the velocity through the carburetor mixture conduit will result in a pressure drop therein sufficient to raise piston 38 upward against the resistance of spring 39 thus moving the blocking plate 41 upward and the perforation 42 therein out of alignment with reach pin 27. If, under these conditions, the throttle valve is moved toward a fully opened position the reach pin 27 will strike the blocking plate and continued movement of the throttle valve to a full open position will be permitted by the telescoping of reach pin 27 in hollow plunger 25. See Fig. 4.

The above description and accompanying drawing are intended to be illustrative and not limiting and the exclusive use of all modifications within the scope of the appended claims is contemplated.

We claim:

1. In combination, a prime mover having a fluid induction conduit, a control valve in said conduit, a driven member, a variable ratio power transmission mechanism, a spring opposed electro-magnetic actuator capable of advancing the speed of the driven member with respect to the prime mover when energized, an energizing circuit for said actuator, means responsive to the speed of said driven member for closing said circuit, means movable with said control valve for breaking said circuit, and a pressure responsive device having a suction connection with said induction conduit at a point anterior to said control valve and being responsive to a predetermined suction therein to prevent the breaking of said circuit by said last-mentioned means.

2. In a motor vehicle having an internal combustion engine, a carburetor therefor having a mixture conduit, a throttle valve in said conduit, variable drive ratio power transmission mechanism, an electro magnet for changing the drive ratio, a control circuit for said electro-magnet including a normally closed switch device, manually operable mechanism for opening said switch, a blocking element movable to a position to block the opening of said switch, and a spring opposed pressure responsive device having a suction connection with said mixture conduit at a point anterior to said throttle valve and being responsive to a predetermined suction therein for moving said blocking element to a blocking position.

3. In a device of the class described, a carburetor having a mixture conduit, a throttle valve in said conduit, an operating lever for said valve, a control switch, an operating connection between said lever and said switch, a blocking element movable to a blocking position between said mechanism and said switch, a spring opposed suction device responsive to a predetermined suction in said mixture conduit for moving said blocking element into a blocking position, said mechanism comprising a spring extended telescoping link whereby said throttle is movable when said blocking element is in a blocking position.

4. In a carburetor having a mixture conduit, a throttle valve in said conduit, an operating arm for said throttle valve, control switch structure mounted on said carburetor comprising a slidable switch blade member, and a telescoping plunger for moving said switch blade member, said plunger being constructed and arranged to be moved in a switch opening direction by said throttle oper-

ating arm as said throttle valve approaches a full open position, a blocking element movable to a position between said plunger and said switch blade to prevent the shifting thereof, and a spring opposed pressure responsive device connected to said mixture conduit at a point anterior to said throttle valve for moving said blocking member into a blocking position.

5. In a carburetor having a mixture conduit, a normally closed control switch comprising a movable switch blade element, a plunger member for moving said switch blade, a perforated blocking member between said switch blade element and said plunger, spring means for normally holding said blocking member in alignment to permit the passage of said plunger therethrough, and a suction device connected to said mixture conduit for moving said blocking member out of alignment whereby the shifting of said switch blade by said plunger is prevented.

6. In a device of the class described, a carburetor having a mixture conduit, a throttle valve in said conduit, a control switch, mechanism forming an operating connection between said throttle and said control switch, a blocking element movable to a position in which the operation of said control switch is prevented, and a pressure responsive device having a suction connection with said induction conduit at a point anterior to said control valve and being responsive to a predetermined suction therein to move said blocking element into a blocking position to prevent the operation of said control switch by the movement of said throttle.

7. In a device of the class described, a carburetor having a throttle valve, a manually controlled throttle operating lever, a control switch, mechanism forming an operative connection between said throttle lever and said switch, a blocking element movable to a blocking position between said mechanism and said switch, said mechanism comprising a spring extended telescoping link whereby said throttle may be moved when said blocking element is in a blocking position.

8. In combination, a carburetor having a mixture conduit, a throttle valve in said conduit, a switch device having a movable switch blade element, a throttle lever, a collapsible link between said lever and said switch blade, and a blocking element movable to a position between said collapsible element and said switch blade element.

9. In combination, a carburetor having a mixture conduit, a throttle valve in said conduit, a switch device having a movable switch blade element, mechanism connected to said throttle valve for moving said switch blade element, a collapsible member between said mechanism and said switch blade element, a blocking element movable to a position between said collapsible member and said switch blade element, and a device responsive to suction in said conduit for moving said blocking element.

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