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INERTIA RESPONSIVE CARBURETOR FUEL FLOW CONTROL MEANS

Filed Nov. 11, 1971

FIG. 1

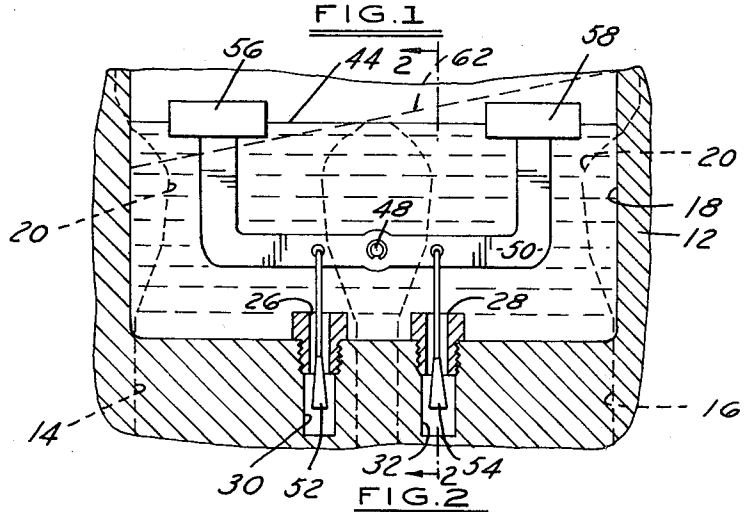


FIG. 2

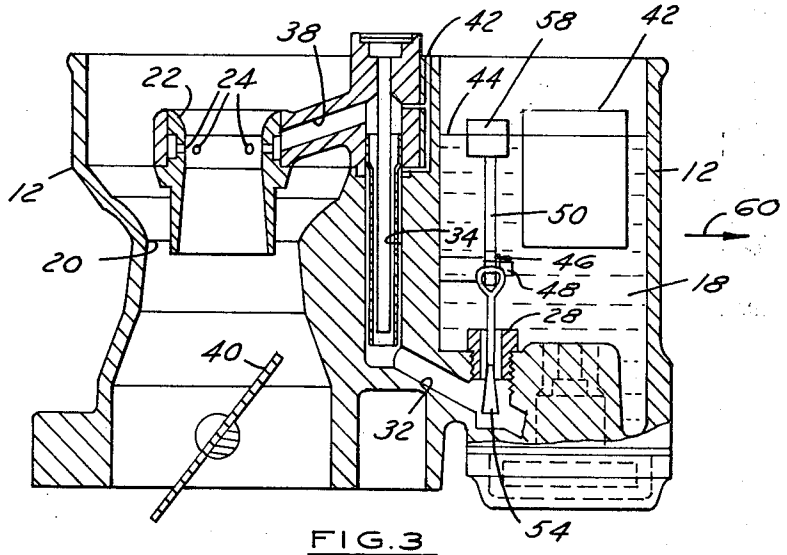
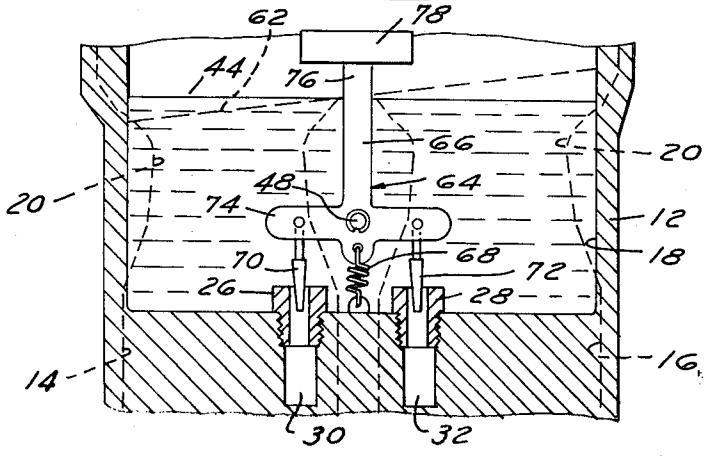


FIG. 3



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INERTIA RESPONSIVE CARBURETOR FUEL FLOW CONTROL MEANS

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ABSTRACT OF THE DISCLOSURE

An inertia responsive carburetor fuel flow control means which accommodates for variations in fuel levels in the fuel bowl caused primarily by centrifugal forces set up by vehicle cornering. The invention is used with multi-barrel carburetors having separate passages to each barrel from the fuel bowl. An inertia sensing means, either in the form of a spring biased weighted arm or a fuel surface angle sensor, controls the positions of metering rods that cooperate with orifices in each passage to maintain essentially identical rates of flow through each passage when the passages experience different fuel heads.

BACKGROUND AND SUMMARY OF THE INVENTION

Most multi-barrel carburetors in use today have laterally spaced main jets and main fuel wells which interconnect the fuel bowl and the several venturis. The result is that when the vehicle corners the centrifugal forces acting on the fuel in the carburetor fuel bowl cause the fuel surface to assume an angle relative to the normal horizontal fuel level. If the jets and the main wells are located symmetrically on either side of the fuel bowl center line, one of the jets and main wells experiences an incerased fuel head while the other of the jets experiences a decreased head. Thus, the mixture delivered by one of the venturi barrels is overly rich while the mixture delivered by the other barrel is overly lean. In a typical V–8 engine, one of the barrels of a two-barrel carburetor feeds the right bank of cylinders, while the second barrel feeds the left bank. If the cornering forces are exceptionally large, the engine may experience stumble because of improper fuel mixtures.

This invention provides a fuel flow control means that eliminates stumble during severe cornering maneuvers. The invention also provides means that control fuel flows to each barrel to accommodate for the different fuel heads acting on the individual main jets and main fuel wells. The invention further provides means that deliver essentially identical fuel flows through each of the main jets regardless of whether the vehicle is proceeding in a straight direction or it is cornering. Finally, the invention provides fuel flow control means that is adaptable for use with conventional carburetors, that may be economically produced and that is reliable in operation.

A fuel flow control means for a carburetor having at least two barrels constructed in accordance with this invention includes first and second passage means leading from the fuel bowl to first and second barrels, respectively. First and second metering means are constructed to regulate the flows through the first and second passages, respectively. An inertia sensor, movable in response to inertia forces acting on the carburetor and to maintain essentially identical fuel flow rates through the passages irrespective of inertia forces acting on the carburetor.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross sectional view of a carburetor taken through its fuel bowl in the longitudinal direction of the vehicle.

FIG. 2 is a cross sectional view taken along the line 2—2 of FIG. 1.

FIG. 3 is a cross sectional view similar to FIG. 1 but showing an alternate embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIGS. 1 and 2 of the drawings illustrate the invention embodied in a typical two-barrel carburetor which is generally used as a part of a V–8 engine. The carburetor includes a housing **12** having two barrels **14** and **16** and a fuel bowl **18** formed therein. Each of the barrels includes a substantially identical main venturi **20** and booster venturi **22**.

The normal operation of the carburetor is typical to that of conventional two-barrel carburetor. Air passing through the venturis **20** and **22** cause reduced air pressures at nozzles **24** relative to the atmospheric air pressure within the fuel bowl **18**. The air pressure differential forces fuel from the fuel bowl through main metering jets **26** and **28** into passages **30** and **32** which discharge into the respective main fuel wells **34**. FIG. 2 is a cross sectional view through barrel **16** and main jet **28** of FIG. 1. A cross sectional view through venturi **14** and main jets **26** would be essentially identical and would show the second of main wells **34** and its connecting passages. A small quantity of air is introduced into the main wells through passages **42** which open to the atmosphere. The mixtures then proceed from the main wells **34** to the nozzles **24** of the booster venturis **22** through passages **38**. There the mixtures are introduced into the air streams passing through each barrel and are discharged past the respective throttle plates **40**.

The fuel bowl **18** includes a float **42** which operates an inlet valve (not shown) to maintain a constant fuel level within the bowl. The surface of the fuel is designated by reference numeral **44**. An inertia sensor assembly **46** is positioned on a pin **48** protruding from a wall of the fuel bowl **18** at a location between and above the main jets **26** and **28**. The pin pivotally supports arm member **50** which, in turn, supports a pair of tapered metering rods **52** and **54** within each of the main jets. The metering rods are calibrated so that when the arm member is horizontal and the fuel surface is level, the tapered portions of the rods are partially received within the orifices of the metering jets **26** and **28**. The arm member is generally U-shaped and has a pair of floats **56** and **58** positioned at each end. The vertical location of the floats is determined in accordance with the normal fuel level **44** within the bowl **18**.

When the automobile is traveling in the direction of arrow **60** along a straight path, there are no inertia forces acting upon the fuel within the bowl **18**. When the vehicle corners even though the speed is kept constant, the centrifugal forces set up by the cornering cause the fuel surface to assume an angle similar to that shown by the dotted line **62** in FIG. 1. The magnitude of the fuel sur-

face angle is proportional to the centrifugal force which, in turn, is a function of the velocity of the vehicle and its turning radius. The floats **56** and **58** follow the surface of the fuel and cause arm **50** to pivot about pin **48**. Metering rod **54** is drawn upwardly from its position in FIG. 1 and increases the restrictions of main jet **28**. Metering rod **52** is lowered and decreases the restrictions of main jet **26**. It may be seen from FIG. 1 that under cornering conditions, the fuel head acting on main jet **28** is less than the fuel head acting on main jet **26**. Similarly, the fuel heads acting on each of the main wells **34** are unlike. If the main jet orifices were to have identical effective openings during cornering the fuel flow through the jet **28** would exceed the fuel flow through the jet **26** because of the fuel head differential. At extreme conditions, engine stumble would result either from one of the bank of cylinders having too lean a mixture or the other bank of cylinders having a too rich a mixture.

It thus may be seen that the invention provides for the increased restriction of the effective orifice of the main jet that experiences the greater fuel head and the corresponding decreased restriction of the effective orifice of the main jet having the lesser fuel head. The main jets **26** and **28** and the portions of the metering rods **52** and **54** interacting with the main jets are so contoured and calibrated that the fuel air ratio is kept constant for each of the barrels of the carburetor and, consequently, for each of the banks of the V–8 engine. It has also been shown that the fuel and the pivotable float assembly **46** operates as an inertia sensor to position the metering rods within their corresponding orifices.

DESCRIPTION OF AN ALTERNATE EMBODIMENT OF THE INVENTION

FIG. 3 of the drawing illustrates an alternate embodiment of the invention. With the exception of the apparatus to be discussed below, the carburetor structure of the second embodiment is identical to that of the preferred embodiment and the same reference numerals are used to identify identical parts.

The inertia sensor assembly **64** includes an inverted cross-shaped arm member **66** pivotally attached within the fuel bowl **18** to pin **48**. The arm member is normally biased into a vertically aligned position, as shown in FIG. 3 by a spring **68** which is secured to the base of the fuel bowl between the main jets **26** and **28**. A pair of tapered metering rods **70** and **72** pivotally depend from the horizontal arm **74** of the cross member **66** and have tapered ends which are received within the orifices of the metering jets **26** and **28**. A vertical leg **76** extends upwardly past the normal fuel level **44** and has mounted at its end a weight **78**. When the vehicle is traveling in a straightforward direction there are no forces tending to move the sensor assembly **64** out of its normal vertically biased position. When the vehicle corners, the weight **78** is drawn by centrifugal force to the side corresponding to the increased fuel head. As the arm pivots about the axis of pin **48** it increases the restriction of the main jet having the greater fuel head and decreases the restriction of the main jet having the lower fuel head. The weight **78** and the metering rods **70** and **72** are calibrated as a function of the fuel head differential to maintain essentially identical flows through the main jets during vehicle cornering.

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

We claim:

1. A fuel flow control means for a carburetor having at least two barrels and a fuel bowl comprising:
- first and second passages leading respectively from said fuel bowl to said first and second barrels,
- first and second metering means constructed to regulate and vary the flows through said first and second passages, respectively,
- inertia sensor means responsive to inertia forces experienced by the carburetor,
- said inertia sensor means being coupled with said first and second metering means to simultaneously increase the restriction of one of said passages and decrease the restriction of the other of said passages in response to inertia forces acting on said carburetor and to maintain essentially identical fuel flow rates through said passages irrespective of inertia forces acting on said carburetor.

2. A fuel flow control means according to claim **1**, said first and second metering means comprising:
- a pair of metering rods,
- a pair of metering orifices with said first and second passages receiving said metering rods.

3. A fuel flow control means according to claim **2**, said metering rods having tapered ends cooperating with said metering orifices.

4. A fuel flow control means according to claim **1**, said inertia sensor comprising float means pivotally mounted relative to said fuel bowl movable in response to changes in the surface angle of the fuel within said fuel bowl.

5. A fuel flow control means according to claim **1**,
- said inertia sensor comprising an arm pivotally mounted relative to said fuel bowl,
- an inertia weight mounted on an end of said arm,
- said arm movable in response to inertia forces acting on said carburetor.

6. A fuel flow control means for a motor vehicle engine carburetor having at least two barrels and a fuel bowl comprising:
- first and second passage means leading from said fuel bowl to said first and second barrels, respectively,
- first and second metering orifices positioned within said first and second passages, respectively,
- said orifices being laterally spaced one on each side of a line parallel to the straightforward direction of travel of the vehicle,
- first and second metering rods received within said first and second metering orifices, respectively, and movable relative thereto to regulate flow through said orifices,
- inertia sensor means responsive to centrifugal forces experienced by the carburetor,
- said sensor including an arm member pivotable about a fixed axis parallel to the straightforward direction of travel of the vehicle,
- said metering rods being carried by said arm member,
- said sensor means and said metering rods being movable in response to inertia forces acting on the carburetor to simultaneously increase the effective restriction of one of said passages and decrease the effective restriction of the other of said passages and to maintain substantially identical fuel flow rates through said pasages irrespective of inertia forces acting on said carburetor.

7. A fuel flow control means according to claim **6**, said metering rods having tapered ends cooperating with said metering orifices.

8. A fuel flow control means according to claim **6**,
- said inertia sensor means comprising float means secured to said arm member at a position corresponding to normal height of the fuel with said fuel bowl,
- said arm member being pivotally movable in response to changes in the surface angle of the fuel within the fuel bowl.

9. A fuel flow control means according to claim **8**,
- said arm member having one portion extending laterally and upwardly from its fixed pivot axis and a second portion extending laterally to the other side and upwardly from said fixed pivot axis,
- said float means comprising individual floats secured to ends of said first and second portions of said arm member.

10. A fuel flow control means according to claim **6**, said inertia sensor means comprising a weight secured

to said arm member at a position above the normal fuel level within the fuel bowl.

11. A fuel flow control means according to claim **10**, spring means biasing said arm member toward a normal vertical position.

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