

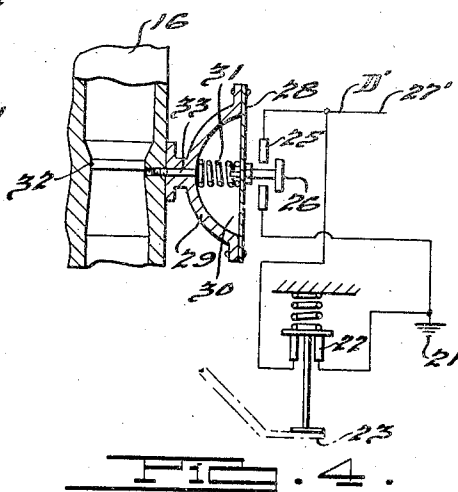
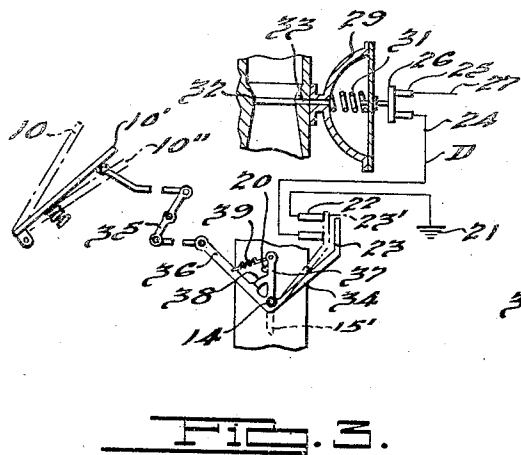
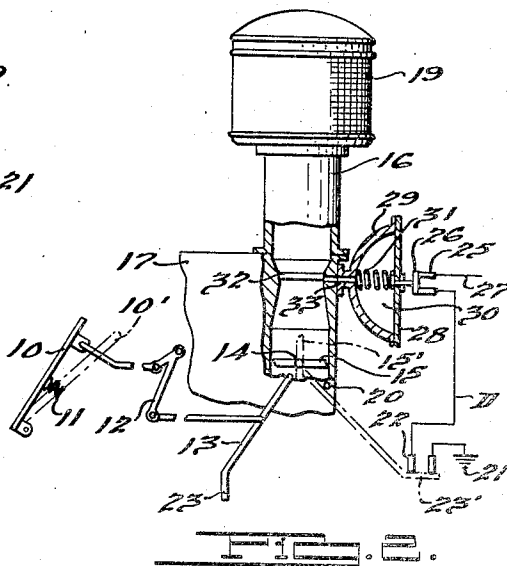
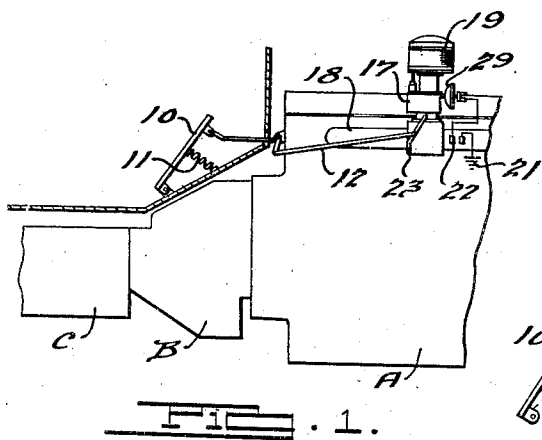
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SWITCH CONTROL MECHANISM

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SWITCH CONTROL MECHANISM

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354,055. Divided and this application August 7,
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14 Claims. (Cl. 200—59)

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.

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.

Fig. 4 is a view generally similar to Fig. 2 but illustrating a modified arrangement of switch control mechanism.

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. When the pedal 10 is fully depressed to position 10' then lever 13 engages stop 20 and valve 15 is fully open as at 15'.

Associated with my switch mechanism is any suitable electrical circuit system desired to be controlled by the switch mechanism under the aforesaid predetermined conditions of throttle opening and car or engine speed. I have illustrated a portion of this electrical circuit at D comprising ground 21 thence through switch 22, which is closed by lever end 23 when in wide open throttle position 23', thence by conductor 24 to a switch 25, adapted to be closed by a contact bridge piece 26, and thence by conductor 27 to any desired electrical control to complete the circuit. Switch 25 is controlled at the intake system of the engine under predetermined desired conditions of engine or car speed.

The contact piece 26 is carried by a piston 28 in the form of a diaphragm extending across the outer end of a container 29 forming a chamber 30 continuously open to riser 16 so that diaphragm piston 28 is subjected to the vacuum in the riser on the atmospheric side of the throttle valve. A spring 31 yieldingly urges piston 28 outwardly so as to cause contact piece 26 to close switch 25 and permit the circuit D to be formed at switch

22 unless however the vacuum in riser 16 is sufficient to withdraw piston 28 and contact piece 28. In the latter instance the switch 25 is open and even though the switch 22 is closed, circuit D will not be formed.

In order to magnify the effect of the vacuum in riser 16 and minimize the size of piston 28, while at the same time utilizing structure already used conventionally, and for other practical considerations, I utilize the conventional carburetor venturi 32 in down-draft riser 16, the chamber 30 being open by a passage 33 to the throat of the venturi.

Chamber 30 thus communicates with the engine intake system at a point between the throttle valve 15 and 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. The chamber 30 is thus open to the suction in the intake riser at a point anterior to the throttle valve 15 rather than at a point 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 26 of great accuracy and simplicity of operation.

In the illustrated arrangement the driver endeavors to control circuit D by closing switch 22 always by manipulating the throttle valve 15 to the same position, approximately wide open throttle in this instance, because at such time the switch 22 is closed. Therefore whether or not the circuit D will be closed between lead 27 and ground 21 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 force of spring 31 and size of piston 28, then the vacuum at venturi 32 acting in chamber 30 will be sufficient to overcome spring 31 and cause switch 25 to open thereby preventing switch 22 from having any effect on circuit D whether switch 22 is opened or closed, whereas if the speed is below such predetermined value then spring 31 will maintain switch 25 closed and switch 22 will alone control circuit D. If, when switch 22 is closed and switch 25 is open, the engine speed drops down below such predetermined value, then switch 25 will close as the vacuum falls off in chamber 30 and thereby close circuit D.

In the Fig. 3 modification, the switch 22 is not closed as 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 conductor end portion 23 of throttle lever 34 is at its switch-closing position 23'. The pedal 10 is connected through linkage 35 to bell-crank lever arm 36 loose on the valve shaft 14, lever 34 being the other arm of the bell-crank. Fixed to shaft 14 is a lever 37 having a projection 38 urged into continuous contact with lever 36 by a spring 39 acting between levers 36 and 37. The stop 20 now engages lever 37 at fully open throttle.

In the Fig. 3 arrangement, depressing pedal 10 to position 10' will result in opening the throttle valve to fully open position 15' because the spring 30 will cause lever 37 to follow the movement of lever 36 and pedal 10. However, as pedal 10 is further depressed to the overtravel position 10'', stop 20 holds lever 37 at wide open throttle position while spring 30 yields to allow lever 34 to

close switch 22 as at 23' for closing circuit D unless, just as in Fig. 2, the switch 25 is open. 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.

My invention is also adapted to control electrical systems wherein the electrical circuit is normally established and adapted to be opened by the throttle opening means under control of the vacuum intake system. In order to illustrate this general arrangement, I have shown in Fig. 4 an arrangement which corresponds generally to the foregoing embodiment but which operates with normally closed switch means instead of normally open switch means.

Referring to Fig. 4 I have illustrated such an arrangement in which the switches 22 and 25 are now arranged in parallel with each other in any suitable circuit system D', a portion of which is illustrated between ground 21 and conductor 27'. Switch 22 is now normally closed and is opened by the lever end 23 of Fig. 2 or Fig. 3 to break the circuit D' unless the vacuum at the venturi 32, as before, is such that switch 25 is closed, in which event opening of switch 22 will not break the circuit.

In Figs. 2 to 4 it will be noted that whenever the driver seeks to change the normal condition of switch 22, by closing the same in Figs. 2 and 3 and by opening the same in Fig. 4, the throttle valve 15 in each instance is at 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 the switch 22 may be changed at less than approximate wide open throttle. Furthermore, by substituting different piston springs for the vacuum operated pistons the illustrated devices 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 throughout the several views will, of course, be suitably electrically insulated against undesired grounding or interfering with the desired electrical control systems.

In Figs. 2, 3 and 4 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 the switch 22. In other words the venturi control renders the switch 22 either effective or ineffective to control opening and closing of the circuit means.

I claim:

1. In a control for electric circuit means, 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 controlling said circuit means, said controlling means comprising a switch-operating element adapted to be operated by said throttle valve adjusting means, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for

overruling said control of said circuit means by said controlling means in response to the engine, during its normal operation, attaining a predetermined speed accompanied by predetermined setting of said throttle valve by said throttle valve adjusting means.

2. In a control for electric circuit means, 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, switch means adapted to open and close said circuit means in response to operation of said throttle valve adjusting means, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for rendering said switch means either effective or ineffective to open and close said circuit means in response to the engine, during its normal operation, attaining a predetermined speed accompanied by predetermined setting of said throttle valve by said throttle valve adjusting means.

3. In a control for electric circuit means, an engine having an intake system provided with a carburetor venturi and a throttle valve for controlling air flow from the atmosphere to the engine, said venturi being disposed at a point in said intake system anterior to said throttle valve, means for adjusting said throttle valve, means for controlling said circuit means, said controlling means comprising a switch-operating element adapted to be operated by said throttle valve adjusting means, and means utilizing pressure variation at said venturi for overruling said control of said circuit means by said controlling means in response to the engine, during its normal operation, attaining a predetermined speed accompanied by an approximately fully open setting of said throttle valve by said throttle valve adjusting means.

4. In a control for electric circuit means, an engine having an intake system provided with a carburetor venturi and a throttle valve for controlling air flow from the atmosphere to the engine, said venturi being disposed at a point in said intake system anterior to said throttle valve, means for adjusting said throttle valve, switch means adapted to open and close said circuit means in response to operation of said throttle valve adjusting means, and means utilizing pressure variation at said venturi for rendering said switch means either effective or ineffective to open and close said circuit means in response to the engine, during its normal operation, attaining a predetermined speed accompanied by an approximately fully open setting of said throttle valve by said throttle valve adjusting means.

5. In a control for electric circuit means, an engine having an intake system provided with a throttle valve for controlling air flow from the atmosphere to the engine, means for controlling said circuit means, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for overruling said controlling means in response to the engine operating at a predetermined speed under predetermined setting of said throttle valve.

6. In a control for electric circuit means, an engine having an intake system provided with a throttle valve for controlling air flow from the atmosphere to the engine, switch means adapted to open and close said circuit means, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve for

rendering said switch means either effective or ineffective to open and close said circuit means during normal operation of the engine.

7. In a switch control mechanism; electric circuit means comprising a pair of switches so arranged as to together exercise functions of control of said circuit means; an engine having an intake system provided with a throttle valve; means operable to adjustably position said throttle valve; means for effecting an operation of one of said switches in response to predetermined operation of said throttle valve adjusting means in the throttle opening direction thereby to effect a certain function of control of said circuit, means provided that the other of said switches is in a certain one of two positions of its operation; and means utilizing pressure variation in said intake system at a point anterior to said throttle valve for effecting an operation of said other switch to the other of its said two positions of operation in response to the engine, during its normal operation, operating at a predetermined speed above its idling speed accompanied by said predetermined operation of said throttle valve adjusting means such that said certain control function of said circuit means is prevented from occurring in response to said predetermined operation of said throttle valve adjusting means.

8. In a switch control mechanism according to claim 7; said pair of switches being arranged in series with each other in said circuit means.

9. In a switch control mechanism according to claim 7; said pair of switches being arranged in parallel with each other in said circuit means.

10. In a switch control mechanism; electric circuit means comprising a pair of switches so arranged as to together exercise functions of control of said circuit means; an engine having an intake system provided with a throttle valve and a carburetor venturi disposed at a point in said intake system anterior to said throttle valve; means operable to adjustably position said throttle valve; means for effecting an operation of one of said switches in response to predetermined operation of said throttle valve adjusting means in the throttle opening direction thereby to effect a certain function of control of said circuit means provided that the other of said switches is in a certain one of two positions of its operation; and means utilizing pressure variation at said venturi for effecting an operation of said other switch to the other of its said two positions of operation in response to the engine during its normal operation operating at a predetermined speed above its idling speed accompanied by said predetermined operation of said throttle valve adjusting means such that said certain control function of said circuit means is prevented from occurring in response to said predetermined operation of said throttle valve adjusting means.

11. In a switch control mechanism, a switch comprising a pair of conductor switch members one of which is adapted for movement relative to the other into positions of engaging and disengaging relationship with respect to said other switch member to respectively provide for closing and opening of the switch, a pressure responsive member adapted to be subjected to a differential of fluid pressure operably connected to said movable switch member and adapted for differential pressure movement from a first position to a second position thereof for effecting movement of said movable switch member from one of its said positions to the other, an engine having a suction intake system provided with a throttle

valve adapted to be adjusted for controlling air flow from the atmosphere to the engine, means for subjecting said pressure responsive member to pressure in said intake system at the atmospheric side of said throttle valve for effecting differential pressure movement of said pressure responsive member from its said first position to its said second position, and means acting to bias said pressure responsive member toward its said first position thereby delaying said differential pressure movement of said pressure responsive member to its said second position until the engine operates at a predetermined speed above its idle speed accompanied by disposition of said throttle valve in a predetermined position of open throttle adjustment, said biasing means operating to prevent movement of said pressure responsive member from its said first position to its said second position during operation of said engine at speeds below said predetermined speed when said throttle valve is adjusted to said predetermined speed, said biasing means permitting said differential pressure movement of said pressure responsive member when the engine attains said predetermined speed and said throttle valve is adjusted to said predetermined position.

12. In a control for electric circuit means, an engine having an intake system provided with a carburetor venturi and a throttle valve for controlling air flow from the atmosphere to the engine, said venturi being disposed at a point in said intake system anterior to said throttle valve, an accelerator pedal for opening said throttle valve, means accommodating movement of said ac-

celerator pedal to its position corresponding to approximately fully open throttle and therebeyond through a range of movement overtravelling said throttle valve, means for controlling said circuit means in response to movement of said accelerator pedal in its said overtravelling range, and means utilizing pressure variation at said venturi for overruling said control of said circuit means by said controlling means in response to the engine operating at a predetermined speed when said throttle valve is approximately fully open.

13. In a control for electric circuit means comprising a switch, an engine having a carburetor venturi, means for operating said switch, and means utilizing pressure variation at said venturi and automatically operating in response to the engine, during operation thereof under its own power, attaining a predetermined speed for preventing said switch operation by said switch operating means.

14. In a control for electric circuit means comprising a switch, an engine having an intake system provided with a throttle valve for controlling air flow from the atmosphere to the engine, means for operating said switch, and means utilizing pressure variation in said intake system at the atmospheric side of said throttle valve and automatically operating in response to predetermined engine speed above its idling speed and predetermined setting of said throttle valve for preventing said operation of said switch by said switch operating means.

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