FAIL-SAFE THROTTLE CONTROL

ABSTRACT: A spring-actuated valve or switch means which is interposed into the accelerator linkage of a motor vehicle acted upon by opposing forces of the accelerator pedal foot pressure and the throttle return spring pressure either to return the engine to idle or disconnect the ignition when in cooperation these forces indicate throttle linkage sticking or failure.
FAIL-SAFE THROTTLE CONTROL

This invention relates to safety controls for motor vehicles and more particularly to a control to deactivate the engine should the accelerator linkage become frozen, broken or disengaged.

Many accidents have been caused by the opening or sticking of the carburetor throttle plate in an open position due to binding or breaking of the linkage, springs or pedals. Under these conditions the driver could turn off the ignition system and stop the car, but the tendency is for the driver to panic as the car picks up speed and neglect to use the brakes. The brakes of modern cars are totally ineffective in such a situation and the results are usually disastrous.

The most common form of failure has been breakage of the throttle return spring that is the spring that urges the throttle plate into idle position when the accelerator is released. On many carburetors when the spring tension is released, the weight of the accelerator pedal and the geometry of the linkage cause the throttle to open thus speeding up the forward motion of the motor vehicle. U.S. Pat Nos. 3,273,552 to W. L. Pihl, as well as 3,457,183 to Schulman and 2,793,706 to Moreland recognize the need for additional safety factors being built to cooperate with motor vehicle carburetors but their attempts to redress failure of the throttle return spring have proven unacceptable since nothing has yet been done in the automotive industry to correct this condition.

Other causes of wide open throttle failure can and do occur when pivot pins break, become loose or fall out, incorrect linkage geometry locks the accelerator open by a toggle action, or the linkage simply binds due to accumulation of dirt or ice from slushy roads, etc.

The present invention not only provides protection against a broken throttle return spring, but in addition senses any deviation from normal operation of the accelerator linkage due to any of the causes heretofore mentioned and provides for suitably disabling the engine.

Further, with certain of the improved constructions which will be hereinafter described, engine speed is maintained at idle which is important when the device is applied to large motor vehicles using power steering and power brakes where stopping the engine would cause dangerously difficult steering and braking.

In view of the foregoing it is the primary object of this invention to provide an apparatus in association with the accelerator linkage of a motor vehicle and the carburetor or ignition circuit whereby improper communication between the throttle and accelerator pedal will not allow the engine to idle.

It is a further object of this invention to provide a simple, efficient and inexpensive vacuum system for disabling the carburetor of a motor vehicle under conditions of open throttle failure.

It is another object of this invention to provide a simple, efficient and reliable hydraulic system for disabling the carburetor of a motor vehicle under conditions of open throttle failure.

It is a further object of this invention to provide a simple, efficient, reliable and foolproof switch mechanism for disabling the carburetor by the utilization of a solenoid for disabling the ignition system of a motor vehicle under conditions of open throttle failure.

It is still another object of this invention to provide a system for disabling the engine of a motor vehicle under conditions of open throttle failure regardless of whether the failure is due to binding, sticking, locking, a broken throttle return spring, or broken or disconnected accelerator linkage.

For a better understanding of this invention and further objects and advantages, reference will be made to the following description and accompanying drawings and to the appended claims in which the new and novel features of this invention are set forth.

FIG. 1 shows the fail-safe throttle mechanism utilizing a push rod system with a vacuum valve integral with the push rod linkage used to control a vacuum power cylinder to return the carburetor to idle;

FIG. 2 shows the fail-safe throttle mechanism utilizing a push rod system with two valves operating in concert to control the vacuum power cylinder;

FIG. 3 shows schematically the fail-safe throttle system utilizing a push rod system with the disabling electrical point system integral with the push rod linkage;

FIG. 4 shows schematically the system of FIG. 3 which is further adapted to using a pull cable connection to the accelerator pedal linkage;

FIG. 5 shows the fail-safe throttle system utilizing a push rod system with the disabling electrical point system pivotally mounted;

FIG. 6 shows the system adapted to using a pull cable connection to the accelerator pedal linkage with the disabling electrical point system pivotally mounted;

FIG. 7 shows still another embodiment wherein two switches and a relay are substantially substituted for the vacuum valve system of FIG. 2 to render the system fail safe.

FIG. 7A shows the use of two switches wired in parallel in the embodiment shown in FIG. 7 to eliminate the need for a relay;

FIG. 8 shows another embodiment wherein a solenoid is used in conjunction with the two switches of FIG. 7 to return the throttle to idle position in case of failure;

FIG. 9 shows a further embodiment wherein a solenoid is used in conjunction with the single integral switch of FIGS. 3, 4, 5 or 6 to return the throttle to idle position in case of failure; and

FIG. 10 shows a still further embodiment wherein hydraulic pressure is used to return the carburetor to idle.

Referring now to FIG. 1, there is shown a cross-sectional view of floorboard 15 of a vehicle to which an accelerator pedal 10 is pivotally attached at its lower end which is not shown. A push rod 12 is pivotally mounted to the accelerator pedal 10 in any standard manner and as normally used in motor vehicles, and extends slidably through cylindrical housing 20 and is rigidly attached by threading or other means to valve 11.

The vacuum valve assembly 13 has a generally cylindrical housing 14 open at one end to reveal a cylindrical bore adapted to receive the valve 11 and closed at the other end with a solid wall having an offsetting cylindrical rod 16 extending concentrically along its axis. The rod end 17 may be flattened to form a rectangular cross section link end and is suitably perforated for apertures 18 and 19. However, other ways of accomplishing this connection will be evident.

The valve 11 is slidably fitted into the open bore of the housing 14 and thereafter the axially perforated cover 20 is attached to the housing by any convenient means.

The free end of valve 11 is suitably reduced to receive surrounding spring 21 which is disposed between the valve 11 and the bottom of the bore of housing 14 under compression to urge valve 11 upwardly toward the cover 20.

The cover 20 includes an axially disposed tubular extension of reduced diameter slotted as at 28 and 29 as shown which extends upwardly through the floorboard 15 and dust seal 22, the tubular extension being arranged to slidably support rod 12 to which the pedal 10 is attached as hereinbefore described.

The housing is perforated as shown and provided with nipples 23 and 24 and adapted to receive the conduits shown attached thereto, the purpose of which will be understood as the description progresses.

The valve 11 is provided with an annular groove about its major diameter in such a manner that when the valve body is urged to its uppermost position by spring 21, the conduits connected to nipples 23 and 24 can communicate with the groove 25 as is well known in spool valve construction.

The accelerator push rod 12 is suitably drilled at 26 to allow pin 27 to be press-fitted therethrough, the pin extending through the slots 28 and 29 arranged to act as a stop against the floor 15 when the spring 21 and return spring 32 urge the rod 12 upwardly.
The lower end of the housing 14 is supported by a link 30 which is pivotally attached thereto at 18 by a pin bolt or other suitable means, and at its other end in a similar manner is suitably and pivotally attached to some portion of the vehicle with the link being suitably perforated generally medially of its length at 31 to receive one end of the throttle return spring 32, and the other end thereof being attached firmly to a fixed anchorage either on the firewall or the engine.

Disposed between the end of the housing 14 and throttle plate lever 33 carried by the carburetor is a push rod construction incorporating a two-way yield device constructed as follows.

As is well shown in FIG. 1 a tubular casing 35 having a suitable partition 35a for a purpose to be described is positioned between the end of housing 14 and the throttle plate lever 33 by rods 34 and 43, respectively. Rod 34 which includes a rigid disc 37 affixed to one end and arranged to be positioned in the casing on one side of the partition 35a has its free end arranged to extend through apertured cover 36 and thereafter be secured to the portion 16 which offstands axially of the housing 14, as shown. A coil spring 38 is provided between the disc 37 and the cover 36 for a purpose that will become apparent later. Also confined within the casing 35 is the disc bearing end 42 of rod 43, the free end of the rod passing through the perforated cover 40 and being affixed to the throttle plate lever 33. In the bore 39 is positioned a spring 41 which abuts the partition 35a at one side and the disc 42 at the other end.

It is believed to be now evident from a study of FIG. 1, that the two-way yield device allows rods 34 and 43 to separate if a force greater than the compressive spring force of spring 38 is applied and allows said rods to come together if a force greater than the compressive spring force of spring 41 is applied.

Adjacent to the point on the throttle plate lever 33 where rod 43 is attached there is also pivotally affixed another rod 44, the free end of which is hallowed formed as at 46 and slidably fitted in the tubular extension 47 of vacuum piston 48. The vacuum piston 48 which includes an annular recess into which is seated an O-ring 48a for seating against the inner wall of the housing 49 is arranged to reciprocate therein and as shown, the extension 47 on the piston projects through an apertured cover 50 provided with a seal means 52. The vacuum housing is closed at its opposite end by a perforated cover 51 which thus vents the chamber formed between the head of the piston and the cover to atmosphere. There is disposed between vacuum piston 48 and cover 52 a spring 53 which is under compression and normally urges said vacuum piston toward the cover 51.

At this time it will be noted that communication is provided for between the power elements thus far described by having on the one hand the nipple 24 on housing 14 connected to the nipple 54 by means of the flexible conduit 55 and on the other hand the nipple 23 on housing 14 connected by another flexible conduit 55a to the intake manifold vacuum.

Those skilled in the art will recognize the following construction as that of a modern carburetor and its operation is briefly described here for purposes which will be apparent when describing the operation and novelty aspects of this invention.

The pivot lever 33 communicates directly with throttle plate 56 through rod 57. Idle adjusting screw 58 bears against stop 59 which allows positioning of the throttle plate and is therefore adjustment of the idle speed. Lever 60 communicates directly with choke valve 61 positioned in the throat of the carburetor and now shown in its open position, this element being controlled to open through lever 62 and push rod 63 by thermostatic coil spring 64 shown here only schematically. The lever 60 communicates with fast idle cam 65 through push rod 66. Fast idle screw 67 bears against fast idle cam 65 when the throttle valve 56 is closed or partially closed during warm up, thus opening the throttle valve 56 to a greater or lesser degree depending on the choke position, therefore preventing the engine from stalling.

From the foregoing description the method of constructing and using this invention will be readily understood.

At idle, throttle return spring 32 is strong enough to overcome the compressive spring force of spring 38 urging vacuum assembly 13 toward the firewall 15 of the vehicle or other positive stop means that is provided therefor. The stop pin 27 being then in contact with firewall 15 or stop means as explained causing push rod 12 to resist the motion of vacuum assembly 13 forcing valve body 11 to its lowest position and causing the upper end of the valve (as shown in FIG. 1) to block communication between the flexible tubes 55 and 55a, respectively. When accelerator pedal 10 is depressed, spring 21 remains compressed due to the restraining force of throttle return spring 32, thus maintaining valve 11 in its lowest position, while at the same time, the forward motion is transmitted through housing 14, push rod 34, disc 37, housing 35, rod 43 to the throttle lever 33, thus opening the throttle. It will now be apparent to those skilled in the art that as long as throttle spring force and the force exerted on the accelerator pedal oppose each other, the valve 11 will block communication between the vacuum chamber 45 and the intake manifold vacuum and that no vacuum will be applied to the idle return vacuum power cylinder. If however, the driver removes his foot from the accelerator pedal, the throttle does not return to its idle rest position, spring 21 will be released forcing valve 11 upwardly toward cover 20, at which time the annular groove 25 will provide communication between conduits 55 and 55a, thus applying vacuum to the idle return vacuum power cylinder 45 and returning the engine to idle.

During idling and under conditions of warming up of the normal motor vehicle provided with an internal combustion engine, the throttle may be required to be adjusted to different openings depending upon the characteristics of a specific carburetor engine, etc. The purpose of the two-way yield device can now be readily seen. As the idle screw 58 or fast idle screw 67 are adjusted, rod 43 moves axially as lever 33 moves. Were it not for the yield device, the vacuum valve assembly would move away from the firewall releasing pressure on spring 21 and applying vacuum to the power cylinder 45. With the new yield device described herein, as rod 43 moves, it causes spring 38 to be compressed slightly without disturbing the balance of the remainder of the system. It is required in the application of this system that spring 32 be able to overcome the spring force of spring 38 and spring 51.

It should now be clear also that the purpose of the second spring 41 provided in housing 35 is to allow the vacuum power cylinder 45 to actuate the throttle lever and return it to an idle position should the linkage between housing link 35 and the accelerator pedal become bound or frozen.

During normal operation of the vehicle it is required that the vacuum power cylinder not interfere with the operation of the carburetor. It should be evident that distance D between the base 46 of the tubular piston extension 47 provided on the vacuum piston 48 and bell end 46 is arranged to allow rod 44 to move unrestricted as throttle lever 33 moves. Should the vacuum power cylinder be actuated, the stroke of piston 48 must be large enough to cause the base 46 of tubular extension 47 to strike the bell end 46 and force the throttle plate lever 33 back to an idle position through the rod 44.

It is contemplated that a further embodiment of this invention, which should be readily understood by those skilled in this art, particularly in view of the foregoing description, may be made by utilizing two vacuum valves operating in concert to control the vacuum power cylinder.

Referring at this time to FIG. 2 there is shown an upper accelerator pedal plate 10 pivotally mounted at its lower end to lower accelerator plate 68. The upper end of plate 10 is suitably located at 70 to communicate with a tang 69A carried by plate 68 such that it allows small angular motion between the two plates. Lower plate 68 is suitably bored to spring 69 which is under a compressive force urging plates 10 and 68 apart, these plates, however, being restrained from separation by tang 69A and hook 70. Rigidly mounted within
a suitable opening in plate 68 is vacuum valve 71, its actuating pin 71' being located so as to be actuated when plates 10 and 68 are pressed together. The assembly is pivotally mounted to the floorboard by pivot pin 72 and a bracket, not shown. Push rod 12 is pivotally mounted at one end to lower plate 69 in a suitably formed socket 73 and passes slidably through the firewall. The other end of rod 12 is bent and extends through a suitable perforation at one terminal end of link 74 retained by any suitable means, not shown. The link 74 is pivotally mounted at its other end to a bracket firmly affixed to the frame such that the link is substantially perpendicular to rod 12 and as explained earlier, the link 74 is associated with the firewall by means of a return spring 32. In proximity to the pivotal attachment between rod 12 and link 74 a second perforation is made to accept the rod 34 that extends to the two-way yield device, the other end of which is attached to the carburetor. The construction and use of the yield device are the same as hereinbefore mentioned.

Mounted on firewall 13 or other fixed and rigid member is a vacuum valve 75 with an actuating arm means 76 that is pivotally or resiliently mounted so as to communicate with the actuating pin of valve 75. Mounted on rod 2 is an adjustable valve actuating means 76', the purpose of which should be apparent without further discourse.

An essential part of this particular embodiment is the vacuum power cylinder 45 which is the same in construction as described in the first embodiment of this invention.

In the rest position, spring 32 urges the carburetor throttle plate arm against the idle stop as in the prior embodiment. The adjustable valve actuator 76' is initially adjusted so that the valve actuating arm 76 may close the valve. It is, of course, understood that there is no foot pressure now being applied to the accelerator pedal upper plate 10 and therefore spring 69 urges plates 10 and 68 apart allowing valve 71 to remain open. However, when foot pressure is applied to the accelerator pedal upper plate 10, it is forced towards plate 68 against the spring pressure of the throttle return spring 32 and spring 69. Thus, valve 71 is actuated and now closes. As push rod 12 is urged forward, valve actuator 76' moves forward allowing valve 75 to open. It is evident then that valves 71 and 75 act in concert to maintain a closed vacuum circuit to vacuum power cylinder 45 as long as communication between the accelerator pedal and carburetor is normal and when there is pressure on the accelerator pedal and the system is in other than an idle condition. Should the linkage bind or the spring 32 break, and the operator removes his foot from pedal 10, valves 71 and 75 will both be in an open condition applying vacuum to vacuum power cylinder 45, returning the throttle plate and carburetor to an idle condition.

In automobiles which are light in weight and do not have power steering or power brakes, it may be economically advantageous to stop the engine rather than return it to an idle condition. FIG. 3 shows such an embodiment utilizing a set of contact points which are integral with the accelerator push rod to sense throttle linkage failure and stop the engine.

Referring now to FIG. 3, there is shown as before, a cross-sectional view of floorboard 5 of a vehicle to which accelerator pedal 10 is pivotally attached (not shown). Push rod 12 is pivotally mounted to accelerator pedal 10 in any standard manner as normally used in motor vehicles and extends through cylindrical upper housing 77 into spring retainer 78 and insulated contact support 79, both of which are pinned or otherwise rigidly affixed to rod 12.

The contact switch assembly, generally indicated as 80, has a substantially cylindrical housing 81 open at one end with a means 16 extending from its lower end along axis, the means being arranged to form a rectangular link end and suitably perforated to form apertures 18 and 19 as hereinbefore described in the first embodiment. The cover 20 for the housing includes the support for rod 12, and the similarity of these elements will be appreciated from a comparison of FIGS. 1 and 3. The end of insulated contact support 79 positioned in the housing is concentrically drilled and/or tapped to receive contact element 83, and attached thereto by any convenient means is a conductor wire 84 which passes through perforation 85 in the end of housing 81 this being suitably bushed to prevent chafing. Housing 81 is suitably drilled and tapped in its bottom concentric with its inner bore to receive the metal contact element 86 with the housing 81 being grounded to the electrical ground of the vehicle. Spring 21, as shown, is disposed between the bottom of the housing 81 and the spring retainer 78 while the push rod 12 is suitably drilled to allow the pin 27 to be arranged as a stop and for the purpose explained earlier.

The lower end of the housing 81 is pivotally supported by link 30 and spring 32 which is associated therewith and operates in the same manner as explained in connection with FIG. 1.

It should be now clear to those skilled in the art that the external construction of the switch means described above resembles the external construction of the comparable valve means of the first embodiment hereinbefore described.

There is interposed between the end of housing 81 and throttle plate lever 33 a push rod incorporating a one-way yield device constructed as follows. Rod 34 is secured at one end to housing 81, as shown and at its opposite end includes a disc 37 which is positioned in casing 89, the casing being closed with a perforated cover through which the rod 34 is arranged to extend. A spring 38 is disposed within housing 86 under a compressive force between disc 37 and cover 36 so as to normally hold rods 34 and 87, the latter being affixed to the throttle plate in fixed alignment, disc 37 being a relatively close sliding fit in the bore of housing 86, and rod 34 being a substantially close sliding fit in the concentric perforation in cover 36.

It is believed to be apparent that the one-way yield device is substantially one-half of the two-way yield device described earlier and is required to allow adjustment of the carburetor as explained herein.

From the foregoing description the method of constructing and using this embodiment will be readily understood. Contact means 83 and 86 form the ground connection for the ignition system. At idle, the throttle return spring 32 has sufficient strength to overcome the compressive spring force of spring 21 and spring 38 thus urging housing 81 toward the firewall 15 and thus causing push rod 12, spring retainer 78, insulated contact support 79 and contact element 83 to resist the motion of housing 81 bringing the contact means 83 and 86, respectively, together and completing the ignition ground. When the accelerator pedal 10 is depressed, spring 21 remains compressed due to the restraining force of throttle return spring 32, thus maintaining both contacts 83 and 86 in abutment while the forward motion of the transverse actuating rod 12, push rod 34, disc 37, housing 89, and rod 87 to the throttle lever 33, thus opening the throttle 56. It will be apparent to those skilled in the art that as long as throttle spring force and the force exerted on the accelerator pedal oppose each other, the contacts 83 and 86 will remain closed and the engine will continue to run. If, however, the driver removes his foot from the accelerator pedal and the throttle does not return to its idle rest position, spring 21 will be released and force spring retainer 78, insulated contact support 79 and contact 83 away from the bottom of housing 81, thus separating the contacts and effectively turning off the ignition.

Referring now to FIG. 4, there is shown another embodiment of this invention which utilizes a pull cable to close the fail-safe switch. In this instance the accelerator pedal 10 is pivotally mounted on arm 91 which, in turn, is pivotally mounted on bracket 92 attached, for example, to the firewall. A cable 93 passes through a suitable conical perforation in the upper end of arm 91 and is secured in tension by a standard cable compression ball. While a detailed description, it can be seen, that the contact switch assembly consisting of cover 94, housing 95, tube extension 96 and its internal parts, performs the same function as hereinbefore described, except that the contacts 94 and 98 are closed when a pull is exerted on cable 93 and the housing is pulled instead of pushed as in the previ-
ously described embodiments. In this form of the invention, link 99 is pivotally mounted on a support 100 which is rigidly attached to the frame. The switch housing is pivotally attached to the upper end of link 99 and slidably supported in bushing 101, tube 96 extending through dust shield 102 and through the firewall. At the lower end of link 99 is attached rod 34 of the one-way yield device constructed and used as hereinbefore described.

Here the throttle return spring 32 is attached to a suitable perforation in link 99 and firmly attached at the other end to a fixed anchorage. The spring force of spring 32 must be adequate to overcome the spring force of spring 103 and spring 38 for the reasons earlier described. It is evident from the discussion of the previous embodiments that under all normal conditions contacts 97 and 98 are in contact maintaining a proper electrical ground for the ignition to operate. If the throttle fails and remains in an open condition when the operator removes his foot from the accelerator pedal, spring 103 opens contacts 97 and 98 and the engine stops.

Referring now to FIG. 5, there is shown a further embodiment of this invention in which the contacts are pivotally mounted instead of axially mounted.

The grounded contact arm 104 is pivotally mounted so as to rotate about shaft 105 which is rigidly affixed to the frame, and the insulated contact arm 108 is pivotally mounted at the same pivot. Contact means 107 is rigidly attached by riveting to an aperture ear extending at right angle from arm 104 and in a substantially radial direction from pivot 105. Contact element 108 is mounted by means of insulated washers to an aperture ear extending at right angles to arm 106 so that the pair of contacts are in direct alignment with each other. In a like manner, ear 109 with spring support pin 110 at its center extends from arm 104, and ear 111 with spring support pin 117 at its center extends from arm 106. Spring means 113 is disposed between ear 109 and 111 to hold the contact elements 107 and 108 apart. Extending also at right angles from arm 104 is an arm 114 which is suitably threaded to receive a stop screw 115 which is provided with a lock nut 116. It will be noted in this embodiment that the stop screw 115 bears against a stop 117 which is rigidly attached to the firewall 15.

Arm 106 is extended downwardly to a perforated terminal end to which one end of the spring 32, the throttle return spring, is attached, while the other end of the spring is connected to a fixed anchorage.

In this embodiment the functions are the same as those in FIG. 3, wherein the switch assembly is an integral part of the push rod assembly. It is believed that from the foregoing it will be now appreciated that the throttle return spring 32 is sufficiently adequate to overcome the force of one-way yield springs 38 and spring 113, thus urging arm 106 and contact 108 against contact 107, while simultaneously forcing arm 104 and stop screw 115 against stop 117. The application of pressure on the accelerator pedal 10 transmits the forwardly directed force through arm 104, contact elements 107 and 108, arm 106 into rod 34, rod 38, to the throttle plate lever 33, thereby maintaining constant contact to properly ground the ignition system. It is evident that should the throttle stick open or spring 32 break and pedal pressure is removed, spring 113 will urge said contact members apart, causing the ignition system to be disabled.

FIG. 6 shows another embodiment of this invention using a pull cable with pivoted contacts. From the foregoing construction and description in FIGS. 4 and 5, the construction and operation of this embodiment should be clear to those skilled in the art. The pivotal point assembly has been reversed so that pulling closes the points and a reversing link is used to achieve a pushing motion to operate the carburetor throttle lever. This embodiment combines elements from FIGS. 4 and 5 to perform the same functions as previously described.

From the foregoing description it should become obvious that combinations of various elements may be assembled to provide the same functions as hereinbefore noted and different energy modes may be used. For example, the embodiment now to be described and shown in FIG. 7, utilizes switches and electrical energy to achieve the same concerted action as the valves shown in FIG. 2.

Referring to FIG. 7, there is shown another embodiment in which switch 120 is affixed to the lower pedal 68, and a switch 121 which is rigidly attached to the firewall 15. Switch 120 replaces valve 71 of FIG. 2 and switch 121 replaces valve 75 in that same view. These switches perform substantially the same function to switch electrical energy to relay 122 to stop the engine in case of throttle failure.

FIG. 7 also shows no yield device, the removal of which may be accomplished by arranging switch 121 to have sufficient overtravel to be actuated just before maximum fast idle when the pedal is released and allowing the linkage to return to lowest idle position when fast idle is not required. It should be clear that this principle can be applied to all of the other embodiments shown.

An alternate approach is shown in FIG. 7A in which switches 120' and 121' are arranged in parallel with each other, the pair being placed in series with the ignition circuit eliminating the need for relay 122 and opening the ignition circuit to stop the engine in the case of throttle failure.

FIG. 8 is a further embodiment which illustrates how the return to idle operation can be accomplished electrically. The solenoid means 123 replaces the vacuum power unit 45 of FIG. 2. By combining the concerted switching of FIG. 7 with the solenoid means 123 of FIG. 8, the precise actions of the embodiment of FIG. 2 are achieved electrically.

FIG. 9 illustrates the same action by combining the single contact switch of the embodiment shown in FIG. 3 with the solenoid means 123 of FIG. 8.

It should be further obvious to those skilled in the art that hydraulic power is available within motor vehicles which have power steering and therefore high-pressure hydraulic fluid may be used to return the carburetor to idle.

Referring to FIG. 10 it can be seen that a hydraulic power cylinder 124 replaces the vacuum power cylinder 45 of FIG. 2. By simply replacing the vacuum valves 71 and 75 of FIG. 2 with hydraulic valves (not shown), will provide the same valving action. By replacing the vacuum lines with hydraulic lines and connecting the system to the high-pressure line of the power steering pump, improper communication between the accelerator pedal and the carburetor will allow both valves to open, applying high pressure oil to the hydraulic power cylinder 124, to thereby return the carburetor to idle.

While numerous embodiments of this invention have been shown, it will be obvious to those skilled in the art that it is not so limited, but may be rearranged in its basic form to include other forms such as actuating the carburetor using a pull cable attached directly to the throttle plate lever arm, appropriately placing the sensing means for delineating proper or improper communication between the accelerator pedal and carburetor.

The term "throttle plate lever means" may represent the throttle control lever in any of its forms including that for the fuel control rack on diesel engines.

Such modifications are considered to be within the spirit of this invention for sensing the lack of proper communication; moreover, it is conceivable to add to the system an additional power cylinder means for actuating the power brakes of the vehicle.

What is claimed is:

1. A fail-safe throttle control mechanism for internal combustion engine carburetors including a carburetor mounted on
a motor vehicle comprising throttle plate lever means associated with the carburetor, means carried by said throttle plate lever means extending to an accelerator pedal, said last-named means further including means for sensing failure of the accelerator pedal to return to a normal condition upon an attempt to decelerate and reacting to such improper communication of operation of the released accelerator pedal to said throttle plate lever means, and said reacting means being so disposed in the mechanism for immediately rendering the engine operation safe by returning the throttle plate lever to an idle position.

2. A fail-safe throttle control mechanism as claimed in claim 1, wherein the reacting means is hydraulically actuated.

3. A fail-safe throttle control mechanism as claimed in claim 1, wherein the reacting means is vacuum actuated.

4. A fail-safe throttle control mechanism as claimed in claim 1, wherein the reacting means includes an electrical system provided on the motor vehicle.

5. A fail-safe throttle control mechanism as claimed in claim 1, wherein a solenoid is included in the electrical system of the motor vehicle.

6. A fail-safe throttle control mechanism as claimed in claim 1, wherein the means carried by said throttle plate lever means extending to the accelerator pedal is push operated.

7. A fail-safe throttle control mechanism as claimed in claim 1, wherein the reacting means comprises a power means.

8. A fail-safe throttle control mechanism as claimed in claim 1, wherein the reacting means comprises a cylinder.

9. A fail-safe throttle control mechanism as claimed in claim 1, wherein the sensing means includes valve means actuated by the accelerator pedal.

10. A fail-safe throttle control mechanism as claimed in claim 1, wherein the sensing means includes electrical contact means actuated by the accelerator pedal.

11. A fail-safe throttle control mechanism as claimed in claim 1, wherein the accelerator pedal comprises at least two interconnected plates, one of which carries either a switch means or a valving means.

12. A fail-safe throttle control mechanism as claimed in claim 1, wherein the carburetor and the throttle plate are replaced by a diesel fuel rack.

13. A fail-safe throttle control mechanism as claimed in claim 1, wherein the means carried by said throttle plate lever means extending to an accelerator pedal further includes means to permit the adjustment of said carburetor without disturbing the sensing means.

14. A fail-safe throttle control mechanism as claimed in 13, wherein the means to permit adjustment of said carburetor includes a double resilient means.