

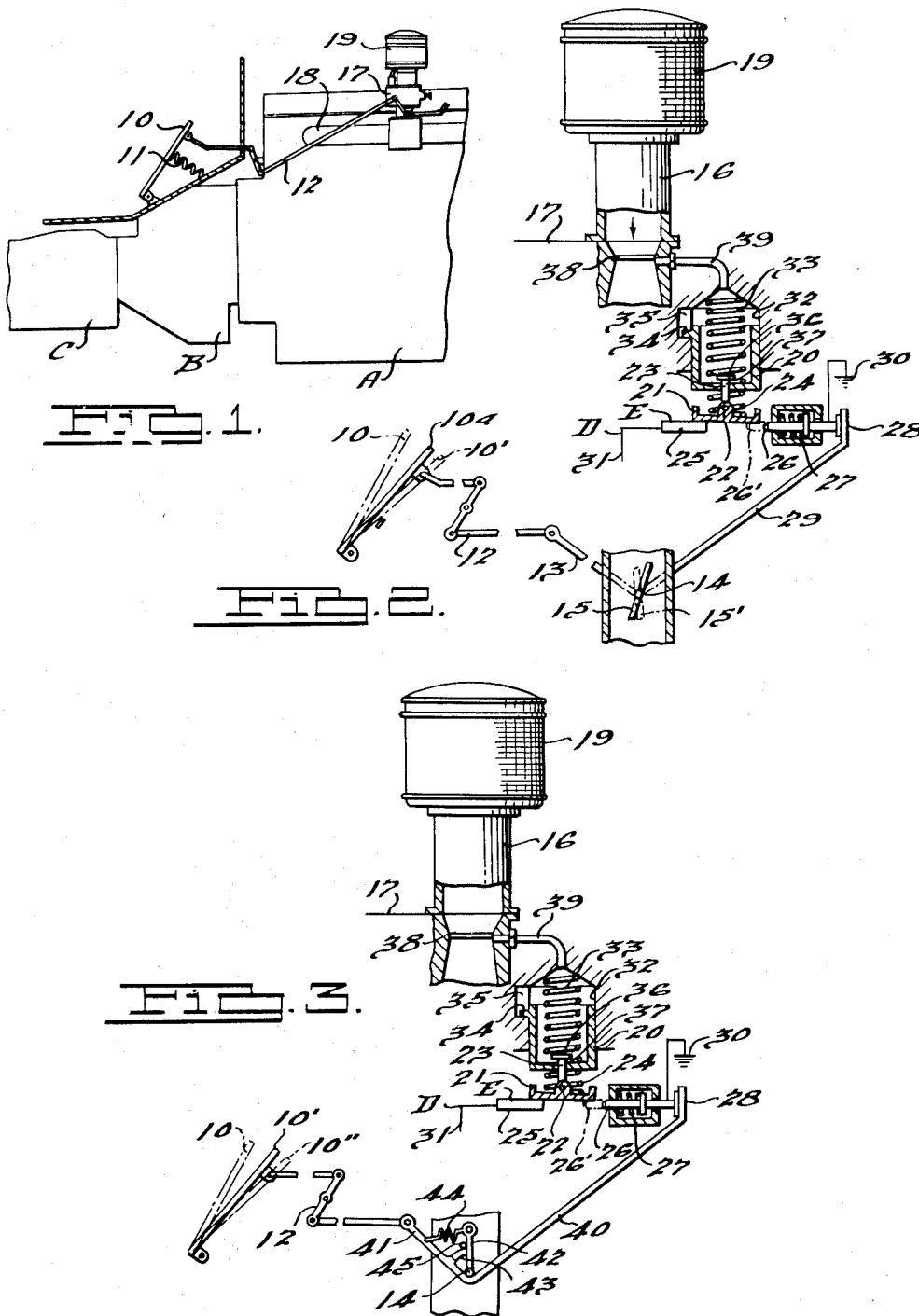
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SWITCH CONTROL MECHANISM

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SWITCH CONTROL MECHANISM

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This invention relates to switch control mechanisms and refers more particularly to switch mechanism adapted for control by engine intake pressure variation, this application being a division of my copending application Serial No. 354,055, filed August 24, 1940.

One object of my invention is to provide an electrical switch controlled in an improved and simplified manner in response to predetermined speed of an engine or equivalent motor vehicle speed in a predetermined drive ratio.

Another object is to provide an improved and simplified governor effect for switch mechanism by utilizing engine intake pressure variation.

A further object is to provide a novel governor effect, as aforesaid, which will function at predetermined amount or position of engine throttle opening under control of engine intake pressure so arranged as to function independently of the load on the engine.

Another object is to provide an improved switch control in which the electric circuit is controlled by a single switch which is adapted to be overruled by the engine intake pressure. The single switch mechanism is adapted for operation by the engine throttle actuating mechanism, or other control, and is under control of the intake pressure so that the latter will render the single switch mechanism either effective or ineffective to control the circuit means by operation of the engine throttle actuating mechanism or other control which may be employed.

Further objects and advantages of my invention will be more apparent as this specification progresses, reference being had to the accompanying drawing in which:

Fig. 1 is a side elevational somewhat diagrammatic view of a motor vehicle power plant illustrating my invention applied thereto.

Fig. 2 is an enlarged somewhat diagrammatic view of my switch control mechanism.

Fig. 3 is a view similar to Fig. 2 but illustrating a modified arrangement of operating linkage.

While my invention may be employed in conjunction with various types and arrangements of mechanisms and devices, I have illustrated the principles of my invention in connection with a motor vehicle a portion of which is shown in Fig. 1 having the internal combustion engine A for driving the vehicle through any suitable drive transmitting and speed ratio changing mechanism in casings B and C.

I have illustrated my switch control mechanism for functioning in conjunction with the throttle control mechanism of the engine. By preference

the arrangement is such that the accelerator pedal in moving to a predetermined position in its throttle-opening direction exercises a controlling effect on the switch mechanism, as when the accelerator pedal is brought to its fully depressed condition corresponding to approximately fully open position of the throttle valve. The gain in power delivered by the engine during the last part of the throttle opening movement is so slight that ordinarily this range may be utilized for the switch control without sacrificing car performance where it is desired to effect the switch control under conditions of maximum throttle opening. However, as it may be desired to provide a distinct switch control range for the accelerator pedal, in addition to its normal throttle-moving range, I have made provision so that my invention is equally well adapted to either arrangement and may even, if desired, be arranged for switch control at any accelerator pedal or throttle position less than that aforesaid.

Referring particularly to Figs. 1 and 2 the accelerator pedal 10 is yieldingly urged in its throttle closing position of release by a spring 11. The pedal is operably connected by linkage 12 with the lever 13 fixed to shaft 14 which carries the throttle valve 15 positioned in manifold down-draft riser 16 between the carburetor 17 and manifold distributing branches 18 leading to the various cylinders of the engine. At the top air inlet end of the riser is the usual air cleaner 19. That part of the intake system which extends above valve 15 may be referred to as the atmospheric side of the throttle valve while the parts below the valve extending to the engine may be referred to as the engine side of the throttle valve.

The vacuum control comprises a vacuum operated piston 20 which carries a conductor 21 pivoted at 22 to a plunger 23 upwardly slidable in piston 20 but normally urged downwardly therefrom by a spring 24. This arrangement allows the conductor 21 a certain amount of movement independently of piston 20 in order to seat on the conductor pieces 25 and 26 of a switch E. The conductor piece 25 is fixed and piece 26 comprises a plunger urged to the right out of contact with conductor 21 by a spring 27. The right end of this plunger is adapted for engagement and operation by the end 28 of a lever 29 fixed to the throttle shaft 14, the lever end 28 is arranged to engage the plunger 26 when the accelerator pedal on throttle opening movement reaches the position 10'. When the accelerator pedal is further depressed to position 10'', plunger 26 slides to the

left, by action of lever end 28, to cause switch E to close as will be presently apparent.

Associated with the switch E is any suitable electrical circuit system desired to be controlled by the switch under predetermined desired conditions of throttle opening and car or engine speed. I have illustrated a portion of this electrical circuit at D comprising ground 30 thence through conductors 20 and 21 to terminal 25 and conductor lead 31 to any desired electrical control to complete the circuit. The switch E is under control of the intake system of the engine according to predetermined desired conditions of engine and car speed.

The piston 20 has its downward stroke in cylinder 32 by the force of spring 33 limited in any suitable manner, as by piston pin 34 reaching the bottom of the cylinder wall slot 35. By preference, the head 36 of plunger 23 has a slight clearance 37 with piston 20 when the latter is fully seated downwardly. This clearance operates to advantage in conjunction with spring 24 which may be as light as desired to insure a constant engaging pressure of conductor 21 on terminals 25 and 26. The conductor 21 may tilt slightly when plunger 20 is retracted as in Fig. 2 but when the plunger is operated to the left then any such tilt is relieved, the tilt insuring a quick positive contact. In order to expedite engagement of plunger 20 beneath conductor 21, the left end of plunger 20 is chamfered and the edge of the conductor is rounded as illustrated. In Fig. 2 the contact element 21 is free both from all loads of piston 20 and also from the pedal thrust imparted at lever end 28.

In order to magnify the effect of the vacuum in riser 10 and minimize the size of piston 20, while at the same time utilizing structure already used conventionally, and for other practical considerations, I utilize the conventional carburetor venturi 38 in down draft riser 10, the cylinder 32 being open by a passage 39 to the throat of the venturi.

Cylinder 32 thus communicates with the engine intake system at a point between throttle valve 15 and the atmosphere rather than between the throttle valve 15 and the engine A so that, for a given throttle opening, the same weight of air will always flow through the carburetor venturi at a given speed of the engine or car in any given drive ratio, regardless of load and other factors. Cylinder 32 is thus open to the suction in the intake riser at a point anterior to the throttle valve 15 rather than posterior to the throttle valve. For simplicity of disclosure I have not illustrated the gasoline supply jet at the carburetor venturi throat as the same is well known. Such arrangement provides a governor control on the system D at switch E of great accuracy and simplicity of operation.

In the illustrated arrangement, the driver endeavors to control circuit D by closing switch E always by manipulating the throttle valve 15 to the same position, approximately wide open throttle in this instance, because at such time the switch E will be closed if piston 20 is in its Fig. 2 lowered position. Thus whether or not the circuit D will be closed between lead 31 and ground 30, when the accelerator pedal 10 is fully depressed, will depend entirely on the engine or car speed at such time. If the speed is above the desired predetermined value, determined largely by the weight of piston 20 along with the force of spring 33 and diameter of cylinder 32, then the vacuum at the venturi raises piston 20 and the

conductor 21 is also raised so that switch E can not be closed until piston 20 lowers although this lowering of the piston may thereupon effect closing of the circuit provided that plunger 20 occupies its position 20' at such times. Assuming piston 20 to be lowered, the condition of vacuum being such as to allow this condition, then conductor 21 rests on terminal 26. When lever end 28 is actuated to slide plunger 20 to the left, this plunger contacts with conductor 21 as at 20' and thereby establishes circuit D from ground 30 to lead 31.

In the Fig. 3 modification, the switch E is not closed when the throttle valve on opening reaches wide open position but in response to movement of the accelerator pedal 10 beyond its wide open throttle position 10' through a secondary range of movement to position 10'' at which time the lever end portion 28 of a lever 40 has been moved to the left of its Fig. 3 position sufficiently to cause plunger 20 to close switch E provided, of course, that piston 20 is down. The pedal 10 is now connected through linkage 12 to the bell-crank lever arm 41 loose on the valve shaft 14, lever 40 being the other arm of the bell-crank. Fixed to shaft 14 is a lever 42 having a projection 43 urged into continuous contact with lever 41 by a spring 44 acting between levers 41 and 42. A stop 45 engages lever 42 at fully open throttle.

When pedal 10 is depressed to position 10' the throttle valve 15 will be fully open, as at 15' in Fig. 2, the spring 44 causing lever 42 to follow the movement of lever 41 and pedal 10. At this time the lever end 28 is in its Fig. 3 position ready to operate plunger 20 to the left. As pedal 10 is further depressed to the overtravel position 10'', stop 45 holds lever 42 at wide open throttle position while spring 44 yields to allow lever 40 to close switch E unless, just as in Fig. 2, piston 20 is raised to move conductor 21 out of the path of plunger 20. The Fig. 3 switch control system operates exactly as described for Fig. 2 except, of course, for the overtravel function of the accelerator pedal as noted above.

In Figs. 2 and 3 it will be noted that whenever the driver seeks to change the normal condition of switch E, the throttle valve 15 is moved to a predetermined position so that the vacuum device will, in effect, then operate as a fixed function of engine speed and hence car speed in any predetermined drive ratio. If desired, the normal condition of switch E may be changed at less than approximately wide open throttle. Furthermore, by substituting different piston springs for the vacuum operated piston the illustrated device may be caused to respond to any desired engine or car speed.

In my specification and claims I use the term "venturi" in a broad sense. This device, as well known, increases the velocity and reduces the pressure of the fluid at the Venturi throat. The venturi may be of any suitable design to obtain the desired pressure magnifying effect. Ordinarily a commercial carburetor venturi is formed with frusto-conical portions at each side of the throat as illustrated.

The various conductor parts will, of course, be suitably electrically insulated against undesired grounding or interfering with the desired electrical control systems.

The pressure variation at the venturi operates to overrule the effect of the throttle adjusting means in controlling opening and closing of the electrical circuit means at switch E. In other words the Venturi control renders the switch E

either effective or ineffective to control opening and closing of the circuit means.

I claim:

1. In a switch control mechanism; a switch comprising a relatively stationarily mounted first conductor switch member, a second conductor switch member movable from a first position to a second position thereof, and a third conductor switch member movable from a first position to a second position, said third member when in its said first position engaging said first member and adapted to be engaged by said second member when the latter is moved from its said first position to its second position thereby to establish switch closing relationship of said members; a piston operably connected to said third member and adapted for movement from a first position to a second position thereof for moving said third member from its said first position to its said second position, said third member when in its said second position being disposed out of contacting relationship with at least one of the other of said members when said second member is moved between its said first and second positions thereby to prevent switch closing relationship of said members; an engine having an intake system provided with a throttle valve for controlling air flow from the atmosphere to the engine; and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for moving said piston from its said first position to its said second position.

2. In a switch control mechanism for electric circuit means, a relatively stationarily mounted first electrical terminal, a second electrical terminal movable relative to said first terminal from a first position to a second position, an electrical conductor movable from a first position to a second position, said conductor when in its said first position being so disposed as to electrically connect said terminals when said second terminal is moved to its said second position, said conductor when in its said second position being disposed out of electrically connecting relationship with said terminals when said second terminal is moved to its said second position, means for moving said second terminal, an engine having an intake system, and means responsive to pressure variation in said intake system for moving said conductor.

3. In a switch control mechanism for electric circuit means, a relatively stationary electrical terminal, a second electrical terminal movable from a first position toward said stationary terminal into a second position free from contact with said stationary terminal, an electrical conductor movable from a second position of electrical disconnection between said terminals to a first position providing electrical connection between said terminals when said movable terminal is in its said second position, means for moving said second terminal, an engine having an intake system, and means responsive to pressure variation in said intake system for moving said conductor.

4. In a switch control mechanism; a switch comprising a relatively stationarily mounted first conductor switch member, a second conductor switch member movable from a first position to a second position thereof, and a third conductor switch member movable from a first position to a second position, said third member when in its said first position engaging said first member and adapted to be engaged by said second member when the latter is moved from its said first position to its second position thereby to establish

switch closing relationship of said members; a piston operably connected to said third member and adapted for movement from a first position to a second position thereof for moving said third member from its said first position to its said second position, said third member when in its said second position being disposed out of contacting relationship with at least one of the other of said members when said second member is moved between its said first and second positions thereby to prevent switch closing relationship of said members; an engine having an intake system provided with a throttle valve for controlling air flow from the atmosphere to the engine; means for adjusting said throttle valve, means for moving said second member by said throttle adjusting means, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for moving said piston from its said first position to its said second position.

5. In a switch control mechanism; a switch comprising a relatively stationarily mounted first conductor switch member, a second conductor switch member movable from a first position to a second position thereof, and a third conductor switch member movable from a first position to a second position, said third member when in its said first position engaging said first member and adapted to be engaged by said second member when the latter is moved from its said first position to its second position thereby to establish switch closing relationship of said members; a piston operably connected to said third member and adapted for movement from a first position to a second position thereof for moving said third member from its said first position to its said second position, said third member when in its said second position being disposed out of contacting relationship with at least one of the other of said members when said second member is moved between its said first and second positions thereby to prevent switch closing relationship of said members; an engine having a carburetor venturi; and means utilizing pressure variation at said venturi for moving said piston from its said first position to its said second position.

6. In a switch control mechanism for electric circuit means, a relatively stationarily mounted first electrical terminal, a second electrical terminal movable relative to said first terminal from a first position to a second position, an electrical conductor movable from a first position to a second position, said conductor when in its said first position being so disposed as to electrically connect said terminals when said second terminal is moved to its said second position, said conductor when in its said second position being disposed out of electrically connecting relationship with said terminals when said second terminal is moved to its said second position, an engine having an intake system provided with a throttle valve for controlling air flow from the atmosphere to the engine, means for adjusting said throttle valve, means for moving said second member by said throttle adjusting means, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for moving said conductor.

7. In a switch control mechanism for electric circuit means, a relatively stationarily mounted first electrical terminal, a second electrical terminal movable relative to said first terminal from a first position to a second position, an electrical conductor movable from a first position to a second position, said conductor when in its said first position being so disposed as to electrically connect said terminals when said second terminal is moved to its said second position, said conductor when in its said second position being disposed out of electrically connecting relationship with said terminals when said second terminal is moved to its said second position, an engine having an intake system provided with a throttle valve for controlling air flow from the atmosphere to the engine, means for adjusting said throttle valve, means for moving said second member by said throttle adjusting means, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for moving said conductor.

and position, said conductor when in its said first position being so disposed as to electrically connect said terminals when said second terminal is moved to its said second position, said conductor when in its said second position being disposed out of electrically connecting relationship with said terminals when said second terminal is moved to its said second position, means for moving said second terminal, an engine having a carburetor venturi, and means utilizing pressure variation at said venturi for moving said conductor.

8. In a switch control mechanism for electric circuit means, a relatively stationary electrical terminal, a second electrical terminal movable from a first position toward said stationary terminal into a second position free from contact with said stationary terminal, an electrical conductor movable from a second position of electrical disconnection between said terminals to a first position providing electrical connection between said terminals when said movable terminal is in its said second position, an engine having an intake system provided with a throttle valve for controlling air flow from the atmosphere to the engine, means for adjusting said throttle valve, means for moving said second member by said throttle adjusting means, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for moving said conductor.

9. In a switch control mechanism for electric circuit means, a relatively stationary electrical terminal, a second electrical terminal movable from a first position toward said stationary terminal into a second position free from contact with said stationary terminal, an electrical conductor movable from a second position of electrical disconnection between said terminals to a first position providing electrical connection between said terminals when said movable terminal is in its said second position, means for moving said second terminal, an engine having a carburetor venturi, and means utilizing pressure variation at said venturi for moving said conductor.

10. In a switch control mechanism for electric circuit means, a relatively stationary electrical contact, a second electrical contact movable relative to said stationary contact between first and second positions thereof, means biasing said second contact toward one of its said positions, means for moving said second contact toward the other of its said positions, a conductor member displaceable between two positions thereof in one of which positions of displacement said member provides electrical connection between said contacts when said second contact is in only one of its said positions and in the other of which positions of displacement said member is out of electrical connection with at least one of said contacts when said second contact is in each of its said positions, an engine having an intake system provided with a throttle valve for controlling air flow from the atmosphere to the engine, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for displacing said conductor member.

11. In a switch control mechanism for electric circuit means, a relatively stationary electrical contact, a second electrical contact movable relative to said stationary contact between first and second positions thereof, means biasing said second contact toward one of its said positions, means for moving said second contact toward the other of its said positions, a conductor member movable from a position thereof at all times free from electrical connection with at least one of said contacts to another position thereof electrically bridging said contacts when said second contact is in one of its said positions, a piston operably associated with said conductor member for effecting movement thereof, an engine having an intake system provided with a throttle valve for controlling air flow from the atmosphere to the engine, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for moving said piston.

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