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(54) **Carburetion system.**

(57) A pressurized fuel carburetion system for internal combustion engines wherein varying velocities and pressures are produced in the throat of the carburetor intermixing fuel with the air passing therethrough in such a manner to create a plurality of cortices containing air and fuel mixtures rotating about an axis substantially perpendicular to the carburetor air flow. The carburetor includes a rotating baffle and fuel distributor producing a restriction in the carburetor throat to cause high air flow velocities and low pressures and the air subsequently expands in such a manner as to produce low air flow velocities and higher pressures creating the desired vortices. The fuel distributor is in the form of a rotating cup, and fuel supplied to the cup interior is projected transverse to the air flow immediately prior to the region of vortex generation. Fuel supply control means utilize a plurality of series related valves employing engine manifold pressure and throttle position to control the rate of fuel supply and idling and acceleration fuel requirements are controlled by appropriate valves.

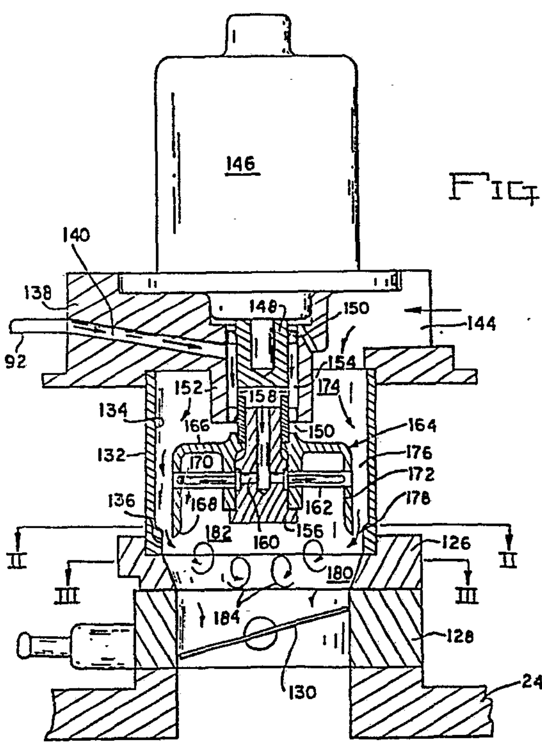

Fig_1

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CARBURETION SYSTEM

Background of the Invention.

The basic carburetion of internal combustion engines consists of intermixing air and fuel to produce a mixture of such ratio as to support combustion. Many proposals have been made for improving air and fuel mixtures to increase the efficiency of fuel utilization, improve engine performance and running characteristics, and aid in reducing the cost of engine operation. Many approaches have been proposed to improve the various aspects of carburetion, and many patents exist disclosing carburetors and air-fuel mixing devices for engines.

For instance, U.S. patents illustrating vortex generation within carburetors are shown in 2,054,734; 2,887,309; 3,286,997 and German Patent 314,428. Also it has been recognized that rotating vanes within the carburetor may aid in fuel-air mixing, and examples of such carburetion devices are shown in U.S. Patents 2,003,180; 2,595,719; 2,750,170; 2,823,906; 3,439,903; 3,286,997 and 3,955,545. Additional U.S. patents have recognized that the use of electric motors to rotate carburetor components to improve intermixing and and atomization of the fuel is of advantage as disclosed in 2,932,495; 3,701,513 and 3,991,143.

While the aforementioned patents, in many cases, have improved the efficiency to a minor extent of the associated engines with which they are used, such carburetion systems have not produced substantial increases in engine efficiency, and even with the high fuel prices that are now commonplace the development of high efficiency carburetors significantly advancing the art has been elusive, and nonconventional approaches to engine carburetion are required if major advances are to be made in the art.

It is an object of the invention to provide a pressurized carburetion system wherein improved intermixing of air and fuel particles is achieved, and wherein the control of fuel supply is primarily mechanically controlled without requiring sophisticated expensive electronic apparatus.

Another object of the invention is to provide a carburetor for internal combustion engines wherein the configuration of the carburetor air flow generates a plurality of vortices of mixing air and fuel particles having axes transversely disposed to the path of air flow, such vortices maintaining this orientation to produce improved flow, cleaning and burning characteristics within the engine intake manifold and cylinders.

An additional object of the invention is to provide an internal combustion engine carburetor wherein a baffle within the carburetor throat produces sequential high velocity-low pressure and low velocity-high pressure regions, and the baffle creats a low pressure transition zone intermediate such regions capable of generating vortices of air and fuel particles having axes of rotation transversely disposed to the direction of carburetor air flow.

Yet an additional object of the invention is to provide an internal combustion engine carburetor utilizing an inverted cup baffle with respect to the direction of carburetor air flow wherein pressurized fuel is fed to the interior of the cup such that fuel will be thrown from the downstream edge of the cup transversely into the path of air producing vortices of air and fuel having an axis transverse to the air flow direction.

A further object of the invention is to provide an internal combustion engine carburetion system wherein sequential high velocity-low pressure and low velocity-high pressure regions are formed within the carburetor throat with a transition zone intermediate such regions, and a reduced pressure is created at the transition zone, such pressure differentials producing vortices of fuel and air particles rapidly intermixing about axes transverse to the air flow within the carburetor throat, the fuel being introduced into the air flow immediately prior to the transition zone and at substantially right angles to the air flow path.

Yet another object of the invention is to provide an internal combustion engine carburetion system of the pressurized type wherein the fuel pressure is regulated regardless of whether an engine powered diaphragm type pump or electric pump is utilized, and fuel control is achieved by a combination of series related valves employing intake manifold pressure and engine throttle conditions to achieve efficient engine operation.

An additional object of the invention is to provide an internal combustion engine carburetion system utilizing a pressurized fuel wherein engine intake manifold pressure is employed to control the rate of fuel flow during acceleration, and the combination of intake manifold pressure and throttle settings are employed to control fluid flow during normal operating conditions and engine temperature controls fast idle operations.

In the practice of the invention pressurized fuel is supplied to a carburetor having a throat in which an inverted cup-shaped baffle is concentrically located. The cup is rotated by an electric motor, and the fuel is introduced into the central region of the cup and produces a film within the cup interior such that the fuel is thrown from the downstream cup edge into the carburetor air flow at right angles thereto. The cup is of such configuration that an annular restricted cross sectional throat portion is defined in radial alignment with the cup producing a high velocity-low pressure throat region, and below the cup the carburetor throat increase in volume producing a higher pressure-low velocity region. Immediately below the cup a transition zone exists, and due to the cup configuration reduced air and vapor pressures exist below and interiorly of the cup where a plurality vortices of fuel and air particles are generated which produces vigorous mixing of the air and fuel particles. Such vortices are drawn into the engine, and tend to "scrub" the engine intake manifold preventing the accumulation of raw fuel thereon, and upon entering the engine cylinders produce uniform combustion.

The fuel is supplied by a fuel pump and pressure regulator means are utilized to control the fuel pressure. For instance, with a diaphragm engine driven pump a pressure regulator utilizing a differential piston is employed controlling a fuel flow valve to regulate fuel pressure. If an electric fuel pump is used a recirculating pressure regulator is employed wherein recycling of the fuel to the fuel tank is controlled by a pressure differential valve preventing pump overloading or the consumption of excessive fuel.

A hot idle fuel flow valve is used to control engine operation during idling, and solenoid operated valves are mounted within the fuel supply conduit and the hot idle fuel supply conduit preventing fluid flow to the carburetor unless desired. Also, a bimetallic element sensing the engine's temperature regulates the rate at which the associated engine will idle while the engine is cold.

In the practice of the invention the objects thereof as set forth above are met, and significant improvements in engine efficiencies have been experienced.

Brief Description of the Drawings.

The aforementioned objects and advantages of the invention will be apparent from the following description and accompanying drawings wherein:

Fig. 1 is an elevational view, partially in diametrical section, of an internal combustion engine carburetor in accord with the invention,

Fig. 2 is a plan, elevational, sectional view as taken along Section II-II of Fig. 1,

Fig. 3 is a plan, elevational, sectional view taken through the transitional zone of the carburetor throat along Section III-III of Fig. 1,

Fig. 4 is a schematic, elevational, sectional view of a carburetion system in accord with the invention,

Fig. 5 is a graph illustrating typical engine operating characteristics during the practice of the invention,

Fig. 6 is a schematic, sectional, elevational view of an alternate control unit for regulating fuel control,

Fig. 7 is an elevational view, partially in diametrical section, illustrating an embodiment of carburetor in accord with the invention wherein the cup baffle is axially adjustable within the carburetor throat,

Fig. 8 is an enlarged, elevational, sectional view of the cam means employed with the embodiment of Fig. 7 as taken along Section VIII-VIII of Fig. 7,

Fig. 9 is an elevational view, partially sectioned, illustrating the bimetallic fast idle and hot idle linkages, and

Fig. 10 is a schematic, elevational, sectional view of an alternate fuel supply system utilizing an electric fuel pump as used with the fuel control unit illustrated in Fig. 4.

Description of the Preferred Embodiment.

The entire system of the invention is best appreciated from Fig. 4 wherein the basic components of an internal combustion engine carburetion system are disclosed. The fuel tank is represented at 10, and fuel is drawn therefrom by the conventional diaphragm fuel pump 12 mechanically driven from the engine, not shown, in the usual manner. A fuel accumulator 14 receives the output from the fuel pump eliminating surges, and the fuel is filtered at 16 prior to being received by the pressure regulator 18. The pressure regulator supplies fuel to the control unit 20 and the pressurized fuel output from unit 20 passes to the carburetor 22 mounted upon the engine intake manifold schematically represented at 24.

More specifically, the pump 12 is connected to the fuel tank 10 by an inlet conduit 26, and the pump pressurized output is connected to the fuel accumulator by conduit 28. The fuel accumulator uses a spring biased cylinder to absorb fuel surges, and conduit 30 thereof communicates with conventional fuel filter 16 which supplies the fuel pressure regulator 18 through conduit 32. The fuel pressure regulator 18 includes a valve 34 supported upon diaphragm 36 extending across chamber 38 separating the chamber into portions 40 and 42. Compression spring 44 biases the valve 34 toward a seated condition to the right, while spring 46 biases the diaphragm and valve toward the left. The effective pressure face area on the left of the diaphragm 36, and valve 34, is less than that on the right of diaphragm wherein the diaphragm comprises a differential pressure piston capable of positioning the valve relative to its seat, and thereby control the rate of fluid flow into the chamber 40. The fuel pressure regulator output conduit 48 communicates with the chamber 40, and the metered fuel from the control unit communicates with the chamber 42 through conduit 50.

The control unit 20 includes a body 52 in which substantially similar valves 54 and 56 are mounted as separated by a chamber 58. The valve 54 includes an annular groove 60 and radial ports communicating with an internal chamber and orifice 62, while the valve 56 includes a circumferential groove 64, and ports, communicating with the internal chamber and orifice 66. A control needle or rod 68 is slidably received within the valve 54 axially positionable within the orifice 62, while the control rod 70 is axially translatable within the valve orifice 66. Each of the control rods is provided with a flattened surface 72 formed upon the associated cylindrical rod such that the transverse cross section of the control rod varies along its axial length. Thus, the size of the opening within the orifices through which fuel may flow will vary depending upon the axial position of the associated control rod, and in this manner fluid flow through the associated orifice can be very accurately controlled.

The control rod 68 is connected to an evacuated bellows 74 located within the chamber 76, and the chamber 76 communicates with the associated engine intake manifold through conduit 78. The bellows 74 includes an internal compression spring 80, the compression of which may be adjusted by the threaded spring pad 82.

The control rod 70 of valve 56 is connected to the associated engine throttle mechanism which includes a shaft 84 having a slotted arm 86 cooperating with the control rod pin 88. Thus, as shaft 84 is rotated by the engine throttle linkage the rod 70 will be axially translated within the valve orifice 66.

From the above it will be appreciated that fuel entering the body 52 through conduit 48 may pass through valve 54 and orifice 62 and into chamber 58, and from chamber 58 into the orifice 66 and through valve 56 into the outlet conduit 90 communicating with the pressure regulator conduit 50 and carburetor supply conduit 92.

During acceleration fluid flow to the carburetor is primarily controlled by the acceleration valve 94 mounted within body 52 and the valve 94 is supplied with fuel by body passage 96, and the output from the valve flows to valve 56 through body passage 98. The acceleration valve includes a chamber 100 containing the piston-diaphragm element 102 connected to the valve 94, and compression spring 104 adjustable through threaded shaft 106 will permit adjustment of the seating pressure of the acceleration valve. The opposite side of the diaphragm 102, with respect to chamber 100, communicates with a dashpot accumulator 108 communicating with the bleed orifice 110 and parallel check valve 112, and both the bleed orifice and the chamber 100 communicate with the conduit 114 connected to the intake manifold wherein, during acceleration when the intake manifold pressure decreases, the valve 94 will open permitting pressurized fuel to flow therethrough into the carburetor supply line 92.

The fuel control unit 20 also includes a hot idle fuel flow valve 116 receiving pressurized fuel through the body passage 118 and a threaded needle valve type pin 120 controls the fuel flow into the hot idle supply conduit 122 attached to the carburetor 22 through the solenoid operated valve 124, as later described.

The carburetor 22 in accord with the invention is illustrated in Fig. 1 and includes an adapter 126 attached to the throttle blade valve plate 128 of intake manifold structure 24 in which the conventional throttle valve 130 is located. The throttle valve 130 is connected to the engine throttle linkage in the conventional manner, and rotative positioning of the valve controls the amount of air and fuel mixture entering the engine to regulate the rate of engine rotation.

The carburetor body includes a throat 132 mounted on adapter 126 which is of a cylindrical configuration internally defined by the cylindrical inner surface 134 which includes a shoulder 136 forming a reduced diameter. The super structure of the starter includes an upper support body 138 in which the pressurized fuel supply line 140 communicates with conduit 92 through solenoid operated valve 142 and air passages 144 are formed therein for receiving the carburetor air throughout the circumference of the upper body as indicated by the arrows.

The upper body 138 supports an electric motor 146 usually of the 12 volt variety having a driveshaft 148 supported within bearing structure and the driveshaft is sealed at 150 to the plate hub 152. As will be apparent from Fig. 1, an annular chamber 154 is defined about the driveshaft 148 which communicates with the fuel supply passage 140.

The driveshaft 148 supports the shaft extension 156 coaxially aligned with the driveshaft which includes radial ports 158 communicating with an axial passage, and lower radial passages 160 which communicate with the fuel distribution spokes or fingers 162.

A baffle in the form of a cup 164 is attached to the extension 156 for rotation therewith, and the cup includes the hub firmly mounted upon the extension, and the tubular spokes 162 extend therethrough. The cup 164 includes an upper closed end 166 disposed "upstream" with respect to the direction of air flow as represented by the air flow arrows, and at the downstream end the cup is open as defined by the circular edge 168. The spokes 162 are each provided with a hole 170 wherein the fuel within the spokes is discharged adjacent the inner surface of the cup cylindrical wall 172, and centrifugal force due to cup rotation will produce a film of fuel upon the cup inner surface and the fuel will be rapidly thrown outwardly from the cup edge 168 in a direction and plane perpendicular to the air flow through the carburetor throat 132.

As will be appreciated from Fig. 1, the configuration and dimension of the cup 164 is such that a relatively large chamber 174 will be defined upstream of the cup, but as the cup wall 172 is disposed relatively close to the throat inner surface 134 an annular chamber is defined at 176 of restricted cross sectional area and the velocity of air flowing through the chamber 176 will substantially increase with respect to the air flow velocity within chamber 174, and the pressure within the chamber 176 will be lower than at 174.

The greatest resistance to air flow will be at the clearance 178 intermediate the throat shoulder 136 and the lower region of the cup, and downstream from this annular location the carburetor throat area again enlarges at chamber 180 producing a region of lower velocity and higher pressure when the valve 130 is open such that air flow is existing in the carburetor throat. A transitional zone exists at 182 downstream of the cup and in the region adjacent the cup edge 168. This transitional zone has a reduced air pressure due to the venturi effect resulting from the configuration of the cup and the high velocity of the air passing between the shoulder 136 and the cup edge 168. Thus the "hollow" nature of the cup and its axial dimension as defined by the cylindrical cup wall 172 and parallel relationship to the throttle throat inner surface 136 produces a venturi effect resulting in a controlled turbulence within the transition zone 182 and the chamber 180.

The aforementioned controlled turbulence results in a plurality of vortices within the transition zone 182 and chamber 180 and such vortices rotate about axes substantially perpendicularly disposed to the axis of the throat and the flow of air therethrough. As the fuel has been mixed with the air as the air passes the cup edge 168 the vortices as represented at 184 in Fig. 1, will contain fuel particles as well as air particles and a thorough and rapid intermixing of the particles and vaporization of the fuel occurs.

As the vortices 183 continue to rotate about their axes the vortices are drawn into the engine intake manifold 124 and into the combustion cylinders. The direction of vortex rotation will continue to be substantially horizontal as represented in Fig. 1, and such air and fuel movement tends to "scrub" the walls of the intake manifold reducing the likelihood of fuel adhering to the manifold walls which produces a wet condition, as often occurs within engine intake manifolds. Also, the vortexing of the fuel and air mixture continues into the combustion chamber distributing the fuel throughout the combustion chamber facilitating burning resulting in high efficiency utilization of the fuel.

The combination of the sequential flow of air from the high velocity-low pressure chamber 172 to the higher pressure-low velocity chamber 180 and the formation of the low pressure transitional zone 182 immediately after mixing of the fuel and air achieves a controlled vortexing of the fuel and air mixture described above which significantly increases the efficiency of combustion of the fuel more effectively utilizing the energy thereof.

As illustrated in Fig. 4, the hot idle circuit includes the chamber 186 receiving fuel from the valve 124 and the chamber communicates with the carburetor throat at orifice 188 adjacent the periphery of the valve 130 at valve notch 190, and at the needle valve orifice 192, below the throttle valve, the rate of fluid flow through the orifice 192 being controlled by needle valve 194.

Operation of the solenoid valve 124 is by a limit switch, not shown, connected to the throttle wherein, the valve will be opened upon the throttle being released to return to its usual "idle" position, and at such time the valve 142 will close interrupting the main supply of fuel through the conduit 92 and to the cup 164.

In the embodiment shown in Fig. 6, a modification of hot idle fuel supply is illustrated. In this modification similarly described components are indicated by primed reference numerals.

The body 52' includes the hot idle needle valve 116' which communicates with supply passage 196, and the output thereof communicates with the acceleration valve 94' through passage 198. Thus, during idling, when no acceleration is taking place and the intake manifold pressure is high, the valve 94' permits fuel to flow through the valve 94' and passage 98' through the fluid supply conduit 90', and this construction eliminates a separate electric solenoid valve in the hot idle circuit. In this embodiment notched openings must be located in the throttle valve 130 to allow the fuel and air mixture to enter the intake manifold.

With further reference to Fig. 6, a cold idle control is shown which includes a bimetallic spring member 200 mounted within block 202 which is attached to the associated engine block. Thus, the bimetallic spring 200 is subjected to the temperature of the engine, and as the arm 204 is affixed to the spring temperature variations in the bimetallic spring will cause the arm to rotate. A cam slot 206 defined in the bracket receives the follower pin 208 attached to the needle valve 210 and as the bimetallic spring and arm rotate the position of the needle valve will vary.

The block chamber 212 communicates with a filtered air supply at 214, and the chamber also communicates with the valve 210. Thus, air within the chamber 212 may be drawn through the needle valve 210 into conduit 216 which communicates with the control unit 20' at chamber 58' and communicates with the engine intake manifold at 218. This arrangement permits the vacuum within the chamber 58' to be regulated in accordance with the temperature of the engine allowing fuel enrichment during engine warmup. Once the engine is warm the cold idle mode enrichment circuit will be closed due to the closing of the needle valve 210, and in this manner the valve 54' will provide the additional fuel required during the initial engine warmup phase.

The acceleration valve 94, Fig. 4, and Fig. 6, utilizes the bleed orifice 110 in series with the dashpot accumulator 108. The bleed orifice and dashpot accumulator limit the time that the acceleration mode circuit is actuated. The time that the acceleration circuit will be in use is variable depending upon the amount of the differential decrease in the manifold vacuum as sensed through conduit 114 and the "on" time of the acceleration valve is directly dependent upon the value of the differential decrease in the manifold vacuum. The check valve 112 within the bleed orifice housing resets the timing circuit when the vaccum increases.

With reference to Fig. 9, the lever 220 attached to the hot idle valve 116 is shown. The lever 220 cooperates with a stop set screw 222 mounted upon bracket 224 wherein the amount of fuel passing through valve 116 may be readily controlled. Also, the shaft of the bimetal spring 200 may include an arm 226, Fig. 9, which supports a wire link cooperating with the pivotally mounted fast idle cam 228. The fast idle cam is provided with a plurality of stop surfaces 230 cooperating with the adjustment screw 232 formed on the hot idle lever 220, and it will be appreciated that the position of the cam 228 will vary in accordance with the engine temperature presenting different adjustment screw stop surfaces 230 in alignment with the screw 232 to control the position of the idle screw lever 220 and idle valve 116. As the engine warms a lesser amount of fuel is required for idling purposes.

In the graph of Fig. 5 typical operating relationships of an engine in accord with the invention are shown. The throttle range indicates the angular position of the throttle blade 130, while the fuel flow indicates the percentage of flow with respect to the maximum possible. The curves indicate the relationship between throttle angle and fuel flow under various manifold vacuum conditions, and the road load is represented by curve A. As the manifold vacuum decreases the fuel flow increases as does the throttle angle.

A modification of carburetor relationships is illustrated in Figs. 7 and 8 wherein components identical to those previously described are indicated by primed reference numerals.

In this embodiment the motor 146' is supported upon the plate 138' by a ball and ramp assembly consisting of plates 234 and 236 having a plurality of ball elements 238 interposed therebetween within obliquely disposed grooves 240 and 242, as apparent in Fig. 8. The plate 236 is connected to motor 244 for rotating the plate about the motor axis, and such plate rotation will cause the balls 238, several of which are used, to raise and lower the motor, driveshaft and cup 164' in accordance with engine performance. For instance, an expansible chamber motor 244, such as a bellows in communication with the engine intake manifold, is mechanically connected to the plate 236 wherein the axial position of the cup 164' within the throat 132' will vary in accordance with manifold pressure. It is possible to substitute a pneumatic, mechanical or electronic motor means for the vacuum means shown, if desired.

The axial position of the cup 164' may be varied with respect to the throat and the throat shoulder 136' which varies the spacing at clearance 178 controlling the velocity of the air stream flowing therethrough. By controlling the dimension of the clearance 178 throughout the range of engine speed optimum air flow characteristics can be maintained thereby regulating the carburetor for optimum efficiency and operation. The smaller gap will occur at clearance 178 during high manifold vacuum conditions with a closed throttle or idle speed, while the clearance will be increased at low vaccum open throttle conditions during higher engine speed.

When the engine ignition is deactivated the solenoid valves 142 and 124 close preventing fluid loss to the carburetor, or flooding, and the use of the solenoid operated valve provides complete control of the fuel supply to the carburetor.

As shown in Fig. 4, the drive motor 146 may include the upstanding threaded stud 246 for receiving conventional air filter structure, not shown, and it is to be appreciated that the carburetion system of the invention utilizes the conventional filters and anti-pollution equipment commonly employed with motor vehicles and required by law.

In Fig. 10 the arrangement is shown which is used with an electric fuel pump, rather than a diaphragm pump. Electric pump 248 supplies regulator 249 having valve 250 controlled by diaphragm 252. When the pressure within chamber 254 becomes excessive the valve 250 opens and returns fuel to tank 10' by return conduit 256. In this manner a constant pressure is maintained on the fuel without becoming excessive.

It is also to be appreciated that while a combination pneumatic and mechanical control unit 20 is illustrated, known electronic fuel control devices may be used with the illustrated carburetor, and it is to be appreciated that the carburetor disclosed is not dependent upon the fuel supply and control apparatus shown.

The presence of the vortices 184 at the transition zone 182 imparts to the air and fuel mixture a movement highly advantageous with respect to intermixing the small air and fuel particles and produces a "scrubbing" action of the manifold walls as well as producing a turbulence within the combustion chamber. Of course, a very fine fuel-air mist and vapor exists within the transition zone and therebelow, and the improved movement and intermixing of the air and fuel produces superior combustion characteristics.

It is appreciated that various modifications to the inventive concepts may be apparent to those skilled in the art without departing from the spirit and scope of the invention.

Claims.

1. The method of intermixing air and fuel for combustion purposes within a passage comprising the steps of:

(a) producing a dynamic air flow in a given direction within a passage,

(b) introducing fuel particles into the air flow,

(c) producing a plurality of vortices of mixed air and fuel particles each having a vortex axis substantially perpendicular to said air flow given direction, and

(d) introducing said vortices of mixed air and fuel into the intake manifold of an internal combustion engine.

2. The method of intermixing air and fuel as in claim 1 wherein the step of introducing the fuel particles into the air flow comprises projecting the fuel particles into the air flow in a direction substantially perpendicular to the air flow given direction.

3. The method of intermixing air and fuel as in claim 2, including the step of producing a decreased air pressure region within the passage adjacent the location of introduction of the fuel particles into the air flow to aid in the formation of said vortices.

4. The method of intermixing air and fuel as in claim 2, including the step of channeling the air flow into an annular cross sectional configuration at a first axial location and shaping the air flow into a solid uniform cross section configuration at a second axial location downstream of said first location, the fuel particles being introduced into the air flow at a transition zone between said first and second axial locations.

5. The method of intermixing air and fuel as in claim 4, including the step of producing a decreased air pressure within the passage at a transition zone between said first and second locations to aid in the formation of vortices.

6. The method of intermixing air and fuel for combustion purposes within a passage comprising the steps of:

(a) producing a dynamic air flow in a given direction within the passage,

(b) creating a high velocity flow within the passage at a first axial location,

(c) creating a low velocity air flow within the passage at a second axial location adjacent to said first location and downstream thereof, a transition zone existing between said first and second locations,

(d) introducing fuel particles into the air flow at said transition zone to produce a plurality of vortices of mixed air and fuel each having a vortex axis substantially perpendicular to said air flow given direction, and

(e) introducing said vortices of mixed air and fuel into the intake manifold of an internal combustion engine.

7. The method of intermixing air and fuel as in claim 6 wherein the step of introducing the fuel particles into the air flow comprises projecting the fuel particles into the air flow in a direction substantially perpendicular to the air flow given direction.

8. The method of intermixing air and fuel as in claim 6, wherein said high velocity flow is of an annular transverse cross section, said low velocity air flow being of a uniform cross section configuration, comprising the step of producing a low pressure at said transition zone aiding in the formation of said vortices.

9. A carburetor for an internal combustion engine comprising in combination, a body having a throat defined therein having a longitudinal axis, an air inlet and a fuel mixture outlet, vortex generating means within said throat producing a plurality of air vortices within said throat each having an axis transverse to the throat axis and fuel supply means introducing fuel into said throat adjacent said vortex generating means whereby said vortices intermix fuel with vortexing air.

10. In a carburetor as in claim 9, said vortex generating means including air guiding means within said throat sequentially restricting and expanding the transverse cross sectional area of said throat, a transition zone being defined within said throat between said restricted and expanded cross sectional areas, said fuel supply means supplying fuel to said throat at said transition zone, said vortices being generated in said transition zone.

11. In a carburetor as in claim 10, said throat being circular in transverse cross sectional configuration, said air guiding means including a baffle concentrically located within said throat having a wall radially spaced from said throat defining an annular channel within said throat of restricted transverse cross sectional area, said baffle having a downstream end at said transition zone, said fuel supply means introducing fuel into said throat in said transition zone in axial alignment with said channel adjacent said baffle downstream end.

12. In a carburetor as in claim 11, said fuel supply means introducing fuel into said transition zone throughout the circumference of said baffle at said downstream end.

13. In a carburetor as in claim 12, said baffle comprising an inverted cup having a closed upstream end, a wall and an open downstream end whereby a reduced air pressure is produced within said cup in axial alignment with said baffle adjacent said downstream end.

14. In a carburetor as in claim 13, means rotatably supporting said cup within said throat, an electric motor mounted upon said body drivingly connected to said cup rotating said cup about an axis coincident with said throat axis, said fuel supply being introduced into said cup and forming a film upon the inner surface of the cup wall and being projected radially outwardly at said downstream end into axial alignment with said channel.

15. In a carburetor as in claim 13, an annular shoulder defined within said throat adjacent said baffle downstream end in axial alignment with said channel restricting the channel transverse cross sectional area adjacent said baffle downstream end.

16. In a carburetor as in claim 15, adjustable cup supporting means defined on said body supporting said cup for axial displacement within said throat, engine manifold pressure operated motor means connected to said cup supporting means for adjusting the axial position of said cup in accordance with the associated engine manifold pressure.

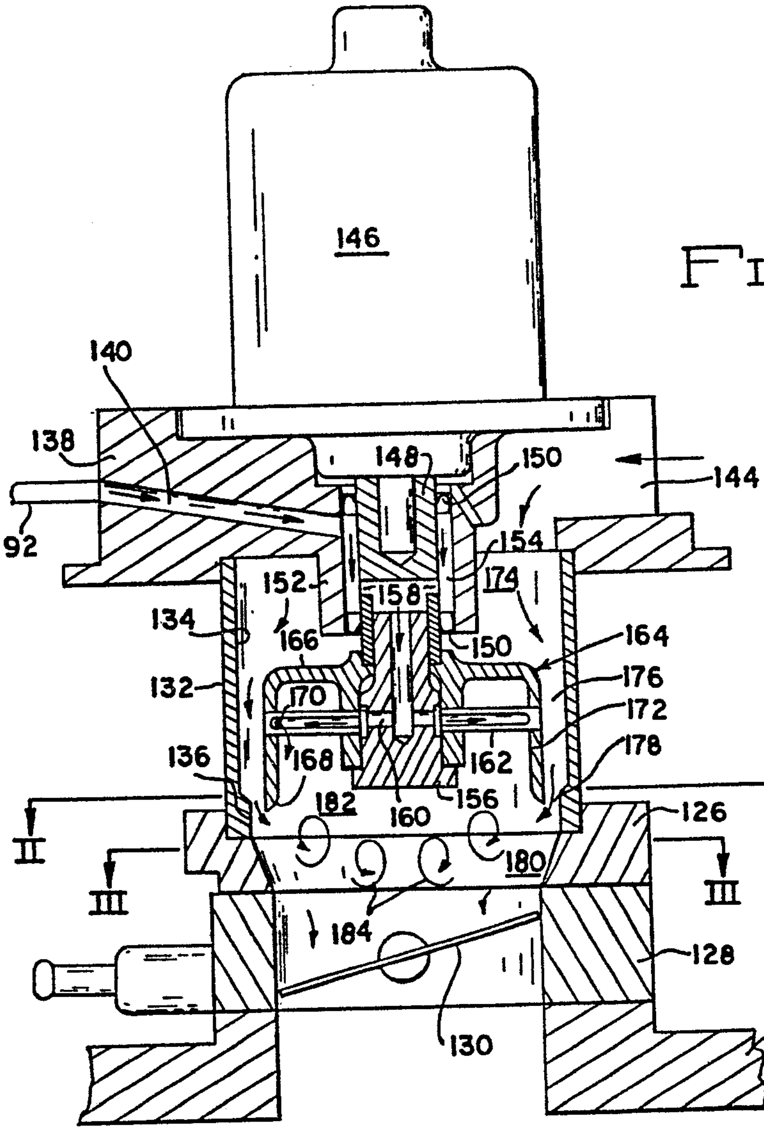
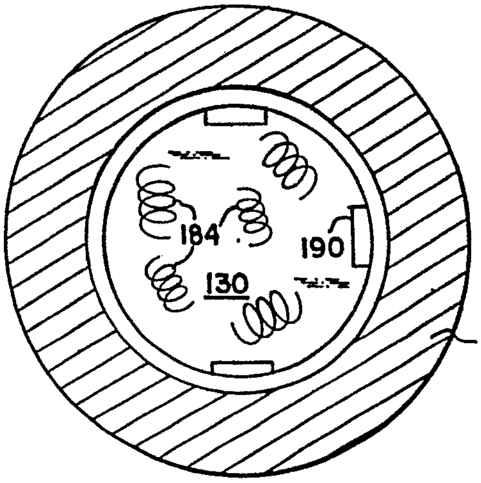


Fig. 1



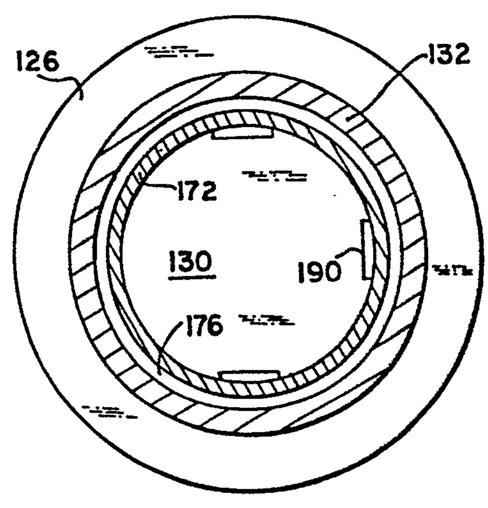


Fig. 3

Fig. 2

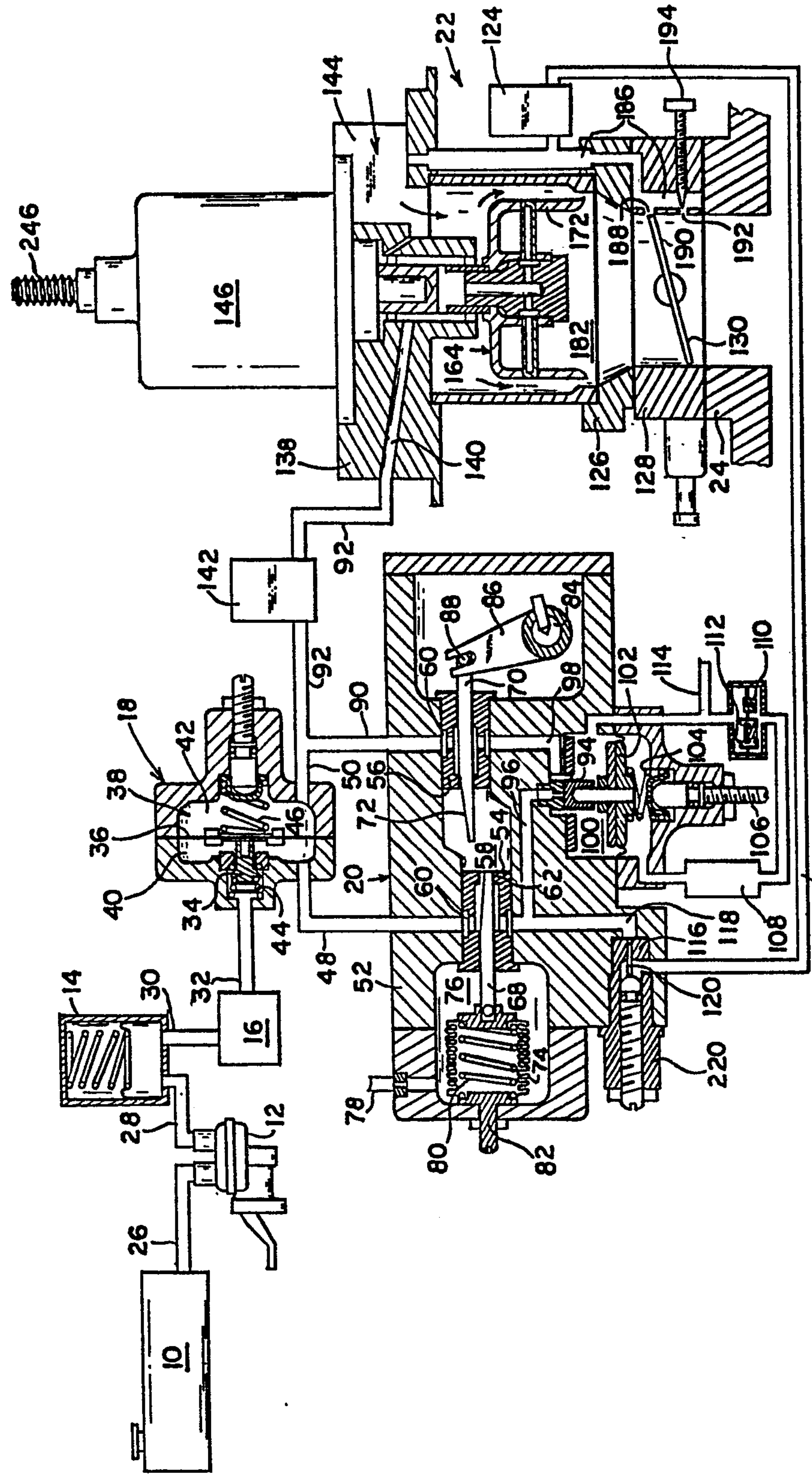

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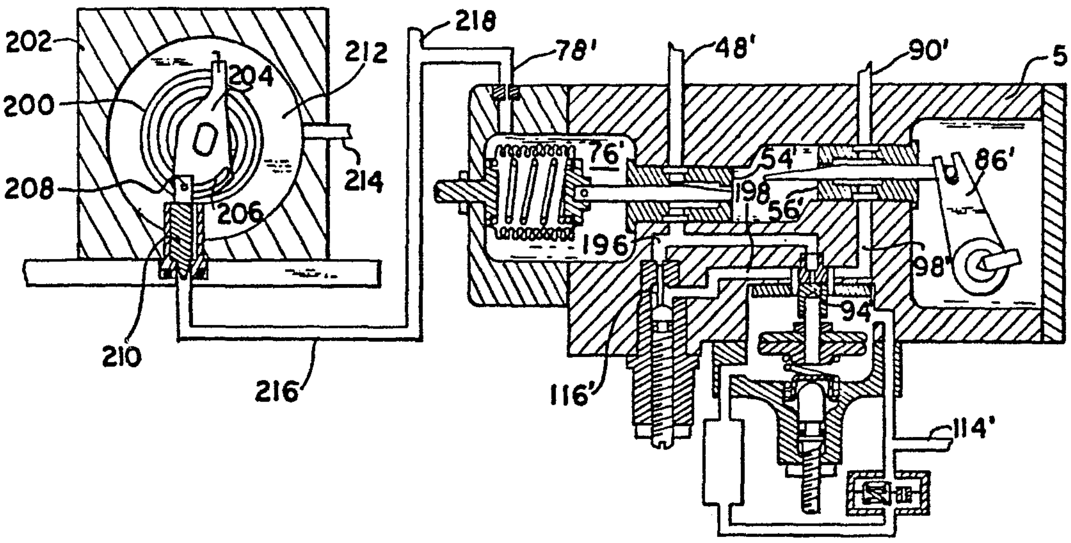
FIG. 4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196
98'
94
116'
114'

FIG. 6.

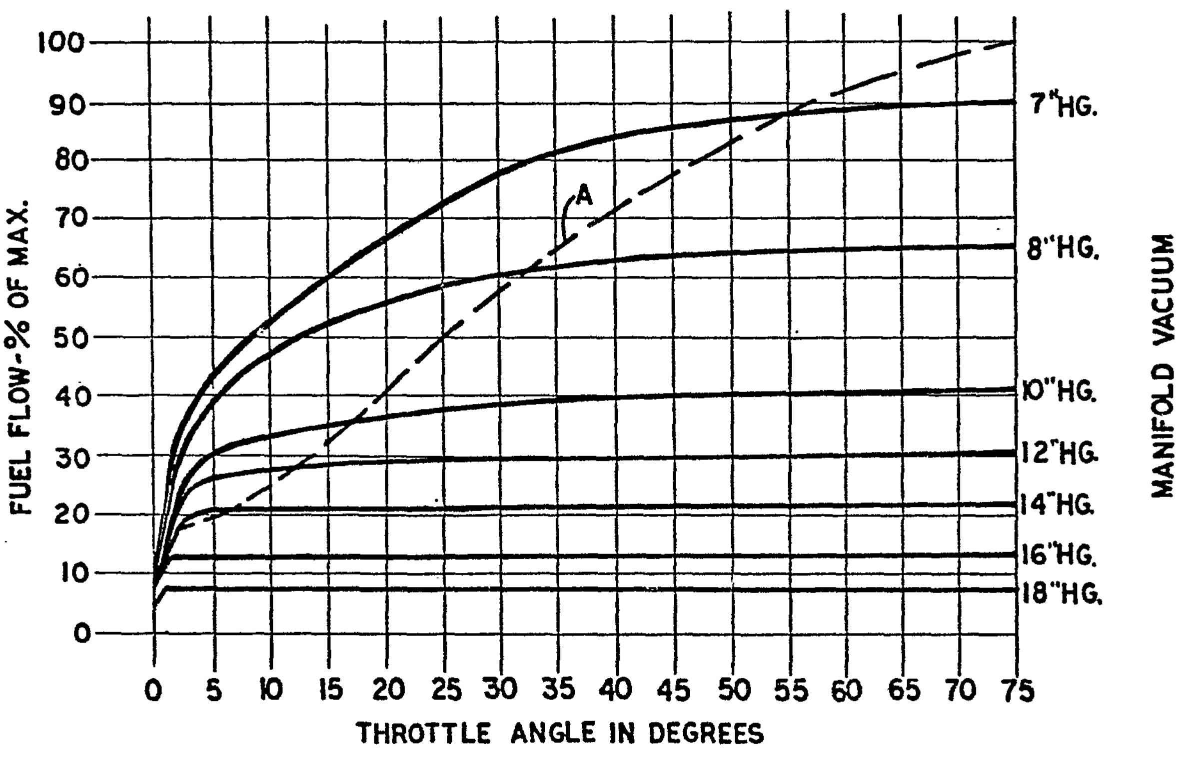
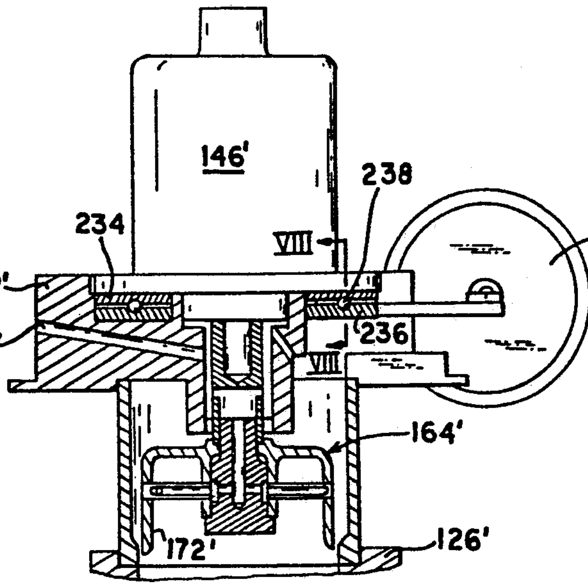

100
90
80
70
60
50
40
30
20
10
0
FUEL FLOW-% OF MAX.
A
7"HG.
8"HG.
10"HG.
12"HG.
14"HG.
16"HG.
18"HG.
MANIFOLD VACUUM
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75
THROTTLE ANGLE IN DEGREES

FIG. 5.

Fig-7-



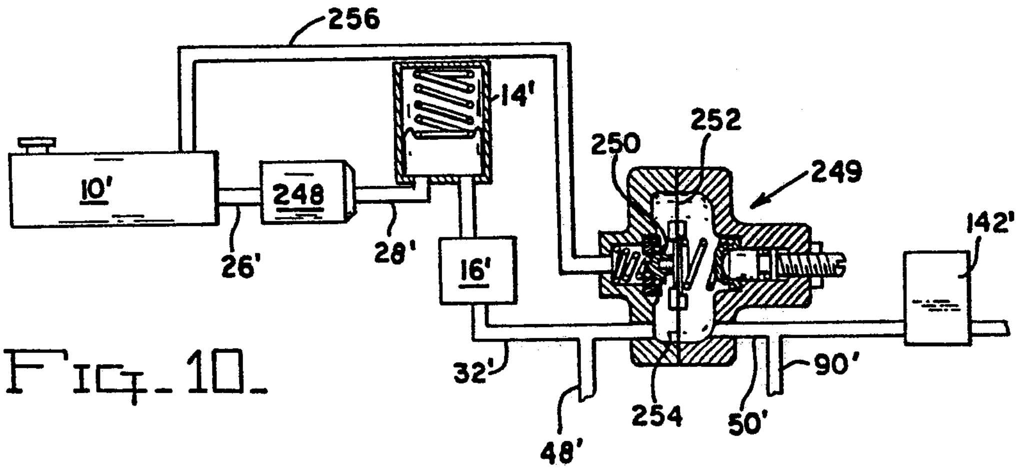


Fig-10-

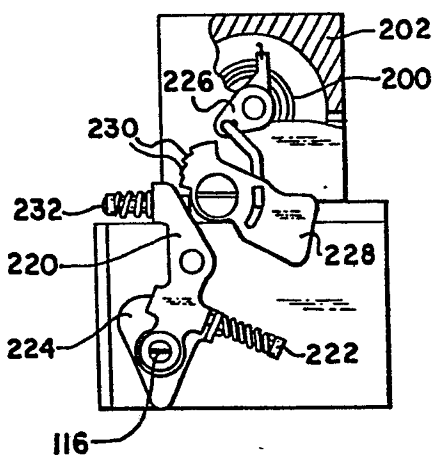


Fig-9

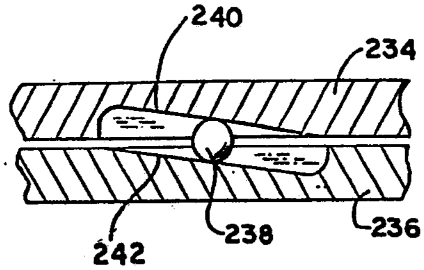


Fig-8-