

- [54] **POWER FUEL SUPPLY SYSTEM FOR AN
INTERNAL COMBUSTION ENGINE
CARBURETOR**
- [75] Inventors: **Clarence C. Herbert**, Southgate;
Thomas R. Johnson, Ann Arbor;
Anthony Verduce, Plymouth, all of
Mich.
- [73] Assignee: **Ford Motor Company**, Dearborn,
Mich.
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- [52] **U.S. Cl.**..... 261/23 A; 261/51; 261/69 R;
137/625; 137/68
- [51] **Int. Cl.**² **F02M 7/22**
- [58] **Field of Search**..... 261/69 R, 69 A;
137/625.68, 613; 261/51, 23 A

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Primary Examiner—Tim R. Miles
Attorney, Agent, or Firm—Roger E. Erickson; Keith L. Zerschling

ABSTRACT

A power fuel supply system for a multi-barrel carburetor of an internal combustion engine. The system includes a power valve which in its preferred embodiment has a two-stage operation. The first stage opens in response to a drop in manifold vacuum while the second stage is mechanically actuated near a wide-open throttle position by a linkage connected to the throttle lever. The power valve includes a sleeve or piston which when the valve is closed prevents communication between the left-hand and right-hand fuel supply passages of the carburetor and thereby prevents undesirable interaction effects to the separate fuel metering signals.

6 Claims, 5 Drawing Figures

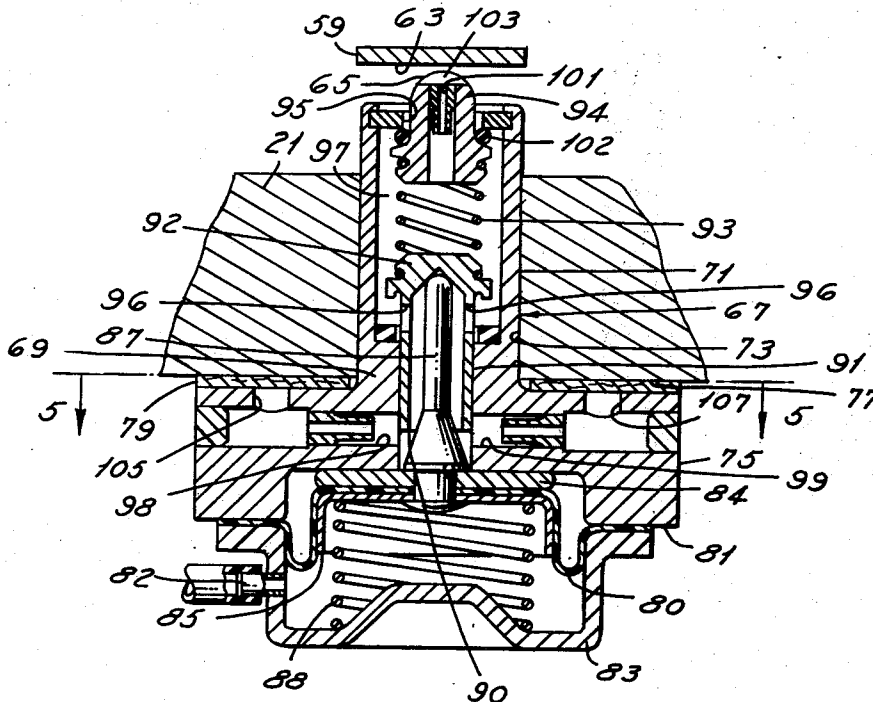


FIG. 1

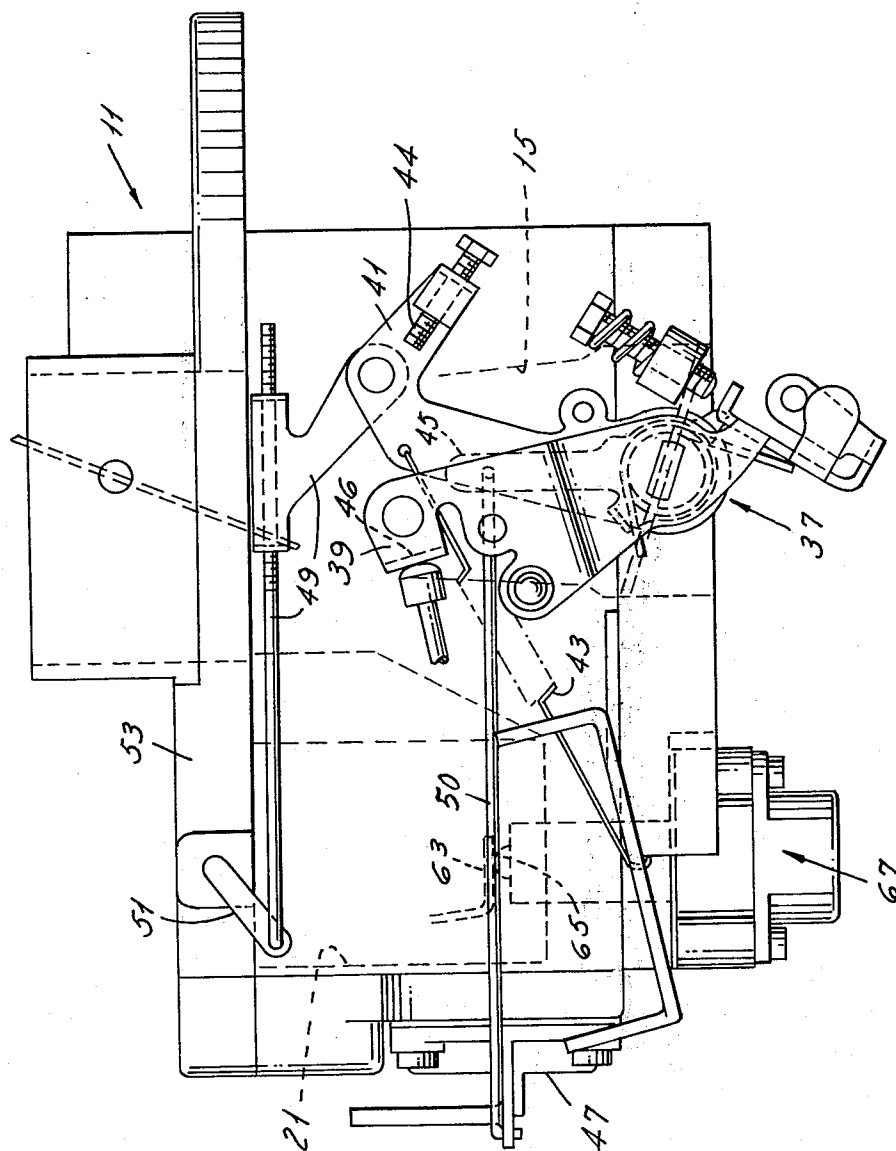


FIG. 2

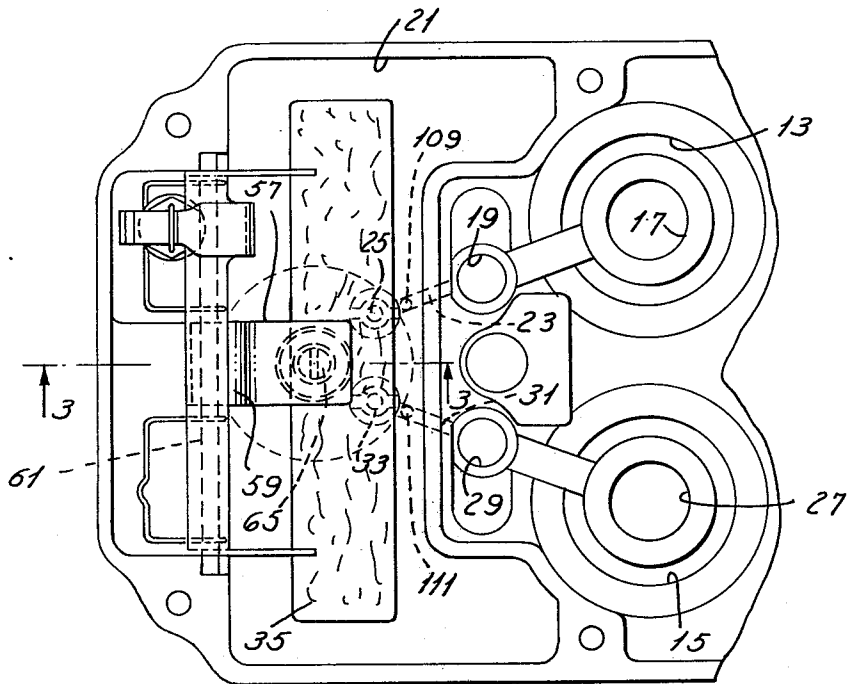


FIG. 3

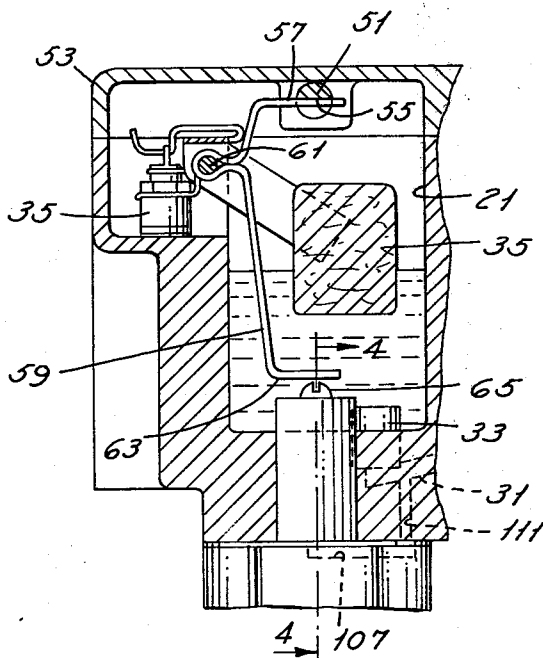


FIG. 4

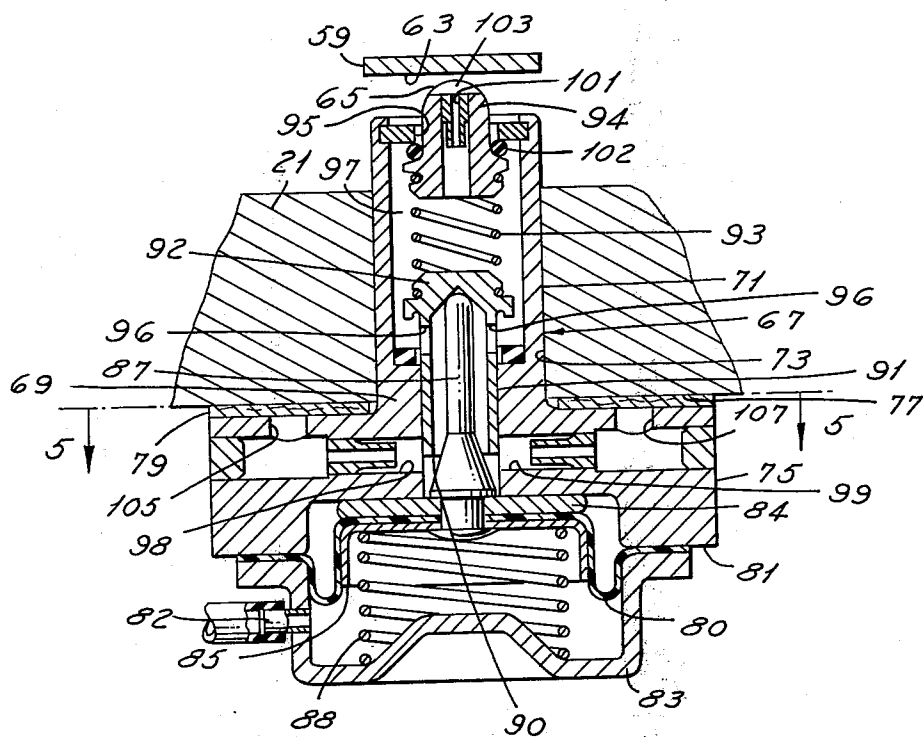
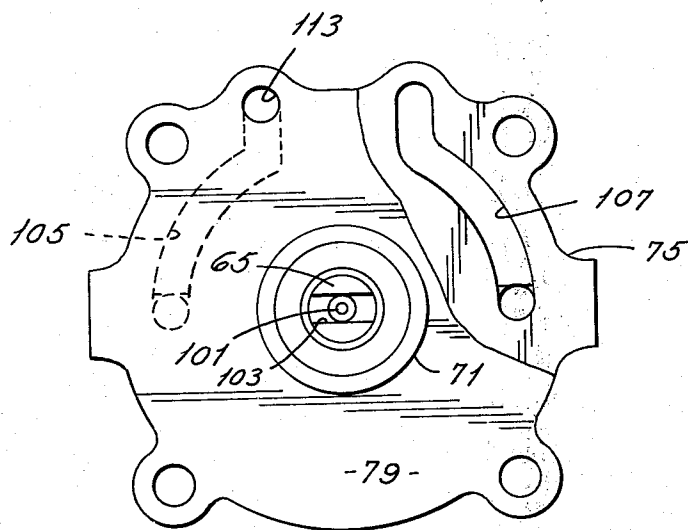


FIG. 5



POWER FUEL SUPPLY SYSTEM FOR AN INTERNAL COMBUSTION ENGINE CARBURETOR

BACKGROUND AND SUMMARY OF THE INVENTION

Many carburetors used in automobile engines today employ a power fuel supply system to supplement the main fuel supply system during acceleration or heavy loading of the engine. Such a power fuel supply system generally includes a valve which responds to a drop in intake manifold vacuum to provide a richer mixture to the engine combustion chamber in accordance with the demand for more power.

One type of power fuel supply system used extensively in presently produced carburetors employs a simple on-off valve that opens when the intake manifold vacuum drops below a certain magnitude to provide additional fuel to the engine. These valves can be constructed for two-stage operation by providing valve elements that open successively. Another type of power fuel supply system utilizes a comparatively expensive metering rod cooperating with a metering orifice or jet to provide a continuously variable power fuel flow more closely corresponding to the magnitude of the vacuum drop within the intake manifold.

Particular problems may occur with carburetors having two or more barrels in which one of the barrels feeds one group of engine cylinders and the other of the barrels feeds another group of engine cylinders. For reasons of economy and packaging, it is common for each of the inlets to the fuel supply system for the two or more barrels to be regulated by a single vacuum responsive power valve. The valve when open permits fuel to enter a chamber where the inlets to the fuel delivery passages are located. U.S. Pat. No. 3,172,923 granted to Romeo et al. on Mar. 9, 1965 illustrates such a power fuel supply system. When the valve is closed it prevents fuel in the fuel bowl from entering the chamber, but it does not seal one inlet from the other. Consequently, fuel signal interaction occurs through the chamber from one fuel delivery passage to the other which may adversely affect the fuel metering signals of the respective barrels. Because the power fuel supply systems of many present day carburetors feed directly into or are combined with the main fuel metering systems, fuel signal interaction between delivery passages in the power fuel supply system also provides interaction between the separate sides of the main fuel system.

It is an object of this invention to provide a power fuel supply system for a multi-barrel carburetor which when the power valve is closed isolates the right-hand fuel supply passages from the left-hand fuel supply passages, thereby preventing fuel signal interaction. It is a further object of the invention to provide a two-stage power fuel supply system in which one of the stages is actuated in response to intake manifold vacuum and the second stage is actuated mechanically. Finally, it is an object of the invention to provide a power fuel supply system that is economical to produce and integrate with existing carburetor structures.

A power fuel supply system constructed in accordance with this invention includes a carburetor fuel bowl and a power valve assembly receiving fuel from the fuel bowl. A pair of fuel passages receive fuel from the power valve assembly and conduct the fuel to a pair of carburetor barrels or venturis. The power valve as-

sembly includes a vacuum motor including a movable element displaceable in response to changes in intake manifold vacuum. A sleeve or piston is slidably received within a bore of the valve assembly. A passage is formed within the piston and has an inlet opening on the sliding surface of the piston and an outlet opening to the pair of fuel passages. The piston is displaceable to one extreme position in which the portion of the piston which contains the inlet is uncovered and protrudes outwardly from the bore while the outlet is simultaneously in communication with the fuel passages. When the piston is in this position, the fuel bowl is connected to the fuel passages. The piston is displaceable to an opposite extreme position in which the outlet is closed to the pair of fuel passages and communication between the fuel bowl and the fuel passages and between the first and second fuel passages is prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a carburetor incorporating the invention.

FIG. 2 is a top view of a portion of the carburetor assembly incorporating the invention.

FIG. 3 is a cross sectional view taken along line 3—3 of FIG. 2.

FIG. 4 is a cross sectional view taken along line 4—4 of FIG. 3.

FIG. 5 is a top view taken along line 5—5 of FIG. 4.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Reference numeral 11 refers generally to a two-barrel carburetor having a pair of barrels or induction passages 13 and 15. The first induction passage 13 has positioned within it a fuel inlet venturi assembly 17 connected to a main fuel well 19 which, in turn, is connected to the fuel bowl 21 by means of a fuel passage 23 and a metering jet 25. Similarly, the second induction passage 15 has positioned within it a second inlet venturi assembly 27 connected to a second main well 29 which, in turn, is joined to the fuel bowl 21 by means of fuel passage 31 and the second main metering jet 33. Pivotaly mounted within the fuel bowl is a float and valve assembly 35 which regulates the fuel level within the fuel bowl.

A throttle lever assembly 37 includes a lever element 39 fixed to the throttle shaft (not shown). A second lever element 41 is pivotally mounted to the throttle shaft and abuts the first element 39 during the latter portion of throttle opening movement. Spring 43 biases the adjustment screw 44 of lever element 41 against tab 46 of lever 39 during the latter portion of throttle opening movement so that the two levers then move simultaneously. A third element 45 of the assembly 37 is resiliently connected to lever element 39 and moves simultaneously with lever element 39 during the first portion of its opening travel to displace link 50 and actuate accelerator pump 47. The lever element 41 is pin-joined to an adjustable link 49 connecting a lever with L-shaped shaft member 51 pivotally mounted within the carburetor cover 53. The horizontal portion of member 51 has a semi-cylindrical portion removed providing a flat side 55 that acts as a cam against the upper surface 57 of the lever 59. Lever 59 is pivotally attached within the fuel bowl 21 to the main body of the carburetor and pivots about shaft 61 in response to rotation and the cam action of member 51. The lower end 63 of lever

59 rests on top of element 65 of the power valve assembly, as shown in FIG. 3 of the drawings.

The power valve assembly 67 (shown in detail by FIG. 4) has a main body 69 including a cylindrical portion 71 received within a bore 73 formed in the carburetor body. The upper end of the cylindrical portion protrudes into the fuel bowl 21. A flanged portion 75 of the power valve body 69 has an upper surface abutting a mounting pad 77 formed on the underside of the carburetor body. A gasket 79 separates the upper surface and the pad. A flexible diaphragm 80 is held between the lower surface 81 of the flanged portion and a cover 83. The cover and the power valve main body 69 are mounted to the carburetor main body by suitable threaded fasteners (not shown). The volume immediately beneath the diaphragm 80 connected to a source of intake manifold vacuum by means of passage 82. The volume immediately above the diaphragm is at atmospheric pressure, similar to the fuel bowl 21. The central portion of the diaphragm 80 is sandwiched between a disc 84 and a cup 85. An upwardly extending pintle 87 is rigidly attached to the disc 84 and cup 85 and is biased upwardly by compression spring 88 into a bore 89 formed in the valve body adjacent the junction of the cylindrical portion 71 and the flanged portion 75. Positioned over and about the upwardly extending pintle is a hollow cylindrical sleeve or piston 91 having a closed upper end 92 and an open lower end 90. The sleeve is movable within bore 89 and is biased downwardly against the top of the pintle by a compression spring 93. The spring acts against restriction element 94 positioned within an orifice 95 at the upper end of the cylindrical portion 71 of the valve body. The sleeve includes inlets 96 which connect the interior or chamber 97 of the cylindrical portion of the valve body through the hollow interior of the sleeve 91 with a pair of restricted passages 98 and 99 when the sleeve is in its uppermost position as shown in FIG. 4 of the drawings.

The restriction element 65 includes a metering orifice 101 that communicates the interior 21 of the fuel bowl with the interior 97 of the cylindrical portion of the valve body at all times. The restriction element is displaceable downwardly by the force of the lever 59 to cause the restriction element seal 102 to unseat from against the orifice 101 and to create a substantially greater communication and flow between the fuel bowl to the interior 97 of the cylindrical portion of the valve body. A horizontally extending slot 103 is formed in the upper tip of the restriction element 65 to prevent the lower surface 63 of the lever 59 from obstructing the metering orifice 101.

Passages 98 and 99 are connected to the fuel passages 23 and 31, respectively, by means of grooves 105 and 107 and risers 109 and 111, respectively. Openings 113 formed in the gasket 79 permit the grooves 105 and 107 to discharge into risers 109 and 111, respectively.

OPERATION

The power fuel supply system described above provides an increased flow of fuel to the carburetor induction passages under conditions of heavy loading or acceleration. The lower chamber of the vacuum motor beneath diaphragm 80 is in communication with the source of intake manifold vacuum. The volume above the diaphragm 80 is in communication with the fuel bowl 21 and is at atmospheric pressure. Under idle con-

ditions or small throttle openings, the intake manifold vacuum is high and the diaphragm 80 and pintle 87 are drawn downwardly until the bottom rim of the cup 85 engages or nearly engages the cover 83. With the pintle in its lowermost position, the compression spring 93 biases the sleeve 91 downwardly so that the bottom rim of the sleeve 91 drops below the openings to passages 98 and 99 and flow from the fuel bowl to the passages and communication between the passages, is precluded.

Upon engine acceleration or heavy loading, the vacuum within the intake manifold of the engine drops significantly thereby reducing the pressure differential experienced by the diaphragm so that the spring 88 urges the diaphragm and pintle 87 upwardly to the position as shown in FIG. 4. The pintle carries the sleeve upwardly against the bias of the spring 93 to the position as shown in FIG. 4 in which the openings to passages 98 and 99 are open and in communication through the interior of sleeve 91 with the fuel bowl 21. Fuel is then drawn through passages 98 and 99 and introduced into the respective induction passages. The quantity of fuel is metered by orifice 101.

When the throttle lever 39 is about two-thirds open it engages adjustment screw 44 of lever 41. Further, opening travel of lever 39 displaces lever 41 resulting in corresponding displacement of member 51. The flat 55 on member 51 cams lever 59 which pivots about shaft 61. The lower portion 63 of lever 59 engages element 65 and displaces it downwardly opening the larger orifice 95 and permitting relatively unrestricted flow of fuel into the chamber 97. Fuel flow through passages 98 and 99 is then metered by restrictions positioned within those passages.

It may be seen that the above-described invention provides a two-stage power fuel supply system; the first stage actuated by intake manifold vacuum and the second stage actuated by mechanical linkage from the throttle lever assembly. It also may be seen that when the intake manifold vacuum is high and the power valve is closed, the right-hand passage 99 is completely closed from the left-hand passage 98 by the interposition of the sleeve 91 in its lowered position, thereby preventing mixture of the fuel metering signals and interaction between the fuel passages.

Modifications and alterations will occur to those skilled in the art which are included within the scope of the following claims:

We claim:

1. A power fuel supply system for an internal combustion engine carburetor having at least two barrels and throttle valves pivotally mounted within said barrels,

said carburetor including a fuel bowl, a power valve receiving fuel from said fuel bowl, and first and second fuel passages receiving fuel from said power valve and discharging it into first and second of said barrels, respectively,

said power valve including a housing having a vacuum motor at one end thereof,

said vacuum motor having a variable volume chamber in communication with a source of engine intake manifold vacuum, said vacuum motor including a movable element displaceable in response to intake manifold vacuum pressure,

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said power valve including a bore and a piston means
slidingly received within said bore in engagement
with said movable element,
said piston means having an inlet and an outlet open-
able to said first and second fuel passages, 5
said piston means being resiliently held in a first pos-
ition in which it blocks the outlet from the first and
second fuel passages and the first fuel passage from
the second fuel passage,
said piston means being movable by the vacuum 10
motor to a second position in which the outlet is in
communication with the first and second fuel pas-
sages,
a flow restrictor resiliently mounted within an open-
ing in said housing and having an orifice to permit 15
fuel flow from said fuel bowl to said piston means
inlet,
a throttle lever pivotally movable with said throttle
valves,
and motion transfer means interconnecting said re- 20
strictor and the throttle lever to displace said re-
strictor when the throttle lever reaches a predeter-
mined position, said restrictor when displaced per-
mitting increased fuel flow into said housing
through said opening. 25
2. A power fuel supply system according to claim 1,
said restrictor being displaced to open the opening in
said housing during the latter portion of throttle

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lever opening movement.
3. A power fuel supply system according to claim 1,
said movable element comprising a pintle,
said piston comprising a cylindrical sleeve having
abutment means adjacent one end thereof, said
pintle extending into said piston and being engage-
able with said abutment means.
4. A power fuel supply system according to claim 1,
a first compression spring biasing said movable ele-
ment and said piston toward said first position,
a second compression spring acting between said pis-
ton and said restrictor, said second spring opposing
said first spring, said second spring biasing said re-
strictor toward said opening, said first spring hav-
ing greater stiffness than said second spring.
5. A power fuel supply system according to claim 1,
the portion of said power valve housing including
said opening and said restrictor within said opening
protruding into said fuel bowl.
6. A power fuel supply system according to claim 1,
said motion transfer means including a cam member
and a second lever, the second lever extending be-
tween the cam member and the restrictor,
opening movement of said throttle lever past said
predetermined position causing rotation of said
cam member and opening of said restrictor.

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