

[54] **PART THROTTLE ADJUSTMENT**

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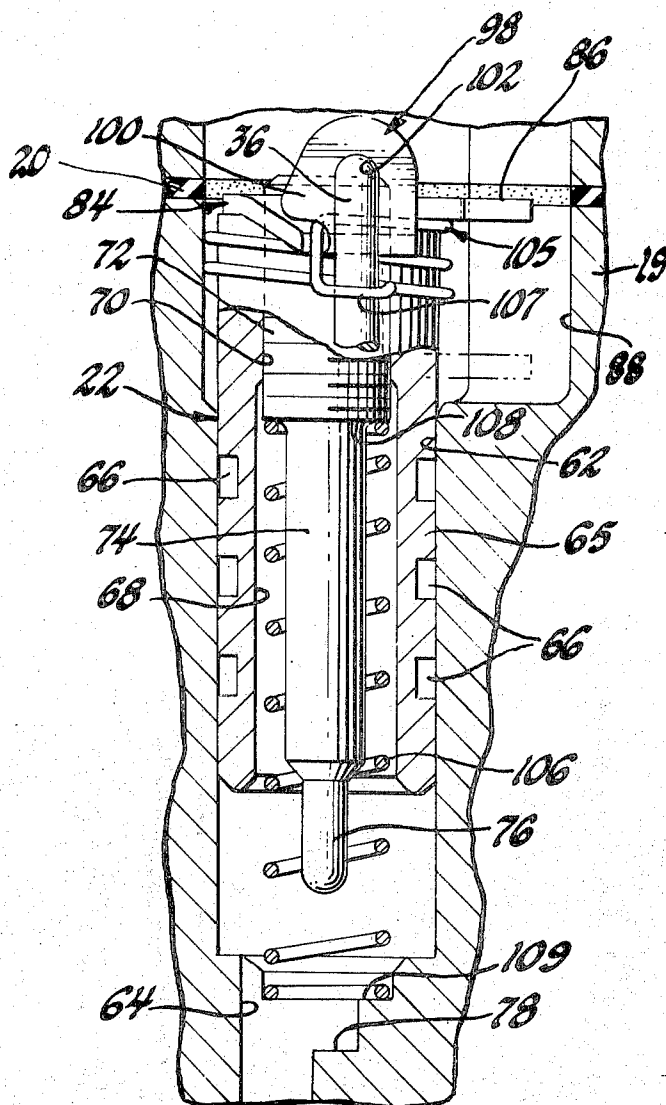
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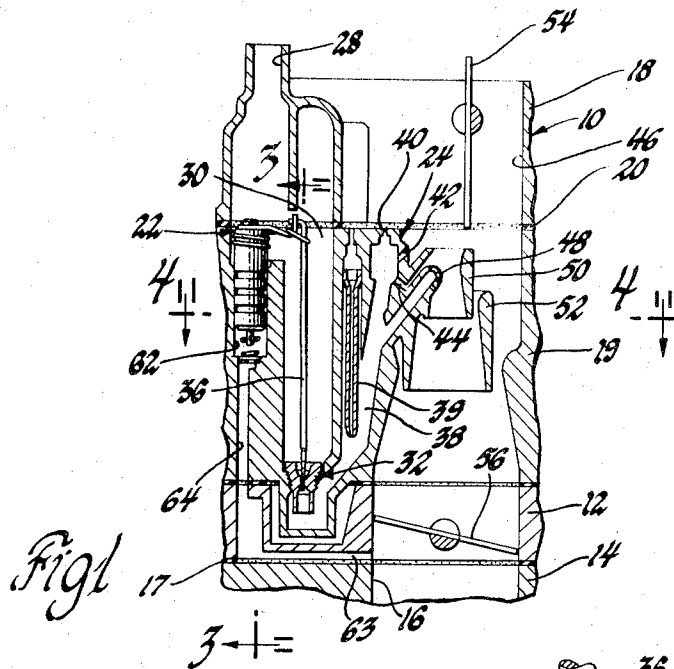
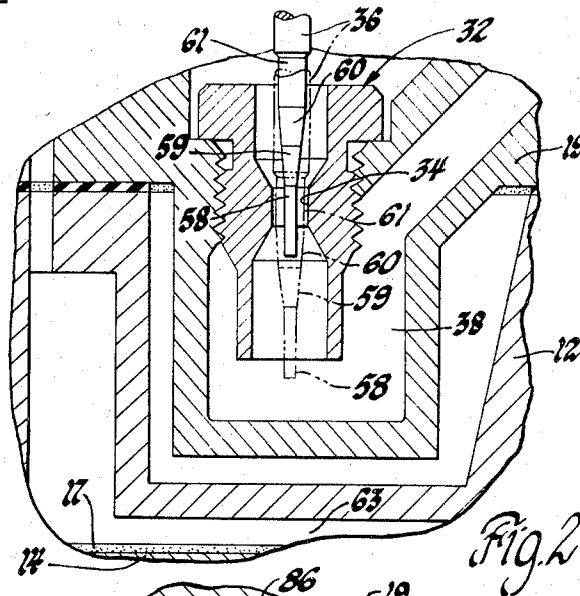
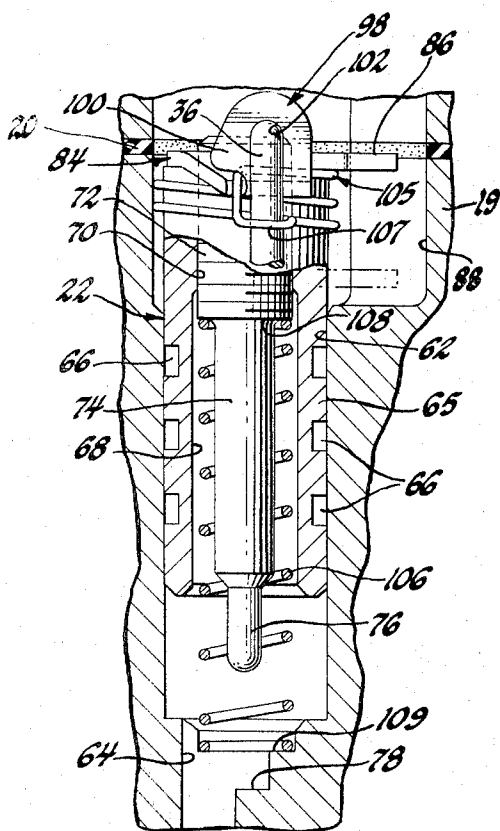
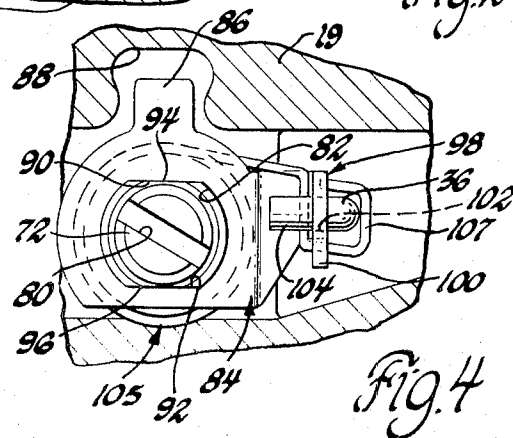
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[57] **ABSTRACT**

A part throttle adjustment mechanism for a carburetor power piston assembly includes a part throttle position maintained by intake manifold vacuum so as to locate a metering rod with respect to a main metering jet orifice to restrict fuel flow through the metering jet orifice. Adjustment of the part throttle position is by screw action between the piston and an adjustment pin threadably supported therein. A spring interposed between the pin and the carburetor housing maintains a constant spring force on the power piston throughout adjusted idle positions thereof thereby to cause extra fuel enrichment only in response to a predetermined reduced vacuum level in the intake manifold of the vehicle.

5 Claims, 4 Drawing Figures





PART THROTTLE ADJUSTMENT

This invention relates to part throttle adjustment mechanisms in carburetors that supply an air fuel mixture to internal combustion engines and more particularly to means for accurately calibrating a part throttle adjustment mechanism without varying its control function.

Main metering systems in carburetors for internal combustion engines include means to supply fuel through the primary bores of the carburetor between off, idle and wide open throttle operations. During such operation high engine manifold vacuum acts on power piston means to hold main metering rods within main metering jets against a spring force that is operative to withdraw the main metering rods from the jets when the intake vacuum manifold is reduced under conditions that require an enriched fuel flow to the primary bores of the carburetor. Adjustment of fuel flow under part throttle conditions is obtained by calibration means that will adjust a power piston within a power cylinder bore so as to change the height relationship between the main metering rod and the main metering jet. In prior systems, adjustment of the position of the power piston changes the length of the power piston spring. This results in movement of the power piston from its first control position to a fuel enrichment position before the intake manifold vacuum has been reduced to a point at which fuel enrichment is necessary.

Accordingly, an object of the present invention is to improve part throttle adjustment mechanisms for carburetors by the provision therein of means for adjustment of a main metering rod with respect to a main metering jet orifice or to give finer metering control in the part throttle range for controlling exhaust emissions and to do so without changing the response of a pressure biased power piston in the part throttle adjustment mechanism to a predetermined reduced level of vacuum in the intake manifold of the engine.

Another object of the present invention is to improve the operational control of a part throttle carburetor adjustment mechanism for positioning a metering rod in a first control position to restrict fuel flow through a metering jet orifice and a second metering position to cause enrichment of fuel supply to the main bore of a carburetor by the provision of means for obtaining fine metering control in the first control position by adjusting the position of the power piston within its bore and including spring means for maintaining a constant force on the power piston throughout the range of its height adjustment to operate the piston in its second position only in response to a predetermined reduced intake manifold vacuum.

Still another object of the present invention is to provide an improved power throttle adjustment mechanism for a carburetor that includes calibration means for adjusting the height relationship between a main metering rod and a main metering jet orifice to compensate for dimensional tolerance variations between component parts of the part throttle mechanism and wherein the calibration means will permit adjustment of the power piston without varying the force of a spring component for shifting the power piston between a first restricted control position and a second fuel enrichment position whereby fuel enrichment only occurs in response to a predetermined reduced intake manifold vacuum corresponding to a predetermined

heavy acceleration or high speed operation of a vehicle.

These and other objects of the invention are attained in one working embodiment including a power piston with a tab to prevent rotation of the piston within the power piston bore and a hanger attached to the piston to carry the metering rod or rods; a part throttle adjustment screw is accessible from the top of the bore. It includes a thread locking device to retain a screw threaded relationship between the piston and screw. The screw has a fixed height from the tip of the screw to a spring seat thereon to maintain predetermined constant relationship between intake manifold vacuum and a spring force required to move the power piston between first and second control positions. A calibrated compression spring supported between the spring seat on the adjustment screw and the carburetor housing causes a predetermined vacuum applied to the bottom of the piston to move the piston downwardly to overcome the spring force until the tip of the adjusting screw stops on a fixed control surface thereby limiting the piston travel into the bore so as to locate the metering rod or rods in a fixed orifice metering flow relationship to main metering jet orifices. The adjustment screw turned either counterclockwise or clockwise will cause the piston to move up and down on the outer surface of the adjustment screw to change the location of the rod in the jet when the adjustment screw tip is against the control surface thereby to meet predetermined fuel requirements. When the adjustment screw contacts the control surface, a compression spring height is determined by the distance from the control surface to the spring seat on the adjustment screw. It is maintained constant throughout the adjusted height positions of the power piston on the outer surface thereof. As a result of the constant spring force, the dimensional variations between the parts and the mechanism are eliminated insofar as effecting the control of the power piston between a first reduced fuel flow position and a second fuel enrichment control position and the switch from part throttle control to enriched control occurs in response to the same vacuum throughout the adjusted part throttle positions of the power piston.

The aforesaid system is adaptable to computerize flow stand testing by a fixed adjustment screw location accessible from the top side of the carburetor assembly.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

IN THE DRAWINGS:

FIG. 1 is a fragmentary, sectional view of a part throttle adjustment mechanism in a carburetor for supplying air fuel mixture to an internal combustion engine;

FIG. 2 is an enlarged view of a metering rod and jet of the present invention;

FIG. 3 is an enlarged vertical sectional view taken along the line 3—3 of FIG. 1; and

FIG. 4 is an enlarged fragmentary vertical sectional view taken along the line 4—4 of FIG. 1.

Referring now to the drawings in FIG. 1, a carburetor 10 is illustrated including a throttle body portion 12 secured to an intake manifold 14 of an internal combustion

tion engine in overlying relationship to an induction port 16 therein. A gasket 17 seals between body portion 12 and manifold 14. It further includes an air horn body 18 sealed with respect to a float bowl body 19 by means of a gasket 20 and being removably secured thereto for permitting access to a part throttle adjustment mechanism 22 forming part of a main metering system 24 of the carburetor 10. The air horn 18 has an internal vent port 28 vented to controlled atmosphere under an air cleaner (not shown) located above air horn 18. A float bowl cavity 30 is formed by openings in the body portions 18 and 19.

The float bowl 19 has main metering jets in the base thereof one shown at 32 having an orifice 34 therethrough. Fuel is metered under the control of a main metering rod 36 from the float cavity 30 into a main fuel well 38 in part underlying the metering jets 32 and in part extending vertically on one side of body portion 19. An idle tube 39 depends downwardly within well 38. Fuel flowing into the main fuel well 38 is mixed with air from a vent opening 40 at the top of the main well and side bleed ports 42, 44, the side bleed 42 leading from inside a carburetor bore 46 above the carburetor venturi and the bleed 44 leading from the main fuel cavity around the main fuel nozzle 48 in the main well 38. The air fuel mixture then passes through the main discharge nozzle 48 into a boost venturi 50 thence through the main venturi 52 in the bore 46 to the induction bore 16 of the engine.

The carburetor 10 includes an upwardly located choke valve 54 and a throttle valve 56 that are adjusted in response to acceleration of the vehicle to vary the level of vacuum in the intake manifold of the vehicle.

In order to control emissions, the part throttle adjustment 22 includes means for accurately positioning the metering rod 36 with respect to the metering jet 32 to give a finer metering control in a part throttle adjustment to control exhaust emissions.

More particularly, and as best seen in FIG. 2, the metering rod 36 includes a small diameter tip 58 thereon which is of a diameter substantially reduced from the diameter of the metering orifice 34 in the jet 32. A tapered segment 59 on the rod 36 joins small diameter tip 58 to a second stage tapered segment 60 leading to a large diameter control segment 61 on the rod 36.

When the part throttle adjustment 22 is in a first control position, the rod 36 will be moved downwardly into the dotted line position shown in FIG. 2 so as to locate the large diameter segment 61 on the rod 36 within the orifice opening 34 so as to restrict fuel flow from the float bowl cavity 30 into the main fuel well 38. This position of the rod 36 with respect to the metering jet 32 is maintained during part throttle and cruising range operation of the accelerator pedal. This will position the throttle valve 56 so as to maintain a substantial intake manifold vacuum which will be sufficient to condition the part adjustment mechanism 22 to hold the rod 36 in its first control position with controlled metering of fuel to the engine.

The part throttle adjustment mechanism 22 further positions the main metering rod 36 in a second control position shown in solid lines in FIG. 2 wherein the small diameter tip 58 thereon is aligned with the control orifice 34. In this position, extra fuel is directed from the float bowl cavity 30 into the main fuel well 38. The second position occurs under heavy acceleration or high

speed operation of the vehicle wherein intake vacuum is reduced. The mechanism 22 is spring biased to overcome the reduced intake vacuum under increased engine loads to cause the metering rod 36 to move into the upward position to locate the smaller diameter tip 58 on the rod in the metering orifice 32. This allows more fuel to pass through the main metering jet and will enrich the mixture flowing into the primary main well and out the main discharge nozzles through the carburetor bore 46 into the induction port 16 to compensate for added engine load.

The part throttle adjustment mechanism 22, best shown in FIG. 3, includes a power cylinder bore 62 therein opened at the upper end to be in communication with the controlled atmosphere under the air cleaner through the upper space of the cavity 30 and the port 28. A crossover passageway 63 leads from the induction port 16 to a housing port 64 that directs intake manifold vacuum into the bore 62 against the underside of a power piston 65 which is slidably supported for reciprocation within bore 62 between first and second control positions. The piston 65 includes peripheral grooves 66 for separating the upper end of bore 62 from the intake manifold vacuum end thereof. It has a tubular configuration including a bore 68 therethrough with internal threads 70 at the upper end thereof for threadably receiving the screw head end 72 of an adjustment pin 74. The part throttle adjustment pin 74 more particularly includes a dependent tip portion 76 movable against and away from a stop control surface 78 located above the passageway 63 and below the port 64.

As shown in FIG. 4, the end 72 of the adjustment pin 74 is slotted at 80 and is directed upwardly through an opening 82 in a combination hanger and tab member 84. The member 84 has a side tab 86 thereon directed into a vertical slot 88 in the float bowl body 19. The opening 82 has flats 90, 92 in spaced parallelism therewith fit over flattened upper end surfaces 94, 96 respectively to interlock the member 84 against rotation with respect to the power piston 65. The tab 86 interlocks piston 65 against rotation with respect to bore 62.

The adjusting arrangement fixes the adjustment pin in a predetermined location and thereby enables it to be accurately tested and calibrated on a computerized flow stand test setup. The member 84 further includes an outwardly directed hanger 98 with a hook 100 formed thereon at a point overlying the float bowl cavity 30. The hook 100 has an opening 102 therethrough in which is fit a bent end 104 on the upper end of the metering rod 36. The bent end 104 is held in place against the hanger 98 by means of a retainer spring 105 having one end 107 thereon wrapped around the outer surface of the upper end of the rod 36 thence underneath the hook 100 and across the back side of the hanger 98 where it is wrapped around the outer diameter of the upper end of the piston 65.

In operation, the part throttle mechanism 22 and the power piston 65 will respond to a predetermined intake manifold vacuum reflecting part throttle and cruise speed operation to pull the power piston 65 downwardly in the bore 62 against the force of a calibrated return spring 106 having the upper end thereof seated against a spring seat 108 formed on the underside of the threaded end 72 of the adjustment pin 74. The opposite end of the spring 106 is seated against the sur-

face 109 at the bottom of the bore 62. When the vacuum is great enough, the spring 106 will collapse and the tip 76 will engage the stop surface 78 to define a first control position wherein the metering rod 36 is moved downwardly with respect to the metering jet 32 as shown in dotted lines in FIG. 2 to restrict flow of fuel to the main fuel well 38.

One advantage of the present invention is that the metering action of the part throttle adjustment can be closely calibrated to produce a fine control of metering of fuel in the part adjustment range of operation.

To get close adjustment control of the metering rod 36 with respect to the metering jet 32, a screwdriver is placed in the slot 80 and the piston 65 and adjusting pin 74 are moved within the bore 62 until the tip 76 hits the control surface 78. At this point, it should be noted that the length of the spring 106 is a constant distance defined by the length of the adjusting pin 74 between the seat 108 and the bottom of the tip 76. This height relationship will remain constant throughout the height adjusted relationship between the power piston 65 and the adjustment pin 74 so that a constant spring force acts on the power piston 65 when the power piston 65 is in its first fuel restriction control position. When the piston 65 is so positioned, to obtain fine adjustment of the rod 36 and the metering jet 32, the adjustment pin 74 is screwed with respect to the power piston 65. The tab 86 will prevent rotation of the power piston 65 and as a result, the power piston 65 will thread upwardly or downwardly on the adjustment pin 74. This will change the height relationship between the end of the rod 36 and the jet 32 so as to closely adjust the restricted flow of fuel from the cavity 30 into the main well 38 under part throttle conditions. Moreover, the calibration of the mechanism 22 is accomplished without changing the vacuum intake pressure at which the power piston will be moved upwardly by the constant force of the spring 106 so as to move the metering rod 36 outwardly of the metering jet 32 into the fuel enrichment position mentioned above.

While the embodiments of the present invention, as herein disclosed, constitute a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A part throttle adjustment mechanism for a carburetor comprising: a housing having a bore therein exposed at one end to atmosphere and at the other end to a vacuum source, a power piston slidably supported for reciprocation in said bore and having an internal opening therethrough, an adjustment pin located within said opening, means on said piston for locating a metering rod within a metering jet, coaxing means on said pin and said piston for adjustably positioning said piston along the length of said pin to adjust the part throttle position of said piston, a compression spring interposed between said adjustment pin and said housing having a fixed height when the piston is maintained in a part throttle position by a first vacuum level at the other end of said bore, said spring moving said piston to a fuel enrichment position in response to a predetermined reduced vacuum at the other end of said bore at all part throttle adjusted positions of said piston to provide extra enrichment of fuel supply through the metering jet.

2. A part throttle adjustment mechanism for a carburetor operative to supply an air fuel mixture to an internal combustion engine and including a throttle valve

operative to vary the vacuum in the intake manifold of the engine comprising: carburetor housing means including a bore therein having one end thereof exposed to atmosphere and the opposite end thereof exposed to intake manifold vacuum, a tubular power piston slidably supported for reciprocation in said bore for separating atmospheric pressure on one end of said piston from vacuum pressure on the opposite end thereof, one end of said power piston being internally threaded, an adjustment pin having a head portion thereon threadably received in the one end of said power piston, a compression spring connected between said pin and said housing means for forcing said piston exteriorly of said bore, means on said power piston for locating a metering rod with respect to a metering jet for controlling fuel supply to the internal combustion engine from an off idle position to wide open throttle operation wherein intake manifold vacuum levels are maintained to subject said piston to a pressure differential thereacross to collapse said spring to hold said power piston in a part throttle control position, means for fixing said power piston against rotation with respect to said bore to permit screw adjustment of said piston with respect to said pin so as to move said piston longitudinally of said bore thereby to adjust the height relationship between the metering rod and the metering jet for varying part throttle fuel flow, said spring having a fixed height relationship between said pin and housing when said power piston is in its part throttle control position thereby to maintain a constant spring force on said piston throughout screw adjustment thereof whereby extra mixture enrichment of the vehicle is only obtained when the vacuum within the intake manifold is reduced below a preselected level in response to predetermined increased engine loads.

3. A part throttle adjustment mechanism for a carburetor having a throttle valve and fuel supply means including a metering jet and a metering rod movable with respect to the metering jet to control fuel supply to the vehicle comprising: housing means having a bore therein exposed at one end to atmosphere and exposed at the other end to a source of vacuum responsive to changes in vehicle operation and having a first vacuum level under part throttle positions and a predetermined reduced vacuum level under heavy acceleration or high speed throttle positions, a power piston supported for reciprocation within said bore for separating the atmospheric and vacuum sides of said bore from one another and maintained by a predetermined intake vacuum in a part throttle position, means on said power piston for supporting a metering rod, means within said power piston including an elongated compression spring for biasing said power piston outwardly of said bore against reduced vacuum on one end thereof, said adjustment mechanism including means coaxing with said piston for causing said piston to be adjusted longitudinally of said bore to adjust the part throttle position of the metering rod with respect to the metering jet, and means for supporting said spring at a constant height when said piston is held in its part throttle control position by the first vacuum level to maintain a constant spring force thereon for shifting said piston to a fuel enrichment position in response to a predetermined reduced vacuum throughout the adjusted position of said piston.

4. A mechanism for permitting adjustment of a part throttle mechanism in a carburetor having a first con-

control position to limit fuel supply to an internal combustion engine and a second fuel enrichment position to increase the flow of fuel to an internal combustion engine and operative to be moved between the first and second control positions in response to a predetermined reduction in engine intake manifold vacuum comprising: housing means forming a bore opened at one end to atmosphere and at the opposite end thereof to vacuum within an intake manifold, a power piston slidably supported within said bore for separating the atmospheric end thereof from the evacuated end thereof and maintained by a predetermined intake vacuum in a first control position, height adjustment means within said power piston for adjusting said piston with respect to its first control position within said bore to adjust a part throttle position of a metering rod with respect to a metering jet so as to calibrate control of fuel through the metering jet at the part throttle control position, said height adjustment means including spring means for imposing a constant spring force on said piston throughout adjustment of said power piston in its first control position and operative upon a predetermined reduced vacuum on the evacuated end of the power piston to shift the power piston from its first control position to a second control position for locating the rod within the jet to cause enrichment of fuel flow therethrough.

5. A mechanism for permitting adjustment of a part throttle mechanism in a carburetor having a first control position to limit fuel supply to an internal combustion

engine and a second fuel enrichment position to increase the flow of fuel to an internal combustion engine and operative to be moved between the first and second control position in response to a predetermined reduction in engine intake manifold vacuum comprising: housing means forming a bore opened at one end to atmosphere and at the opposite end thereof to vacuum within an intake manifold, a power piston slidably supported within said bore for separating the atmospheric end thereof from the evacuated end thereof and maintained by a predetermined intake vacuum in a first control position, an adjustment pin threadably received by said power piston, means locating said piston against rotation within said bore, said pin being threadable within said piston to the adjust position of said piston on said pin thereby to adjust a part throttle position of a metering rod with respect to a metering jet so as to calibrate the control of fuel through the metering jet at the part throttle control position, a compression spring interposed between said pin and said housing means having a fixed height when said power piston is in its first control position to direct a constant spring force thereon, said spring operative upon a predetermined reduced vacuum on the evacuated end of the power piston to shift the power piston from its first control position to a second control position for locating the metering rod and jet to cause enrichment of fuel flow therethrough.

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