United States Patent [19]

Hartel et al.

[11] **3,765,658**

[45] **Oct. 16, 1973**

[54] **CARBURETOR FOR AUTOMOTIVE VEHICLES**

[75] Inventors: **Gunter Hartel**, Rosellen; **Dietmar Walter**, Zons, both of Germany

[73] Assignee: **Deutsche Vergaser Gesellschaft m.b.H. & Co. K. G.**, Neuss, Germany

[22] Filed: **Oct. 22, 1971**

[21] Appl. No.: **191,625**

[30] **Foreign Application Priority Data**

Oct. 24, 1970 Germany ..... G 70 39 342.9

[52] **U.S. Cl.** ..... **261/41 D**, 123/97 B, 261/44 R, 261/69 R

[51] **Int. Cl.** **F02m 9/06**

[58] **Field of Search** ..... 261/44 R, 69 R, 41 D; 123/119 R, 97 B

[56] **References Cited**

UNITED STATES PATENTS

2,327,592	8/1943	Chisholm	261/41 D
2,447,264	8/1948	Beardsley, Jr.	261/69 R
3,190,623	6/1965	Ball	261/39 B
3,252,539	5/1966	Ott et al.	261/41 D
3,265,373	8/1966	Walker et al.	261/41 D
3,272,488	9/1966	Bickhaus	261/69 R
3,304,068	2/1967	Thomas	261/41 D
3,408,054	10/1968	Walker	261/69 R
3,450,115	6/1969	Toda et al.	261/44 R
3,472,494	10/1969	Seiden	261/41 D

FOREIGN PATENTS OR APPLICATIONS

2,005,063	8/1970	Germany	261/44 R

Primary Examiner—Tim R. Miles
Attorney—Eric H. Waters et al.

[57] **ABSTRACT**

A carburetor for automotive vehicles having improved performance characteristics in supplying fuel-air mixtures to the engine of the vehicle, including an auxiliary fuel-air supply arrangement and regulating valve which is responsive to instantaneously varying operating conditions of the engine to supply correspondingly adjusted quantities of fuel-air mixture thereto.

6 Claims, 2 Drawing Figures

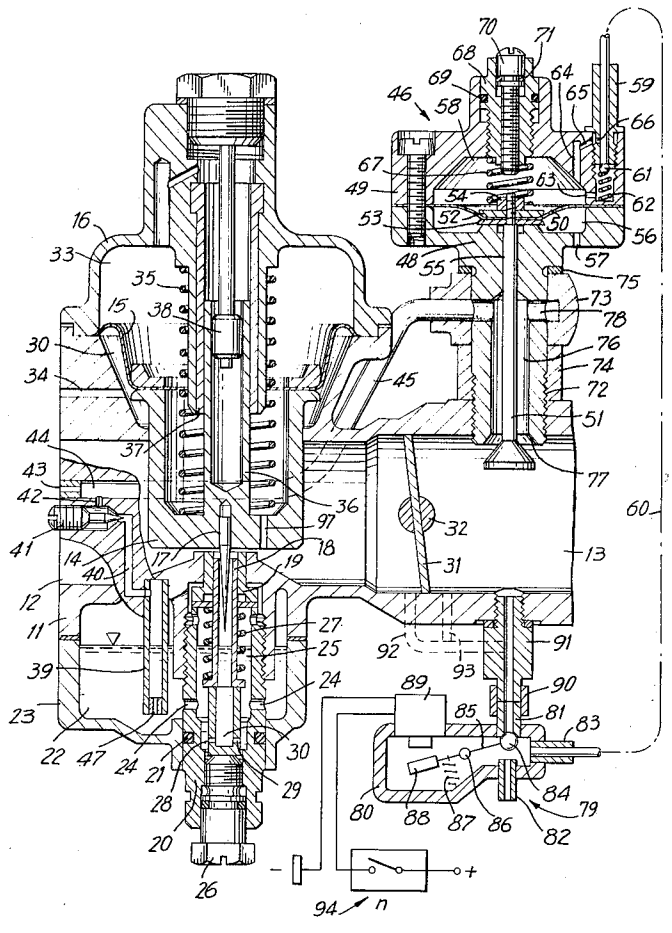


FIG. 1

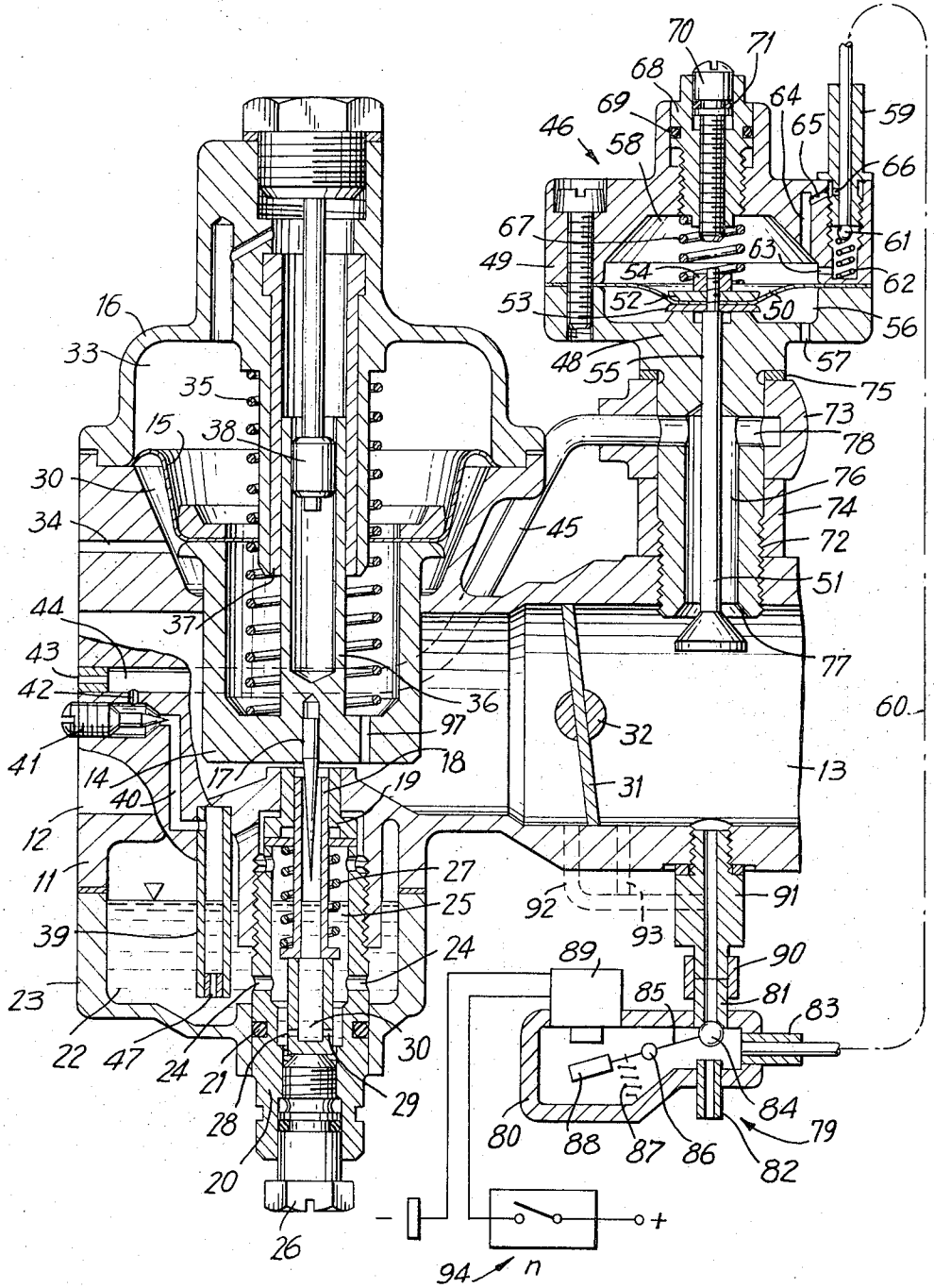
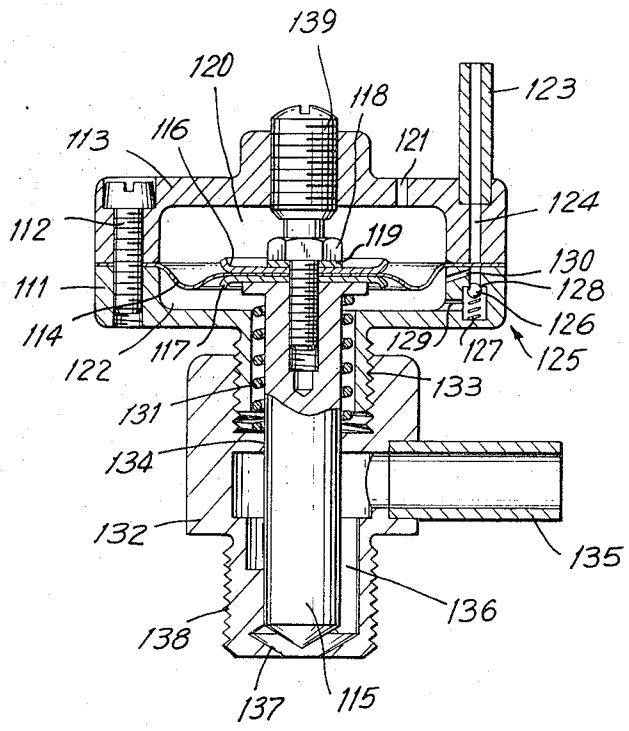

70
71
68
69
64
65
59
46
58
66
67
61
49
63
54
62
53
52
50
56
48
55
57
75
16
33
35
73
15
38
78
30
76
34
74
45
72
51
44
37
77
43
42
36
60
32
97
41
18
14
17
19
13
40
31
12
27
92
91
11
25
93
39
24
89
90
23
85
81
83
22
47
24
21
30
29
84
28
80
88
87
86
79
20
82
26
94
n

FIG. 2


139
120
118
123
113
116
121
124
112
119
130
111
128
114
126
122
117
129
127
125
133
131
134
132
135
136
138
137
115

CARBURETOR FOR AUTOMOTIVE VEHICLES

FIELD OF THE INVENTION

This invention relates to a carburetor for automotive engines or the like and, more particularly, to a carburetor providing for improved performance characteristics in response to rapidly or instantaneously changing engine operating conditions.

Various carburetors are presently known, which include suitable installations providing fuel-air mixtures for normal engine operation, with these installations being generally designated as the carburetor primary systems. The fuel-air mixture outlet conduit or passageway of the primary system leading to the engine generally includes a mixture throttle, which is selectively or arbitrarily actuatable, and which is usually constituted of a throttle valve. Furthermore, presently used carburetors also frequently include devices providing fuel-air mixtures for the idling and drive operating modes of the engine, essentially consisting of a calibrated fuel supply conduit, a calibrated air supply line, and an idling or auxiliary fuel-air mixture conduit which connects into the fuel-air mixture outlet conduit leading to the engine downstream of the mixture throttle valve. The fuel supply conduits and air supply line for the engine idling and drive operating modes may also be combined with the fuel-air supply components of the carburetor primary system.

DESCRIPTION OF THE PRIOR ART

In utilizing prior art carburetors, it has been found that when the idling automotive engine is subjected to loads from auxiliary components, such as, for example, automatic drives or engine accessories, difficulties arise in supplying an adequate fuel-air mixture to the engine. These difficulties result in the rotational speed of the engine dropping below a required minimum value for the unloaded or idling operating mode of the engine, which may cause the stalling of the engine.

SUMMARY OF THE INVENTION

It is, accordingly, an object of the present invention to provide a novel carburetor which avoids the limitations and drawbacks encountered in the prior art.

It is a further object of the invention to provide a carburetor having a fuel-air mixture output which will maintain the engine idling speed at a constant value, independently of rapid changes or fluctuations in the loads imposed on the automotive engine through auxiliary components and accessories.

Another object of the invention is to provide a novel carburetor which will supply during drive operating modes requiring increased engine rotational speeds, a controlled quantity of fuel-air mixture to the engine which is larger than the quantity required for the engine idling mode.

In accordance with the present invention, the novel carburetor having the improved fuel-air flow characteristics is provided with a regulating valve which is positioned at the orifice of the idling or auxiliary fuel-air mixture conduit, and with the valve having a cross-sectional flow through area which is automatically increased in response to an increase in the fuel-air suction tube pressure and decreased in response to a drop in the pressure.

In order to attain this operating objective, the regulating valve includes an actuating device which consists

of a closed membrane housing having a membrane interiorly thereof so as to form a first membrane chamber which is connected to ambient or atmospheric air, and a second membrane chamber which is connected by an evacuated or reduced-pressure conduit to the fuel-air mixture outlet conduit of the primary system at a point downstream of the mixture throttle. The membrane is subjected to the pressure of the fuel-air suction tube in opposition to the adjustable tensile force of a spring in the membrane housing.

The regulating valve includes adjusting elements for the membrane-loading spring and for the quantity of fuel-air mixture being supplied to the engine. The adjusting elements consist of two concentrically positioned adjusting screws which extend through the wall of the membrane housing. The larger or outer adjusting screw facilitates the adjustment of the membrane spring, whereas the smaller adjusting screw regulates the operating stroke of the valve and thereby controls the quantity of fuel-air mixture flowing therethrough.

The idling engine is frequently loaded in a rapid or instantaneous manner through an auxiliary engine component or accessory. Consequently, fuel-air suction pressure will be correspondingly rapidly increased. In order to correlate the action of the regulating valve with the sudden pressure increase without undue delay, a generally unhindered flow must be provided in the conduit leading toward the membrane housing. This is achieved by providing, at the juncture between the reduced-pressure conduit and membrane housing, a return valve, which only allows the flow to be toward the membrane housing upon the reduced-pressure conduit reaching a higher pressure than the pressure prevailing within the membrane housing.

Any unrestricted flow through the reduced-pressure conduit in the reverse direction is undesirable in order to avoid over-compensation in the closing direction of the regulating valve which would result in fluctuation or sag of the operating rotational speed of the engine. The required effect is provided by a calibrated by-pass passageway or conduit located upstream of the return valve which provides a continuous flow connection between the reduced-pressure conduit and the membrane chamber, bridging the return valve.

At engine drive, in effect, when the moving vehicle drives the connected engine at a rotational speed in excess of its idling speed, it is desirable to have an increased quantity flow of the fuel-air mixture toward the engine. Accordingly, a further feature of the invention lies in the provision of a switching valve at the juncture between the reduced-pressure conduit and the fuel-air mixture outlet conduit of the primary system at a point downstream of the mixing throttle, adapted to selectively connect the reduced-pressure conduit with the fuel-air mixture outlet conduit of the primary system or with the ambient atmosphere.

The actuation of the switching valve is dependent upon the engine speed in a manner whereby the reduced-pressure conduit is connected with ambient atmosphere when the engine exceeds a predetermined speed, and connected to the fuel-air mixture outlet conduit of the primary system at all lower engine speeds. As soon as the reduced-pressure conduit is vented to the ambient atmosphere, both membrane chambers of the membrane housing are subjected to an equal pressure. This causes the spring acting on the membrane to be unloaded, thereby increasing the

cross-sectional flow area of the regulating valve to its greatest value.

The actuation of the switching valve may be effected, as is known, by a suitable electromagnet which may be activated or deactivated by means of an electric or electronic engine RPM counting switch.

The actuation or selective positioning of the switching valve may also be dependent upon the pressure in the suction conduit generated in response to the speed of the engine, whereby the reduced-pressure conduit is connected to the ambient atmosphere when the pressure in the suction conduit drops below a predetermined value, and connected to the fuel-air mixture outlet conduit of the primary system downstream of the mixing throttle upon the pressure in the suction tube reaching higher values. The actuation of the switching valve is obtained with the assistance of a membrane housing device, the latter of which is responsive to the pressure in the suction conduit. This mode of switching valve actuation has the advantage in that it is not dependent on electrical energy. The value of the suction tube pressure may be controlled within definite parameters having predetermined tolerances allowing for fluctuations in the engine speed.

The connecting point or juncture between the reduced-pressure conduit and the fuel-air mixture outlet conduit of the primary system is preferably located outside the mechanical operating range of the fuel-air mixing throttle valve. This may present difficulties in that, depending upon the particular construction of the engine, the regulating valve may be opened to an excessive degree inasmuch as, during the change of engine operation from idling to drive mode, the suction tube or conduit pressure increases by a considerable amount. These difficulties may be readily avoided by locating the connection between the reduced-pressure conduit and the fuel-air mixture outlet conduit of the primary system within the mechanical operating range of the mixing throttle valve. Since this installation permits the mixture throttle valve to be easily opened during change-over from engine idling to drive operating mode, the edge of the movable valve portion extends over the outlet orifice of the reduced-pressure conduit. The mixture being sucked into the engine, flowing past the edge of the valve at a high flow velocity, reduces the level of the pressure prevailing in the reduced-pressure conduit to a point below that in the suction tube or conduit, so as to prevent the full effect of the increased pressure in the suction tube being felt by the regulating valve in response to the opening of the throttle valve.

An improved sequence in the change of engine operating modes may be obtained by connecting the reduced-pressure conduit with the fuel-air mixture outlet conduit of the primary system downstream as well as upstream of the mixing throttle valve so as to locate the connection within the mechanical operating reach of the mixing throttle valve.

The valve seat and closure members of the regulating valve are constructed to facilitate the mixture of the fuel and air to be introduced into the suction conduit in a well-distributed manner. This, for example, is the case when the valve seat and closure members of the regulating valve have essentially conical configurations. The advantages of the invention consists not only in that the engine and idling speed is maintained constant under variable loading conditions, and the stalling of the engine is avoided upon sudden loading thereof. Another advantage lies in the inclusion of an automatic compensator for barometic pressure increases. Thus, with the increasing barometric pressures, the difference between the suction tube pressure and the atmospheric pressure is reduced, and as a result this will increase the flow cross-sectioned area of the regulating valve. In the absence of a regulating valve according to the invention, the idling speed of the engine would be reduced in response to a reduced fuel-air mixture flow into the cylinders of the engine. With the inventive regulating valve being utilized, the rate of filling of the cylinders of the engine is increased in response to the increased cross-sectional flow area of the regulating valve. Through suitable calibration of the measurements of the regulating valve, the idling speed of the engine may be closely maintained at a constant level independently of the then present barometric pressure.

BRIEF DESCRIPTION OF THE DRAWINGS

Reference may now be had to the accompanying drawings showing exemplary embodiments of the invention, in which:

FIG. 1 illustrates a cross-sectional view of a carburetor according to the present invention; and

FIG. 2 illustrates a cross-sectional view of a second embodiment of a carburetor including a regulating valve according to the invention, and providing for a piston arrangement controlling the fuel-air suction conduit flow cross-section.

DETAILED DESCRIPTION

Referring now to the drawings, the carburetor includes the housing **11** having an air inlet conduit **12** of generally circular cross-section, and a fuel-air mixture outlet conduit **13**, also of circular cross-section. A slide piston **14** extends vertically downwardly into the housing **11** of the carburetor. When the slide piston **14** is completely located within the carburetor housing **11**, the inlet of air is largely throttled. Through movement of the slide piston **14**, a smaller or larger flow cross-section is provided as required. The lifting of the slide piston **14** is caused by the vacuum or reduced pressure acting on a membrane **15** across a bore **97**.

The membrane **15**, which is formed of a rubberized elastic material or a rubber web, is connected to the slide piston **14** in a gas-tight relationship. The outer peripheral rim of the membrane **15** is clamped in a gas-sealed relationship between the carburetor housing **11** and a carburetor cover **16**.

At its lower end, the slide piston **14** carries a jet needle **17** which extends into a jet orifice **18**. The jet orifice **18** is movably or slidably positioned within an actuating tube **19**, the location of which is determined by a screw stop **20**. The tube **19** is pressure-sealed from the carburetor housing **11** through an "O" ring seal **21**. The screw stop **20** allows for the flow of fuel **22** from a float chamber **23** through a bore **24** into a chamber **25**. A fuel regulating screw **26** allows the jet nozzle **18** to be moved upwardly in opposition to the force of a tension spring **27**, and also to be moved downwardly. Upon further upward rotation of fuel regulating screw **26**, jet nozzle **18** is moved downwardly by the tension spring **27**. By means of this arrangement, a basic adjustment of the fuel flow cross-sectional space between jet nozzle **18** and jet needle **17** is provided. The fuel flows from chamber **12** through bores **28** and **29** into the hol-

low interior 30 of the fuel regulating screw 26, and flows from there into the jet nozzle 18.

The carburetor float system and the fuel inlet installation of the float chamber are not illustrated since they do not form a part of the invention.

A mixing throttle 31 is positioned downstream of slide piston 14 and consists of a selectively adjustable throttle valve having a valve shaft 32 positioned concentrically within the fuel-air mixture outlet conduit 13 of the primary system. The membrane 15, in conjunction with the slide piston 14, forms a movable end wall for the low pressure chamber 33, the latter of which has a variable volume. The chamber 30 below membrane 15 is vented to atmosphere by means of a bore 34. A spring 35 imparts a displacing force to the slide piston 14 in a direction bending to reduce the flow cross-sectional area of the suction conduit. A housing 36 which is connected to slide piston 14 is adapted to slide within housing 37, the latter of which is connected to carburetor cover 16, so as to effect a centrally oriented movement of the slide piston 14. Within the housing a damping installation 38 is located so as to provide a braking effect on the rapid upward motion of slide piston 14, without restricting the rapid downward motion thereof.

In the disclosed embodiment, the mixing throttle 31 is normally closed during the idling position of the engine. In order to obtain this effect, a separate idling system is provided, which essentially consists of a fuel supply tube 39, fuel conduit 40, fuel regulating screw 41, fuel conduit 42, idling air jet 43, idling fuel-air mixture conduit 44, idling mixture conduit 45, and regulating valve 46. The fuel outlet tube extends into the fuel in float chamber 23, and includes a calibrated fuel orifice 47 at its lower end. It is also possible to include a throttling device for regulation of mixing the fuel-air quantities in the idling mixture conduit 45 or idling mixture conduit 44.

The regulating valve 46 includes a valve housing 48, housing cover 49 and other standard components. A membrane 50 is stretched between the valve housing and the cover, and is then connected in a gas-tight relationship with a closure member 51 by means of membrane plates 52 and 53 and a nut 54. The length of the stroke of the membrane plate 53 may be adjusted on the basis of regulating the mixture quantity. The closure member 51 is slidably mounted within housing bore 55 at a minimum tolerance. The lower membrane chamber 56 is vented to ambient atmosphere through a bore 57. The upper membrane chamber 58 is connected to an evacuated or reduced-pressure conduit 60 by a connecting duct 59. The connecting duct 59 has a threaded-end connection and includes a bearing seat at its lower end adapted to receive a return valve ball 61, which is pressed against the seat by means of a spring 62. A bore 63 provides flow connection between the return valve and the membrane chamber 58. A calibrated bypass connection between the reduced-pressure conduit 60 and membrane chamber 58, which bridges the return valve, is provided by passages 64 and 65, and cross bore 56. Membrane 50 is subjected to the action of the suction tube vacuum in opposition to the tensile force of a membrane spring 67, whereby the pressure extends into membrane chamber 58. The membrane spring 67 may be pre-stressed by means of an adjusting screw 68, the latter of which is sealed from the atmosphere by an "O"-ring seal 69. The adjusting screw 68 includes a concentrically positioned threaded bore adapted to receive a smaller adjusting screw 70, which is sealed from the atmosphere by an "O"-ring seal 71 and which forms a limit or stop for the stroke of the valve.

The lower end of the valve housing 48 includes an outer threaded portion 72 which facilitates the mounting of the regulating valve 46 onto the carburetor housing while concurrently providing for the installation and sealing of a conduit-connecting ring 73. The conduit-connecting ring 73 is rotatably mounted to facilitate the connection of the idling mixture conduit 45 from any radial direction. A spacer tube 74 and sealing disc 75 allows the conduit-connecting ring 73 to be sealed from the atmosphere.

The lower end of the valve housing 48 includes a bore connecting to a mixture passage 76 which ends in a conically formed valve seat 77. At the side of conduit-connecting ring 73 transfer bores 78 are provided for the flow of the fuel-air mixture. A closure member 51 is formed into a conical configuration at its lower end.

The connecting point or juncture between the reduced-pressure conduit 60 and the fuel-air mixture outlet conduit 13 downstream of mixing throttle 31 of the primary system, includes a switching valve 79. The switching valve consists of a housing 80, an inlet support 81, inlet connector 81, inlet connector 82, outlet connectors 83, spherical closure member 84, a lever arm 85 having a turn point 86, a tension spring 87, an iron anchor 88 and an electromagnet 89. The switching valve is selectively connected to atmosphere at an inlet point 82. An inlet member 81 is connected to the mixture outlet conduit 13 of the primary system through a slide member 90 and threaded connector 91. In the disclosed embodiment, the threaded connector 91 is located externally of the mechanical operating range of mixing throttle 31. However, the connecting points may also be located as shown in the discontinuous-line drawn conduit connections 92 and 93.

The actuation of the electromagnet 89 is provided by means of electronic or electric engine RPM counters 94.

Another embodiment of the regulating valve is disclosed in FIG. 2, wherein the construction is simpler than that of the regulating valve 46 shown in FIG. 1.

A valve housing 111 is connected to a valve cover 113 by screws 112. A membrane 114 is stretched between the housing and the cover and is connected in a gas-tight manner with a closure member 115 by means of membrane plates 116 and 117, screw 118 and spring plate 119. An upper membrane chamber 120 is vented to atmosphere through a bore 121. A lower membrane chamber 122 is connected to a reduced pressure conduit (not shown) through a connecting member 123. A passageway 124 extends from connecting member 123 to a return valve 125, having a ball valve 126 pressed against a valve seat 128 by means of a spring 127. Connection between return valve 125 and membrane chamber 122 is provided by bore 129. A calibrated bypass connection between passage 122 and membrane chamber 122, which bridges return valve 125, is provided by a passage 130.

The membrane 114 is subjected to the action of the reduced pressure level in the suction tube which is conveyed into membrane chamber 122 in opposition to the tensile force of a membrane spring 131.

A threaded connection is provided by a threaded member **133** located between the valve housing **111** and the lower portion of the valve **132**, and wherein the threaded connection concurrently provides for the pretensioning of membrane spring **131**.

The closure member **115** is movably supported, at a minimum tolerance, within a bore **134** of the lower portion **132** of the valve. The valve portion **132** includes fuel-air mixture inlet member **135** at its side and at least one mixture outlet passage **136** which extends into a conically-shaped valve seat **137**. Similarly, a conical closure member is formed at its lower end. The threaded portion **138** provides for the connection of the regulating valve to the carburetor housing. Adjusting screw **139** provides for the adjustment of the stroke of the valve.

When starting up the engine of the vehicle, the mixing throttle **31** is closed, and slide piston **14** is in its lowermost position, as illustrated in the drawing. The engine RPM counter **94** is closed. Upon ignition of the automotive engine, the positive clamp of the RPM counter **94** is subjected to an electrical current and the electromagnet **89** is energized. The iron anchor **88** is drawn toward the electromagnet so as to swivel pendulum **85** about its pivot **86**, in opposition to the tensile force of the spring **87**, into its other operative end position. This causes the movement of the spherically-shaped closure member **84** in an arcuate motion until the inner aperture of the inlet member **82** is closed. Through this movement the switching valve **89** connects reduced-pressure conduit **60** with the fuel-air mixture outlet passage **13** of the primary system.

Prior to engine starting, the regulating valve **46** is completely opened in response to the force of membrane spring **67**. A reduced pressure is produced, subsequent to the engine start, in the portion of the fuel-air mixture outlet passage **13** downstream of mixing valve **31**, and the pressure drop conveyed into membrane chamber **58**. In response to the reduced pressure, the closure member **51** is moved upwardly in opposition to the force of membrane spring **67**. Concurrently, the closure member **51** assumes a cross-sectional flow area which guarantees a precisely measured quantity of fuel-air mixture for idling engine speed.

The reduced pressure produced in mixture outlet passage **13** is also conveyed into the mixture passage **76**, idling mixture conduit **45**, idling mixture passage **44**, fuel passage **42**, and fuel passage **40** in the fuel outlet conduit **39**. This will cause the idling fuel to be raised towards the orifice of the idling chamber **43** in which it is intimately mixed with the engine idling air and is then sucked by the engine through the aforementioned fuel-air mixture conduits and passages.

As soon as the idling or unloaded engine is loaded through auxiliary components or accessories, the engine RPM is lowered and, concurrently, the pressure increases in mixture outlet passage **13**. The increase in pressure is sensed in membrane chamber **58** by means of threaded member **91**, switching valve **79**, reduced pressure conduit **60** and connecting member **59**. In response thereto, the closure member is moved further downwardly so as to provide a larger cross-sectional area for the flow of the idling mixture, and consequently in view of the increased flow of the mixture, the engine speed is increased to its required rate.

When the engine is loaded in a sudden manner, the pressure in the mixture outlet passage **13** rises just as quickly. This rapid pressure increase has an immediate effect on the return valve ball **61**. The return valve opens and thereby allows for an equally rapid pressure increase to take place in membrane chamber **58**, so as to provide a rapidly increased idling mixture quantity, as hereinbefore described. When the engine exceeds its idling rotational speed, for example, during transitional and full load engine operation, RPM counter **94** interrupts the electrical current energizing electromagnet **89**. This will result in the spring **87** pulling spherically shaped closure member **84** into the operative position disclosed in the drawing. At this point, both membrane chambers **56** and **58** are vented to atmosphere, whereby closure member **51** provides for a maximum flow cross-sectional area through the valve. The reduced pressure created in fuel outlet tube **39** does not in itself suffice for the withdrawal of additional fuel at relatively high suction tube pressures.

When the closing of the mixing throttle is effected in response to the transitional or full-load operation of the engine, the regulating valve **46** remains completely open so as to provide for the required increase in the fuel-air mixture quantity for the particular operational mode of the engine. This is obtained without the need for intermediate steps, until the engine rotational speed again drops to its idling speed. At that time, RPM counter **94** again closes the electrical circuit, in view of which the switching valve **79** is reversed and regulating valve **46** resumes its normal control operation.

Although the drawing discloses embodiments of carburetors showing predetermined constructional features, the invention is not limited to these particular constructions. The invention may be readily applied to numerous other carburetor constructions. In particular, the invention is adapted for all carburetors utilizing reduced-pressure control fuel supply systems.

We claim:

1. In a carburetor for automotive engines comprising means for admixing fuel-air mixtures for normal engine operation, including a primary fuel system having an admixture suction outlet passageway; a selectively actuatable mixing throttle positioned in said passageway; means for admixing fuel-air mixtures for idling and motive engine operation including a calibrated fuel inlet orifice, a calibrated air inlet jet means, and an auxiliary and idling secondary fuel-air-mixture inlet passageway joining into said primary fuel system outlet passageway downstream of said throttle; the improvement comprising, regulating valve means interposed in said secondary fuel-air mixture inlet passageway at the outlet end thereof, said valve having a variable-area flow passageway, actuating means for said regulating valve, said actuating means including a closed housing, a flexible membrane in said housing dividing the latter into first and second chambers, means venting said first chamber to atmospheric air, means forming a reduced-pressure passageway connecting said second chamber to said primary fuel system suction outlet passageway downstream of said mixing throttle, resilient spring means in said housing, said membrane being biased in opposition to the tensile force of said spring means in response to the reduced pressure in said suction outlet passageway, a return valve, said return valve being positioned in the reduced-pressure passageway interconnecting said housing with said suction outlet passageway, said return valve limiting flow in the direction toward said housing when the pressure in said reduced-pressure

passageway exceeds the pressure in said housing, a by-pass conduit bridging said return valve, said by-pass conduit effecting continuous flow communication between said reduced-pressure passageway and said second membrane chamber, and a selector valve disposed in the passageway interconnecting said reduced-pressure passageway and said primary system suction outlet passageway downstream of said mixing throttle, said selector valve alternatively connecting the reduced-pressure passageway with the suction outlet passageway and with the ambient surrounding air, the valve flow area adapted to be automatically increased responsive to pressure increases in said primary system suction outlet passageway, and decreased responsive to pressure drops in said outlet passageway.

2. An improvement as claimed in claim **1**, comprising a pair of adjusting means extending into said housing, said adjusting means including an outer axially adjustable screw member and an inner screw member supported concentrically within said outer screw member and axially movable relative thereto, said outer screw member being adapted to effect adjustment of said spring means, and said inner screw member facilitating variation of the flow area of said regulating valve between predetermined limits.

3. An improvement as claimed in claim **1**, said reduced-pressure passageway being connected to the ambient surrounding air upon said engine exceeding a predetermined rotational speed, and being connected to the suction outlet passageway at speeds below said predetermined rotational speed.

4. An improvement as claimed in claim **3**, including electromagnetic actuating means for said selector valve, said electromagnetic means being connected to electric engine rotational speed counters for actuating said valve in response to a sensed engine rotational speed.

5. An improvement as claimed in claim **1**, said selector valve being actuatable in response to pressures in said suction outlet passageway, whereby said reduced-pressure passageway is connected to ambient surrounding air at predetermined pressures, and connected to the suction outlet passageway at higher suction outlet passageway pressures.

6. An improvement as claimed in claim **1**, including actuating means for said selector valve, said actuating means comprising a housing having a membrane means responsive to pressures in said suction outlet passageway.

* * * * *