

[54] **THROTTLE PEDAL CONTROLLED
THROTTLE OVERRIDE SYSTEM**[75] Inventor: **Donald D. Stoltman**, Henrietta, N.Y.[73] Assignee: **General Motors Corporation**,
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261/23 A, 261/39 B, 261/50 A, 123/98[51] Int. Cl. ... **F02m 13/06**, F02m 1/12, F02m 9/08[58] Field of Search 261/23 A, 50 A, 39 B;
123/97 B, 127, 119 F, 98[56] **References Cited**
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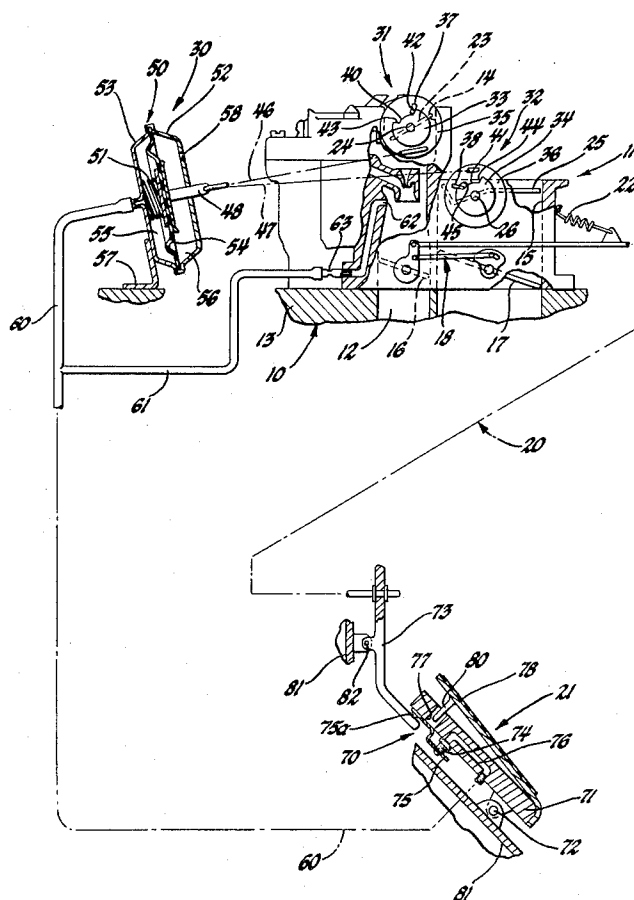
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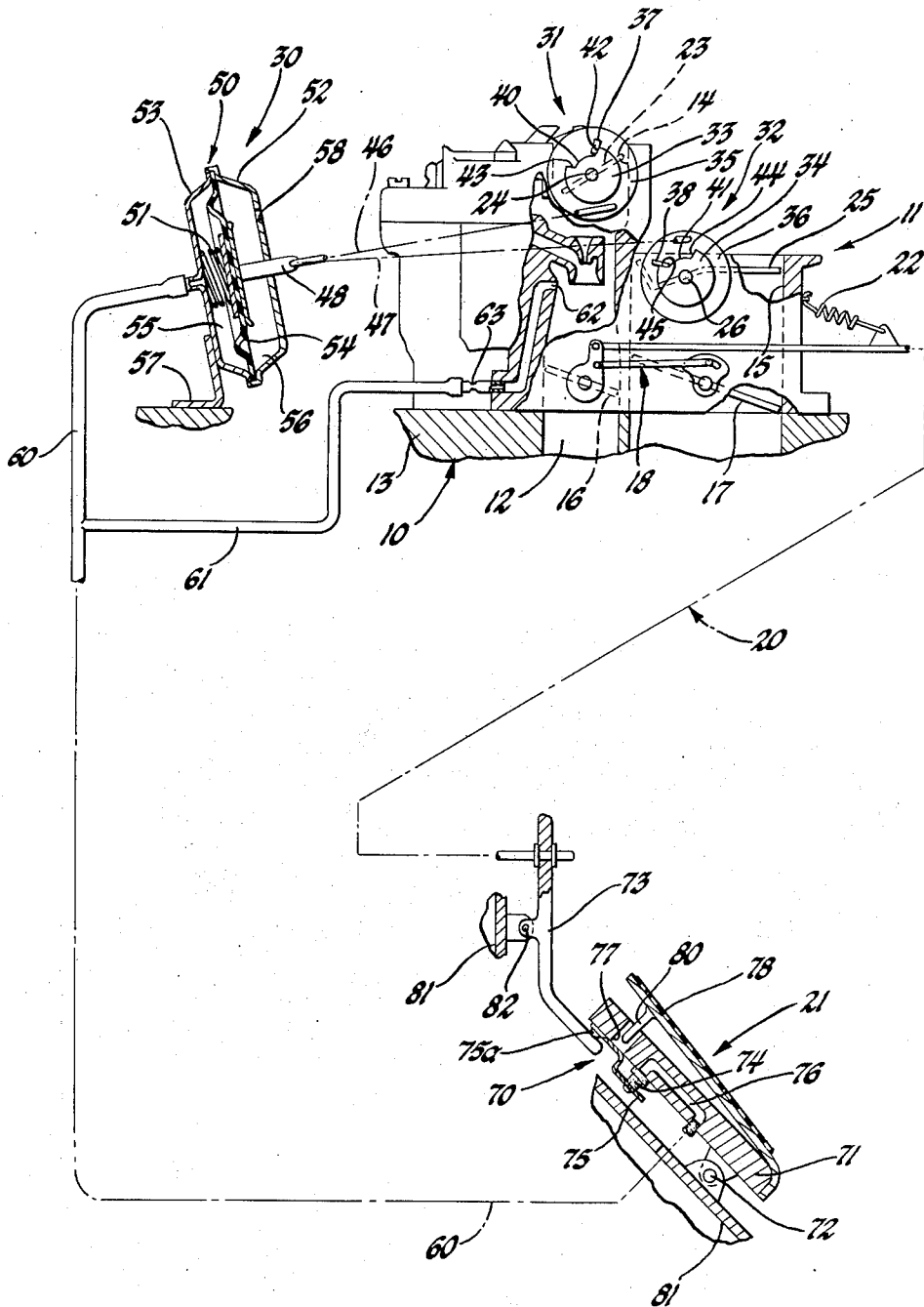
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[57] **ABSTRACT**

A throttle override system for the internal combustion engine of a vehicle wherein the choke valves and the air valves of the carburetor of the engine are connected to the diaphragm of a vacuum motor, the vacuum side of the vacuum motor being connected to a port in the throat of the carburetor and to the inlet of a normally closed bleed valve that is opened by depression of the accelerator pedal of the vehicle.

3 Claims, 1 Drawing Figure



THROTTLE PEDAL CONTROLLED THROTTLE OVERRIDE SYSTEM

The present invention relates to a throttle control for an internal combustion engine and more particularly to a throttle override system for controlling the valves, upstream of the carburetor throttle valves in the carburetor of the engine of a vehicle.

During normal vehicle operation, the acceleration and deceleration of the internal combustion engine of the vehicle is normally controlled by the throttle valves in the carburetor of the engine which are actuated by the vehicle operator through a throttle pedal and interconnecting throttle linkage. It is now deemed desirable to provide in such a vehicle a throttle override system which will act independently of the throttle valves to effect deceleration of the engine, under certain engine operating conditions, when the operator removes the actuating force from the throttle pedal.

It is therefore a primary object of the present invention to provide a throttle override system for the internal combustion engine of a vehicle which is operable on removal of actuating force from the vehicle throttle pedal to partly close the choke valves and air valves upstream of the carburetor throttle valves of the carburetor to thereby reduce the flow of air to the engine independent of the position of the throttle valves.

It is another object of the present invention to provide an air flow control system for an internal combustion engine of a vehicle wherein the choke valves and the air valves upstream of the carburetor throttle valves in the induction passages of a carburetor are moved to predetermined partly closed positions as a function of the accelerator pedal position.

These and other objects of the invention are attained in a vehicle by a throttle override system which includes an actuator mechanism operatively connected to the choke valves and the air valves of the carburetor in a manner to permit these valves to be operated normally in a conventional manner except when actuating force is removed from the vehicle's throttle pedal. The actuator mechanism is connected by a conduit to communicate with a source of engine vacuum and a bleed valve operatively connected to the vehicle throttle pedal.

For a better understanding of the invention as well as other objects and further features thereof, reference is made to the following description taken in conjunction with the single accompanying schematic drawing of a vehicle engine and its control system and includes a throttle override system provided in accordance with the present invention, with some of the elements of these systems being illustrated in cross section.

With reference to the drawing, there is shown the internal combustion engine 10 of a vehicle, not shown, having mounted thereon a conventional carburetor 11, which is illustrated as being a four barrel carburetor, only one primary bore and one secondary bore of the carburetor being shown. Carburetor 11 is operative, in a conventional manner, to supply an air fuel mixture to the induction passage 12 of the intake manifold 13 of the engine. Flow through the primary throttle bores 14 is controlled by primary throttle valves 16 while flow through the secondary throttle bores 15 of the carburetor 11 is controlled by secondary throttle valves 17. These throttle valves are operator controlled in a conventional manner with the throttle valves 17 being con-

nected by a conventional lost motion linkage 18, shown schematically only, to normally follow the movement of the primary throttle valve 16, in a well-known manner. The primary throttle valve 16 and the secondary throttle valves 17 are actuated through a throttle linkage 20 connected to the vehicle throttle pedal 21 to effect opening movement of the primary throttle valves 16 and, through the linkage 18 the secondary throttle valves 17, against the closing bias of a return spring 22 connected between the throttle linkage 20 and the carburetor 11.

As is conventional, choke valves 23 are fixed to the choke shaft 24 for pivotable movement in the primary throttle bores 14 upstream therein of the primary throttle valves 16, and air valves 25 are fixed to an air valve shaft 26 for pivotable movement in the secondary throttle bores 15 upstream therein of the secondary throttle valves 17, both the choke valves 23 and the air valves 25 being operable in a conventional manner. However, in accordance with the present invention, an override mechanism is connected to these valves so that on removal of an actuating force from throttle pedal 12 and if the air flow rate through the carburetor is above a predetermined rate, these valves will be partly closed to limit air flow to the engine, in a manner to be described.

In accordance with the invention, a power actuator 30 is connected through a pair of suitable lost motion devices 31 and 32 to the choke shaft 24 and the air valve shaft 26, respectively, to limit opening of the choke valves 23 and the air valves 25 to predetermined partly closed positions whereby the flow of air to the engine 10 is controlled by the choke valves 23 and the air valves 25 in lieu of this air flow being controlled by the primary throttle valves 16 and the secondary throttle valves 17. The lost motion devices 31 and 32 are operative, in a manner to be described, to permit normal operation of the choke valves 23 and the air valves 25 whereby air flow to the engine is controlled by the position of the primary throttle valves 16 and the secondary throttle valves 17 in a normal manner, except when actuating force is removed from throttle pedal 21, whereupon the power actuator connected to the lost motion linkages 31 and 32 effects movement of the choke valves 23 and the air valves 25 to their predetermined partly closed positions.

In the embodiment shown, the lost motion device 31 is mounted on the choke shaft 24, and includes a fixed lever 33 fixed to the end of choke shaft 24 for rotation therewith and a loose lever 35, for pivotable movement relative to the choke shaft 24. The loose lever 35 is provided with an axially extending tab 37 positioned to be received in arcuate slot 40 in fixed levers 33. The length of slot 40 is defined at opposite ends by shoulders 42 and 43, the spacing between which is such that, when the loose lever 35 is rotated in a counterclockwise direction with reference to the drawing from its position, as shown, the choke valves 23 can be moved in a conventional manner between their closed positions and their open positions. However, when the loose lever 35 is rotated in the clockwise direction to the position shown in the drawing, the tab 37 thereon will engage the shoulder 42 of the fixed lever 33 to effect corresponding rotation of the fixed lever 33 moving the choke valves 23 toward predetermined partly closed positions which is between their normal closed positions and their open positions, these predetermined

partly closed positions of the choke valves 23 being selected, as desired, to provide for adequate air flow to the engine to effect its operation at a reduced speed as desired to permit engine starting. In a similar manner, the lost motion device 32 includes a fixed lever 34 secured to air valve shaft 26 for rotation therewith and a loose lever 36 mounted on this shaft for pivotal movement relative to it. Loose lever 36 is provided with an axially extending tab 38 positioned to be received in the arcuate slot 41 in fixed lever 34. The length of slot 41 is defined at its opposite ends by shoulders 44 and 45, the spacing between which being such that, when loose lever 36 is rotated in the clockwise direction with reference to the drawing from its position as shown, the air valves 25 can be moved in a conventional manner between their open positions and their closed positions. However, when the loose lever 36 is moved in the clockwise direction of the position shown, the tab 38 thereon will engage shoulder 44 of fixed lever 34, moving air valves 23 toward predetermined closed positions selected to provide adequate air flow to the engine to effect its operation at a reduced speed.

Rotational positioning of the loose levers 35 and 36 is effected by means of power actuator 30. Although other coupling arrangements could be used, the actuator mechanism 30 in the embodiment illustrated is connected to one end of suitable linkages 46 and 47, the other ends of which are pivotably connected to loose levers 35 and 36, respectively, this coupling arrangement being such that leftward actuation of the linkages 46 and 47 effects clockwise rotation of loose lever 35 and counterclockwise rotation of the loose lever 36.

Power actuator 30 includes a differential fluid pressure actuated motor in the form of a vacuum motor 50. Vacuum motor 50 comprises a housing formed by cup-shaped right and left housing parts 52 and 53 respectively, that securely seal a diaphragm 54 therebetween to define a vacuum chamber 55, the lefthand chamber with reference to the drawing, and an atmospheric chamber 56, the righthand chamber. A spring 51 shown positioned between left housing part 53 and diaphragm 54 to normally bias the diaphragm to an extended position, to the right with reference to the drawing. The vacuum motor 50 is mounted by a bracket 57 to the engine 10 in a spaced apart relationship to the carburetor 11 so that the vacuum motor actuator rod 48, one end of which is centrally affixed to diaphragm 54, extends slidably through the right housing part 52 in a line intermediate loose levers 35 and 36, the other end of actuator rod 48 being pivotably connected to one end of each of the linkages 46 and 47.

To permit the vacuum actuation of vacuum motor 50, the atmospheric chamber 56 on one side of diaphragm 54 is continually vented to the atmosphere through the vent port 58 in right housing part 52 and the vacuum chamber 55 on the other side of diaphragm 54 is connected by a conduit 60 and a branch conduit 61 to a source of vacuum such as at the venturi located port 62 in the venturi section of a primary throttle bore 14 of the carburetor. A flow restriction or orifice 63 is provided in branch conduit 61 between the vacuum motor 50 and port 62.

Operation of the vacuum motor 50 is controlled by means of a bleed valve or control valve 70 operatively connected for actuation by the accelerator or throttle pedal 21. The throttle pedal 21, in the embodiment shown, includes a pedal and valve body element 71 piv-

otally supported at one end relative to the vehicle fire wall 81 by a pivot 72 and its free end being positioned to contact and pivot a pedal lever 73, pivotally supported relative to the fire wall by pivot pin 82, the pedal lever 73 forming part of the throttle linkage 20. Control valve 70 is positioned in the pedal and valve body element 71 intermediate the pivot end and free end thereof and comprises a valve member 74 fastened to one end of a leaf spring 75, the other end of the spring being suitably connected as by rivet 75a to the underside of pedal and valve body element 71 so as to bias the valve member 74 to normally seat on the underside of the pedal and valve body element 71 to normally seal off one end of a vent passage 76, the other end of which is connected by the conduit 60 to communicate with vacuum chamber 55. As would be apparent, at least the portion of conduit 60 adjacent to the body element 71 should be a flexible conduit. Intermediate its free and fixed ends, leaf spring 75 passes over one end of the finger passage 77 extending through the thickness of pedal and valve body element 71.

Throttle pedal 21 includes a pedal and valve actuating member 78 which may be pivotally connected at one end to the pivot end of the pedal and valve body element 71 or, as shown, be of relatively flexible material connected to the element 71. Proximate its other end, pedal and valve actuating member 78 has an actuating finger 80 extending at right angles from the underside thereof in position to extend into passage 77. Actuating finger 80 is operative upon application of an actuating force to pedal element 78 so as to engage spring 75, to unseat valve 74 from the underside of pedal and valve body element 71 to unblock vent passage 76.

Operation

With an actuating force applied to the pedal and valve actuating member 78, control valve 70 is opened to place the vacuum chamber 55 of the vacuum motor 50 in communication with the atmosphere. Since the flow between the vacuum chamber 55 and the source of vacuum is restricted by orifice 63, the pressure in vacuum chamber, with valve 74 unseated, will increase toward atmospheric pressure. When the pressure differential on the opposite side of the diaphragm 54 is sufficiently decreased, spring 51 will extend the diaphragm 54 to the right from the position shown to effect corresponding movement of linkages 46 and 47 rightwardly with reference to the drawing in a substantially translational movement, thereby rotating loose lever 35 in a counterclockwise direction and loose lever 36 in a clockwise direction from the position of these levers shown in the drawings, whereby the choke valves 23 and the air valves 25 are then permitted to operate normally in a conventional manner. When actuating force is removed from the pedal and valve actuating member 78, leaf spring 75 causes valve element 74 to seat on the underside of pedal and valve body member 71 to close off the vent passage 76. Vacuum is thereupon permitted to be applied to the vacuum chamber 55 through conduit branch 61 and conduit 60 thereby increasing the differential pressure on the opposite sides of the diaphragm 55 until the leftward actuating force created by the pressure differential overpowers the bias of spring 51 to retract actuator rod 48 leftwardly with reference to the drawing, thereby effecting clockwise rotation of the loose lever 35 and counterclockwise direction of the loose lever 36 due to

the leftward translation of linkages 46 and 47, respectively. The amount of closing rotation of choke valves 23 and air valves 25 effected through the rotation of loose levers 35 and 36, respectively, is limited to the translation of linkages 46 and 47 respectively and the amount of such translation is selected so that, rather than being returned to their closed positions, choke valves 23 and air valves 25 are returned to partly closed positions offset slightly in an opening direction from the closed positions. When in the partly closed positions choke valves 23 and air valves 25 reduce the air flow to the engine 10 to effect the deceleration thereof regardless of the position of the primary throttle valves 16 or secondary throttle valves 17 at the time, the air fuel mixture then provided to engine 10 being thereby sufficiently enriched so as to greatly reduce the power output of engine 10 without stalling the engine.

Upon reapplication of actuating force to throttle pedal 21, valve actuating finger 80 thereof overcomes the bias of spring 75 to cause the opening of vent passage 76 thereby the pressure differential on the opposite side of diaphragm 54 is decreased to where spring 51 is permitted to rotate loose levers 35 and 36 from the position shown in the drawing to positions permitting normal operation of the choke valve 23 and air valve 25.

Having described one embodiment of the present invention, it is understood that the specific terms and examples are employed in a descriptive sense only and not for the purpose of limitation. Other embodiments of the invention, modifications thereof, and alternatives thereto may be used. I therefore aim in the appended claims to cover such modifications and changes as I would in the true spirit of the scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a vehicle including an internal combustion engine providing a source of engine vacuum and having an air induction passage; at least one operator controlled throttle valve pivotally mounted in an air induction passage to normally regulate air flow to the engine, a valve pivotally mounted on a shaft upstream of the throttle valve in the air induction passage; and vehicle throttle pedal means operatively connected to the throttle valve;

a. differential fluid pressure actuated power means including diaphragm means and at least one chamber having a movable wall defined by said diaphragm means;

b. valve controlled conduit means connecting said one chamber to the source of engine vacuum and including control valve means and valve actuating means, said control valve means being operatively connected to communicate with said one chamber, and said valve actuating means being operatively connected to said vehicle throttle pedal and positioned to actuate said control valve means to place said one chamber in communication with the atmosphere;

c. lost motion linkage means operatively connecting said diaphragm means of said differential fluid pressure actuated power means to said shaft and operative to permit said shaft to be normally moved between a first position and a second position when said one chamber of said differential fluid pressure actuated power means is placed in

communication with the source of engine vacuum; and

d. spring means operatively connected to said lost motion means and operative to effect movement of said valve from said second position to said first position when said one chamber of said differential fluid pressure actuated power means is placed in communication with the atmosphere by actuation of said control valve means.

2. In the vehicle including an internal combustion engine providing a source of engine vacuum and having a carburetor having at least a primary air induction passage and a secondary air induction passage, a primary operator controlled throttle valve pivotally mounted in the primary air induction passage and a secondary throttle valve pivotally mounted in the secondary air induction passage, the primary throttle valve and the secondary throttle valve being operative to normally regulate air flow to the engine, a choke valve pivotally mounted on a choke shaft upstream of the primary throttle valve in the primary air induction passage and an air valve pivotally mounted on air valve shaft upstream of the secondary throttle valve in the secondary air induction passage; and vehicle throttle pedal means operatively connected to the primary throttle valve and the secondary throttle valve;

a. differential fluid pressure actuated power means including a housing and diaphragm means separating said housing into a first chamber and a second chamber, said second chamber being connected to communicate with the atmosphere;

b. conduit means connecting said first chamber of said differential fluid pressure actuated power means to communicate with the source of engine vacuum; said conduit means including an orifice means to restrict the flow between said first chamber and the source of engine vacuum;

c. control valve means operatively connected to said first chamber and operative to connect said first chamber to selectively communicate with the atmosphere, said control valve means including valve actuator means operatively connected with the vehicle throttle pedal; and being operative upon actuation of the throttle pedal to actuate said control valve means to place said first chamber in communication with the atmosphere;

d. lost motion linkage means operatively connecting said diaphragm means to both the choke shaft and to the air valve shaft and being movable between a first position in which the choke valve and air valve are operable in a normal manner between a normally closed position and a normally open position and, a second position in which the choke valve and air valve are positioned in a partly closed position between said closed position and said open position; and

e. spring means operatively connected to said lost motion linkage means and operative when said vehicle throttle pedal is actuated to effect movement of said lost motion linkage means to said first position to permit normal operation of the choke valve and the air valve.

3. A throttle override system for use in a vehicle including an internal combustion engine providing a source of engine vacuum and having at least one air induction passage, at least one operator-controlled throttle valve pivotally mounted in the air induction passage

to normally regulate airflow to the engine, and at least one valve pivotably mounted on a shaft upstream of the throttle valve in the air induction passage for movement therein between a full open position and a closed position, the throttle override system comprising:

- a. differential fluid pressure actuated power means including diaphragm means and at least one chamber having a wall defined by said diaphragm means;
- b. lost motion linkage means operatively connecting said diaphragm means of said differential fluid pressure actuated power means to said shaft and operative to be moved to a first position in which said valve is permitted to be moved between said open position and said closed position and to a second position in which said valve is in a partly closed position between said open position and said closed position;
- c. spring means operatively connected to said lost motion means to normally bias said lost motion linkage means to said first position; and
- d. valve control means connecting said one chamber to communicate with said source of engine vacuum and including a flow orifice positioned between the

source of engine vacuum and said one chamber and a pedal and valve body pivotably mounted on the vehicle and operatively connected to the throttle valve, said pedal and valve body having a passage therein connected at one of its ends to communicate with said one chamber of said differential fluid pressure actuated power means, spring means connected at one of its ends to said pedal and valve body for movement relative thereto, valve means connected to the other end of said spring means and biased thereby to normally close the other end of said passage, a pedal and valve actuating member connected to said pedal and valve body for movement relative thereto and positioned to engage said spring means when moved relative to said pedal and valve body, whereby, when an actuating force is applied to said pedal and valve actuating member, said pedal and valve actuating member engages said spring means to move said valve means opening said other end of said passage thereby placing said one chamber of said differential fluid pressure actuated power means in communication with the atmosphere.

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