United States Patent

Pelizzoni

[15] **3,659,572**

[45] **May 2, 1972**

[54] VARIABLE VENTURI CARBURETORS

[72] Inventor: **Winton J. Pelizzoni,** Hagerstown, Md.

[73] Assignee: **Mack Trucks, Inc.,** Allentown, Pa.

[22] Filed: **Jan. 29, 1970**

[21] Appl. No.: **6,773**

[52] **U.S. Cl.**.....**123/119,** 123/98, 261/41, 261/44, 261/DIG. 56

[51] **Int. Cl.**.....**F02d 11/02,** F02n 9/08

[58] **Field of Search**.....123/119, 98; 261/44, DIG. 56, 261/69, 41

[56] **References Cited**

UNITED STATES PATENTS

2,621,911	12/1952	Lindsteadt	261/41
2,661,196	12/1953	Ball	261/41
868,251	10/1907	Bollee	261/DIG. 56
1,140,232	5/1915	Allen	261/DIG. 56
1,187,463	6/1916	Merriam	261/DIG. 56
1,222,941	4/1917	Egoroff	261/DIG. 56
1,448,055	3/1923	Corti	261/DIG. 56
1,516,276	11/1924	Hauskins	261/DIG. 56
2,213,917	9/1940	Leibing	261/69
3,259,378	7/1966	Mennesson	261/69 X
3,342,463	9/1967	Date et al	261/69 X

FOREIGN PATENTS OR APPLICATIONS

1,090,014	0/1915	Great Britain	261/DIG. 56
26,424	7/1923	France	261/DIG. 56

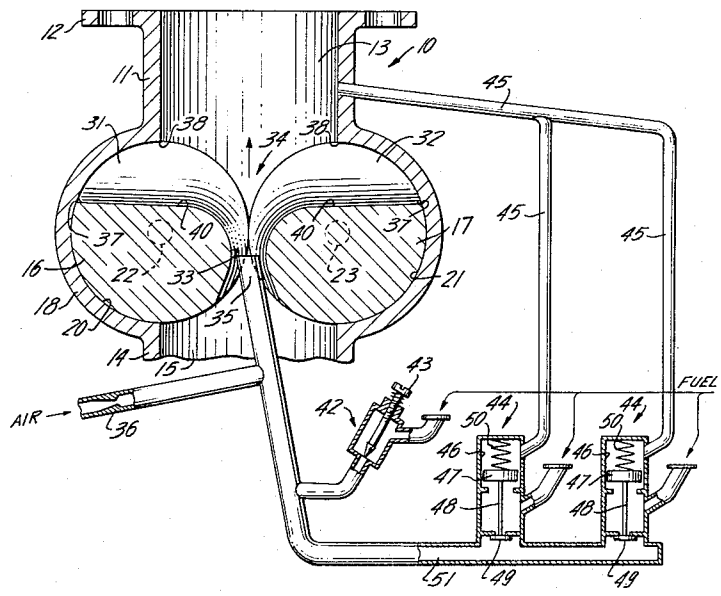
Primary Examiner—Wendell E. Burns

Attorney—Brumbaugh, Graves, Donohue & Raymond

[57] **ABSTRACT**

A carburetor having a venturi formed between intake and outlet passages by a pair of rotatable cylinders with aligned, cooperating channels of varying cross section. At the outlet passage, the channels terminate in channel ends conforming to the adjacent passage end. The channels slope gradually to meet the outlet passage when the venturi opening is greatest. The channel bottoms slope toward the central venturi opening, returning deposited fuel to the flow path. The venturi's variable opening serves as a throttle, eliminating the conventional throttle plate. A single jet opens into the venturi and supplies fuel mixture for all throttle conditions, including idle. Idle mixture is controlled either by adjustment of the fuel supply rate or by adjustment of air bled from a premixing vent. Several fuel supply control systems are employable alternatively to vary the fuel supply rate with the venturi opening. A mixture enriching valve is opened for cold starting to enrich the air-fuel mixture without choking. An engine speed controlled governor may limit the venturi opening to set the venturi for its optimum opening according to the engine speed and load.

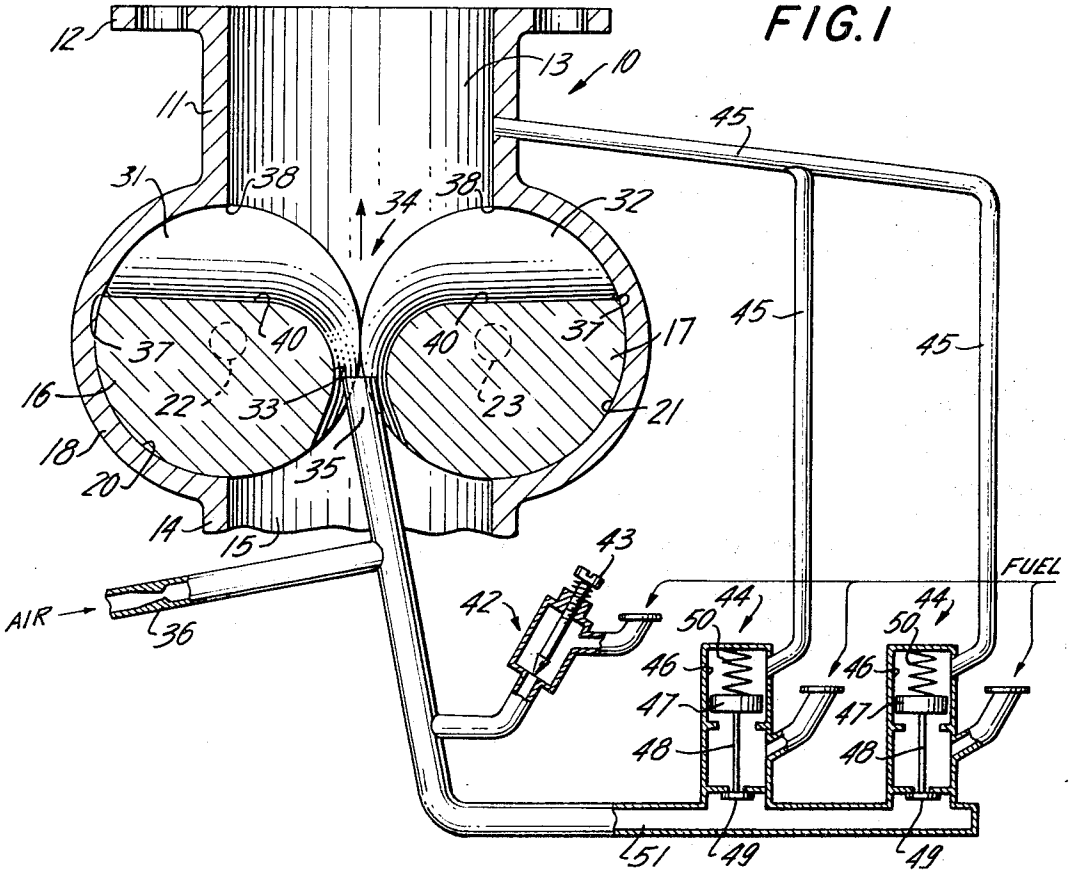
4 Claims, 8 Drawing Figures



Patented May 2, 1972 3,659,572

3 Sheets-Sheet 1

FIG. 1



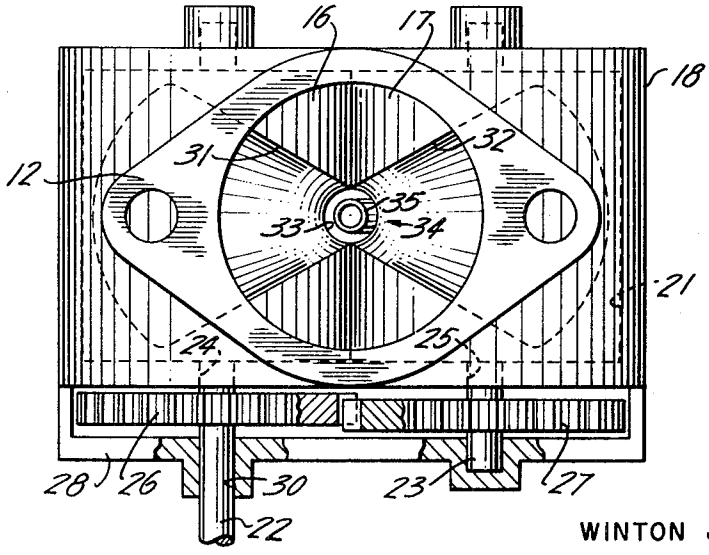


FIG. 2

INVENTOR.
WINTON J. PELIZZONI
BY
Brumbaugh, Graves, Donohue & Raymond
his ATTORNEYS

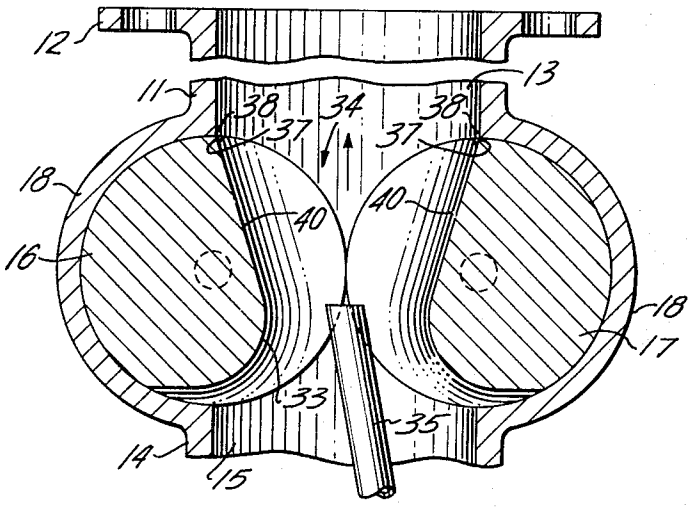


FIG. 3

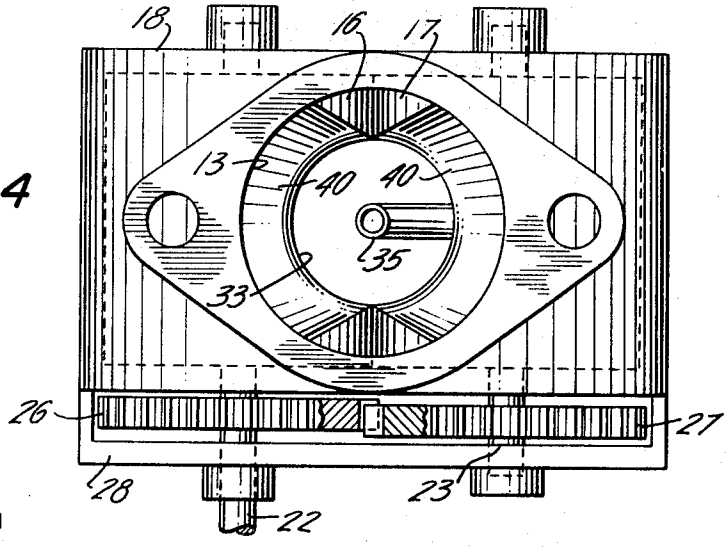


FIG. 4

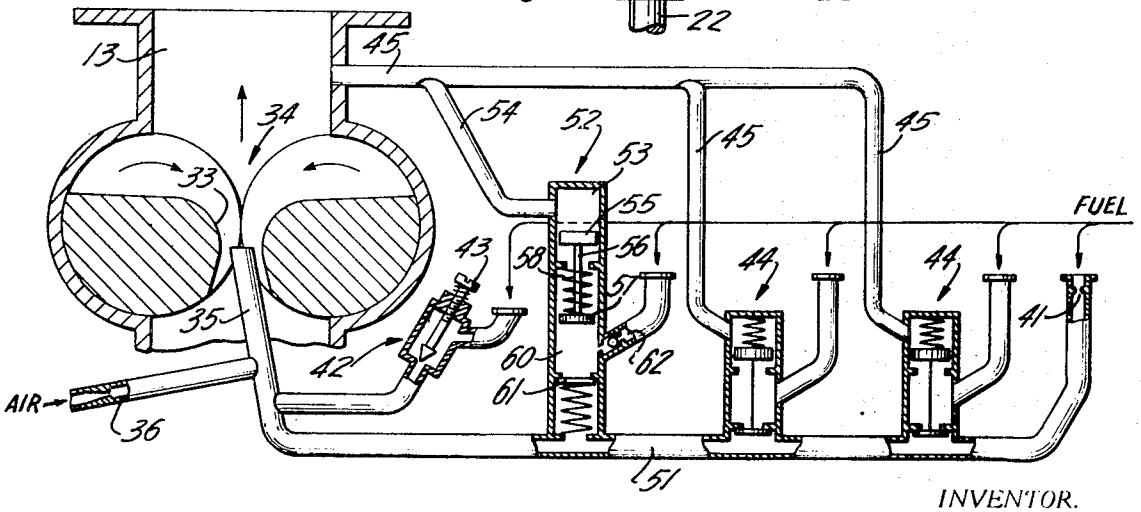


FIG. 5

INVENTOR.
WINTON J. PELIZZONI
BY
Brumbaugh, Graves, Donohue & Raymond
his ATTORNEYS

Patented May 2, 1972 3,659,572

3 Sheets-Sheet 3

FIG. 6

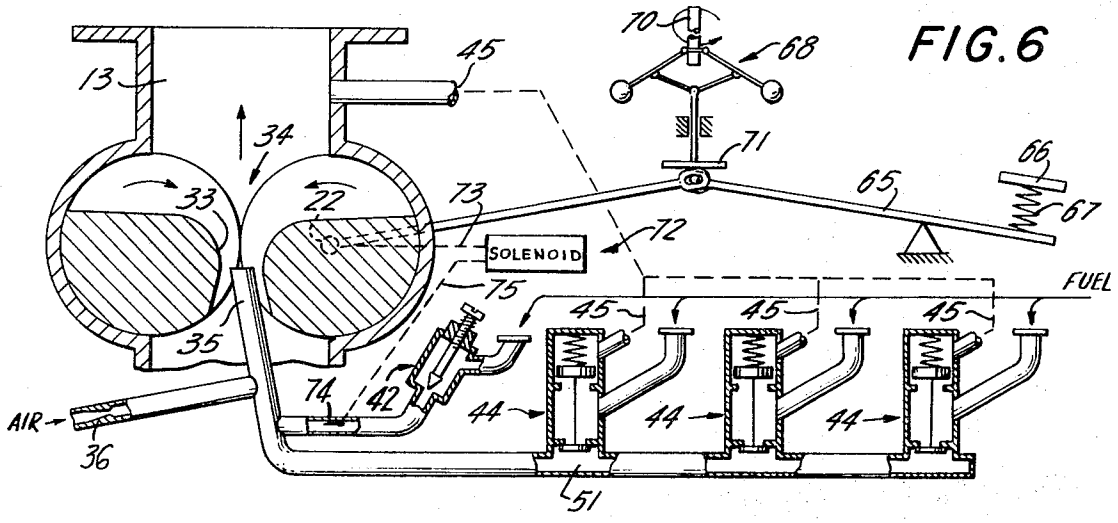


FIG. 7

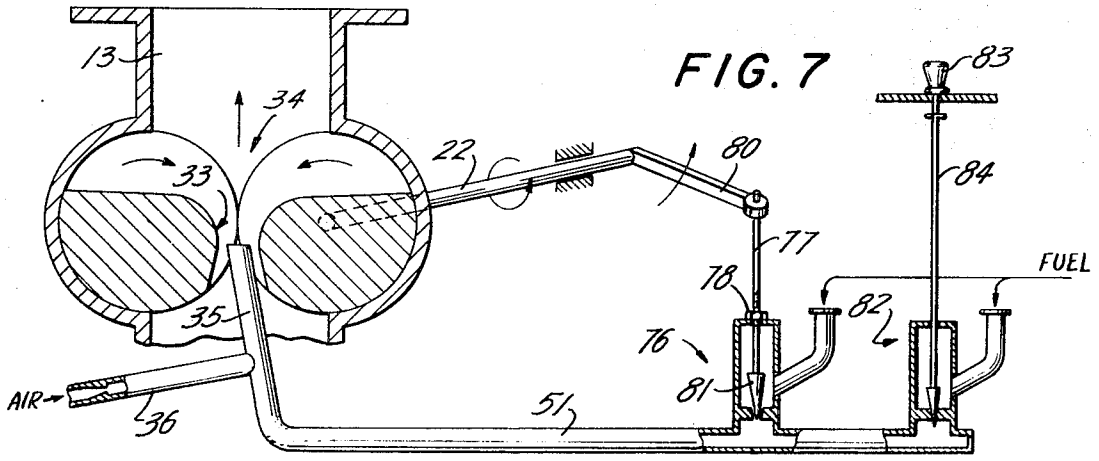
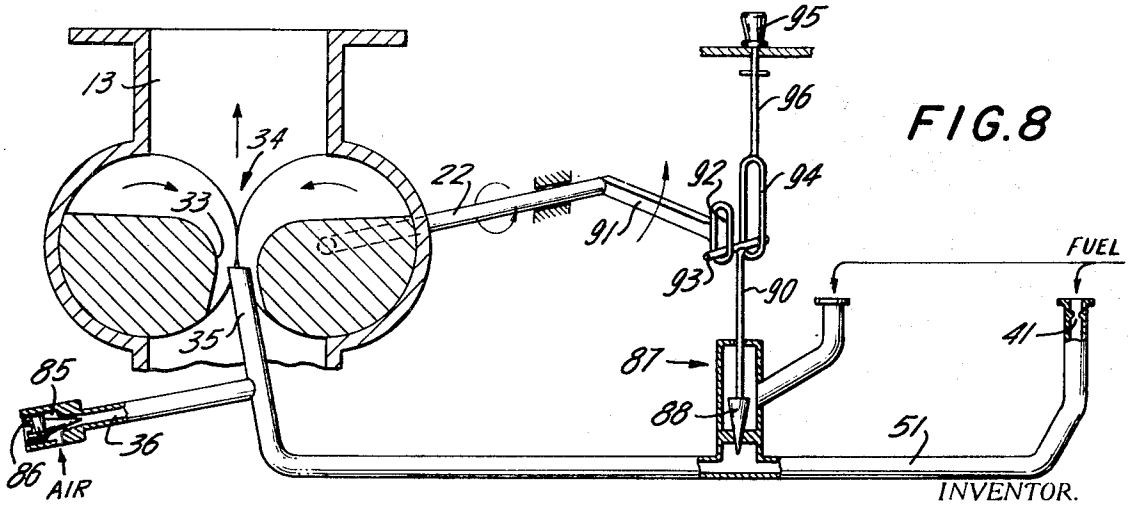


FIG. 8



INVENTOR.
WINTON J. PELIZZONI

BY
Cumbaugh, Graves, Donohue & Raymond

his ATTORNEYS

VARIABLE VENTURI CARBURETORS

BACKGROUND OF THE INVENTION

This invention relates to variable venturi carburetors and more particularly to an improved variable venturi carburetor in which rotatable members control a venturi opening formed by channels of varying cross section on converging surfaces of the rotatable members.

Numerous carburetors previously have been described in which rotatable, channeled members are turned to vary a venturi opening. In these carburetors, discontinuities occurring in the air-fuel mixture flow path between the variable venturi and the carburetor outlet passage become more severe as the venturi is opened. A separate, conventional throttle plate generally is included in addition to the variable venturi. Quite often, variations in partial vacuum or depression at the carburetor outlet vary the positions of the rotatable venturi forming members to control the venturi opening. The additional throttle plate, on the other hand, is driven mechanically to control engine speed. Often, the rate at which fuel is supplied to the venturi is not precisely controlled for both idle (smallest venturi opening) and increased throttle (enlarged venturi opening), nor is the venturi opening controlled for optimum efficient carburetion under varying engine operating conditions.

Despite prior attempts to provide a successful variable venturi carburetor, it remains common practice to employ carburetors with two or more barrels, opening sequentially to satisfy the increasing air and fuel demands of high performance engines. The carburetor described below tailors air and fuel supply to engine conditions even under those conditions which often are satisfied by the opening of an additional carburetor flow path.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a carburetor which combines precise fuel supply and mixture control with variable venturi operation.

Another object of this invention is to provide a variable venturi carburetor, improved by the provision of an increasingly streamlined air-fuel mixture flow path from the venturi through the carburetor outlet passage as the venturi is opened.

Another object of this invention is the provision of a variable venturi carburetor constructed to eliminate the accumulation of fuel intermediate the venturi and the carburetor outlet passage.

Additionally, an object of the invention is the provision of a variable venturi carburetor in which the variable venturi opening is employed to the exclusion of a conventional throttle plate.

A further object is to provide a variable venturi carburetor employable with any of a number of fuel monitoring provisions to afford a proper mixture of air and fuel as a function of venturi opening.

Yet another object of this invention is the provision of a variable venturi carburetor with mixture enriching means to increase the supply of fuel under those conditions normally requiring choking.

One further object of the invention is the provision of a variable venturi carburetor, the venturi opening of which is limited as a function of engine speed to assure an optimum venturi opening for all operating conditions.

These and other objects of the invention will be understood more fully by reference to the following detailed description of preferred embodiments of the invention, considered with the several figures of the attached drawings.

IN THE DRAWINGS

FIG. 1 is a partly schematic and partly cross-sectional illustration of a variable venturi carburetor and associated fuel supply provisions, showing a pair of rotatable, venturi forming members interposed between the inlet and outlet passages of the carburetor.

FIG. 2 is a top plan view of the carburetor shown in FIG. 1 and illustrates the venturi forming members rotated to positions of restricted venturi opening.

FIG. 3 is a fragmentary sectional view of the carburetor of FIG. 1 in which the venturi forming members have been rotated to their positions of greatest venturi opening.

FIG. 4 is a simplified top plan view of the carburetor with the venturi forming members opening as in FIG. 3.

FIG. 5 is a schematic illustration of the carburetor in which the fuel supply provisions include pressure operated mixture control valves for increased venturi opening, and for sudden venturi opening.

FIG. 6 is a schematic illustration of the variable venturi carburetor in which maximum venturi opening is limited by an engine speed responsive governor.

FIG. 7 is a further schematic illustration of the carburetor according to the invention in which the fuel supply provisions include a cold starting enrichment valve, and a fuel metering valve mechanically coupled with the variable venturi.

FIG. 8 is a schematic illustration of the variable venturi carburetor in which the cold starting enrichment valve and fuel metering valve of FIG. 7 are combined.

DESCRIPTION OF PREFERRED EMBODIMENTS

In detail, FIG. 1 shows a carburetor **10**, constructed according to the invention and including a first tubular member **11** terminating in a conventional connection flange **12**. The tubular member **11** defines an outlet passage **13**, circular in cross section, through which an air-fuel mixture is passed for combustion in an associated combustion engine. A further tubular member **14** provides an air intake passage **15** through which air is drawn into the carburetor **10**.

Intermediate the outlet passage **13** and the intake passage **15**, a pair of cylindrical, partially rotatable members **16** and **17** converge centrally. A chamber **18** houses the members **16** and **17** and includes opposed cylindrical interior surfaces **20** and **21** conforming to the outer cylindrical surfaces of the rotatable members. As best seen in FIG. **2**, the chamber **18** closely fits the rotatable members **16** and **17** to prevent leakage paths through the carburetor.

Two shafts **22** and **23** support the rotatable members **16** and **17**, respectively. The shafts **22** and **23** extend from within the interior of the chamber **18**, at one side thereof, through respective openings **24** and **25** at the chamber's opposite side. Mating gears **26** and **27** are affixed to the shafts **22** and **23**, respectively, at the exterior of the chamber **18** where the shafts emerge. The rotatable cylindrical members **16** and **17** are, then, geared together for simultaneous partial rotation. A further housing part **28** cooperates with the chamber **18** to enclose the gears **26** and **27**. The shaft **22**, supporting the rotatable member **16**, extends through an opening **30** in the housing part **28** to allow external adjustment of the rotary positions of the rotatable cylindrical members **16** and **17**.

Two channels **31** and **32** are formed in the rotatable cylindrical members **16** and **17**, respectively, and they extend partially about the cylindrical outer surfaces of those members. Intermediate their ends, the channels **31** and **32** are substantially semi-circular in cross section and increase in cross-sectional area as they proceed toward the outlet passage **13**. The channels combine where the cylindrical rotatable members **16** and **17** converge to form a circular opening **33**, which communicates between the inlet passage **15** and the outlet passage **13**, and which is coaxial with the outlet passage. A venturi **34** is thus formed which is variable in size by limited rotation of the members **16** and **17**.

Opening centrally into the venturi **34**, a main discharge jet **35** supplies fuel from the conventional float chamber (not shown) for mixture with the air drawn through the venturi to the outlet passage **13**. A vent **36** communicates with the jet **35** to provide a premixing of air and fuel prior to emission from the jet **35**.

At their ends nearest the outlet passage 13, the channels 31 and 32 terminate in edges 37 which, along a substantial part of their length, conform in contour to outlet passage edges 38 formed where the outlet passage 13 and the enlarged chamber 18 intersect. As best shown in FIGS. 3 nd 4, when the members 16 and 17 are rotated to their positions of greatest venturi opening, interior channel surfaces 40 at the upper portions of the channels 31 and 32 extend gradually away from the central circular opening 33 to the conforming edges 37 and 38. This gradual increase in width above the central circular opening 33, and the closely conforming contours of the cooperating edges 37 and 38 about a substantial portion of the interior of passage 13 assure an air-fuel mixture flow path from the venturi 34 which becomes increasingly streamlined as the venturi is opened.

As the venturi is opened, the channel bottoms move from a horizontal or nearly horizontal position (FIG. 1) and increasingly slope toward the central opening 33. No fuel accumulates in recesses set out from the air-fuel mixture flow path since any fuel deposited on the channel surfaces 40 will be drained toward the central portion of the venturi. Also, the recesses or pockets formed above the venturi in chamber 18 by the channels 31 and 32 are eliminated as the venturi opens.

In addition to atomizing and distributing the fuel emitted from the jet 35, the variable venturi 34 provides a controlled restriction in the flow path through the carburetor 10 such as is normally provided by the inclusion of an angularly variable throttle plate in a carburetor outlet passage. The throttle plate is eliminated.

Conventional accelerator linkage coupled to the shaft 22 is employed to vary the size of the venturi 34 from its smallest or idling condition to its largest or full throttle condition. The elimination of the conventional throttle plate further reduces disturbance of the air-fuel mixture streamlines through the outlet passage and allows a shortening of the tubular member 11 to substantially decrease the height of the carburetor.

As shown in FIG. 1, the fuel supply provisions communicating with the main jet 35 include mixture control means to provide optimum air-fuel ratio or mixture for varying conditions of venturi opening. With the venturi 34 in its most restricted or idle condition, a relatively small quantity of fuel will be supplied to the jet 35 through an adjustable idle valve 42. An associated setscrew 43 controls the air-fuel mixture at idle. Fuel drawn past the idle valve 42 is first premixed with air from the vent 36 and then is emitted at the venturi 34. Precise mixture control is thus provided at idle.

One or more valves 44 increase the supplied fuel as the venturi 34 is enlarged from the idle condition to a condition of larger aperture. The valves 44 are pressure operated. A series of ducts or passages 45 communicate between the outlet passage 13 and upper valve chambers 46. At idle, the venturi opening 33 is smallest; the partial vacuum in passage 13, passages 45, and chambers 46 is greatest. This partial vacuum acts against valve actuating pistons 47, drawing pistons 47, valve stems 48, and valve elements 49 upwardly against the bias of valve operating springs 50 to hold the valves closed.

As the venturi is opened, the pressure differential across the venturi decreases, decreasing the partial vacuum in the outlet passage 13. As the partial vacuum in valve chambers 46 decreases, valve operating springs 50 overcome the force applied to the valve operating pistons 47, opening the valves to increase the fuel supplied to the jet 35 through a main fuel supply line 51. Thus, the springs 50 open the associated valve as the rotatable venturi elements 16 and 17 are moved a predetermined amount. The springs 50 may be selected to open the two or more valves 44 sequentially as the venturi opens and the partial vacuum in chambers 47 decreases, thereby gradually increasing the supply of fuel as the venturi is opened from its idle condition to its full throttle condition. In this way, mixture is controlled in cooperation with the opening of the venturi, providing optimum mixture ratio for varying throttle conditions.

FIG. 5 shows the variable venturi carburetor with alternative fuel supply provisions, varying slightly from the fuel supply provisions shown in FIG. 1. Like parts are given like reference numerals. An adjustable idle valve 42 is, once again, employed to control idle mixture, the pressure operated valves 44 being closed at idle. In this arrangement, however, adjustable valve 42 provides fine adjustment of the fuel emitted at jet 35 during idle. A fixed restriction 41 between the fuel source or float chamber (not shown) and the main fuel supply line 51 allows fuel passage at a predetermined rate. Added to the fuel passing the fixed restriction 41, fuel supplied past the adjustable valve 42 is metered in accordance with the setting of the setscrew 43 for fine adjustment of the mixture ratio at idle. Just as in the FIG. 1 arrangement, the one or more pressure operated valves 44 open as the venturi opens to add to the fuel in the main supply line 51 for increased throttle conditions.

A further mixture corrective provision is included in the fuel supply arrangement shown in FIG. 5. A conventional accelerating pump 52 momentarily increases the fuel supplied through the line 51 to the main jet 35 when the venturi 34 is opened abruptly.

If a combustion engine is operating under load at a given engine speed, a sudden opening of the venturi 34, by say, a quick depression of the conventional accelerator pedal, results in a gradual, rather than an instantaneous, increase in engine speed. When this happens, a momentary, greater than usual reduction in partial vacuum (increase in pressure) occurs in the outlet passage 13, since the engine, operating at low speed, draws relatively little air past the expanded venturi. The venturi thus draws insufficient fuel from the jet 35, and a momentary leanness in mixture occurs, agravating the lack of engine response.

The pump 52 includes an upper vacuum chamber 53 into which opens a duct 54 connected with the carburetor outlet passage 13. A slidable piston 55 is housed within the chamber 53 and is connected by a piston rod 56 to a plunger 57. A pump spring 58 engages the plunger 57, biasing the plunger 57 and the piston 55 downwardly as shown in FIG. 5. The pressure within the chamber 53 is the same as the pressure within the outlet passage 13. Ordinarily, the partial vacuum within the carburetor outlet passage and pump chamber maintains the pump piston 55 in its uppermost position against the bias of the pump spring 58. When the pressure in the outlet passage 13 momentarily increases as just described, the pump piston 55 is released and moves downwardly with the plunger 57 under the bias of the previously compressed spring 58. Fuel contained in a fuel chamber 60 is pumped into the fuel supply line 51 past a normally closed valve 61. The spring 58 may be selected to provide the force required for pump action at any desired outlet passage vacuum change. A ball valve 62 prevents fuel back-up into the float chamber. Thus, when the venturi 34 is abruptly opened and engine loading prevents response, the pump 52 provides an additional charge of fuel to maintain the richness of the mixture.

FIG. 6 illustrates a novel arrangement which prevents momentary leanness as a result of abrupt venturi opening and provides optimum venturi opening for any particular engine speed. By this arrangement, mixture is controlled to provide optimum fuel consumption, with very little compromise in available power.

Again, an idle mixture control valve 42 assures proper mixture at idling and again, one or more pressure operated valves 44 increase the fuel supplied through the supply line 51 as the venturi increasingly is opened. The opening 33 of the venturi is controlled by conventional throttle linkage 65 coupled to the rotatable channeled members through the shaft 22. Accelerator linkage 66, driven, for example, by an accelerator pedal, is connected to the throttle linkage 65 by a coupling member 67, schematically illustrated in FIG. 6 as a compressible spring extending between the accelerator linkage and the throttle linkage.

An engine speed governor 68 is connected to an engine driven rotary shaft 70 and positions a variable stop 71 as a

function of engine speed. Normally, as the accelerator linkage **66** gradually is moved toward the open throttle position, the coupling spring **67** drives the throttle linkage to increase the opening **33** of the venturi **34**, consequently increasing engine speed. As this occurs, shaft **70** rotates more quickly, expands the governor **68**, and retracts the variable stop **71** in advance of the throttle linkage **65**.

Under a condition of substantial engine loading, immediate engine response would not normally occur with abrupt enlargement of the venturi opening **33**. This is the condition described above which commonly results in leanness when inadequate fuel is supplied upon sudden throttle opening. The arrangement shown schematically in FIG. **6** prevents this condition by limiting venturi opening as a function of engine speed. Thus, if the accelerator linkage **66** abruptly is driven toward its full throttle position and the engine speed does not increase proportionately, the throttle linkage **65** meets the variable stop **71**, which limits the opening of the venturi **34**. Ordinarily, the spring constant of the coupling spring **67** is sufficient to cause corresponding movement of the throttle linkage **65**. However, when the throttle linkage **65** is met by the variable stop **71**, the coupling spring **67** is compressed. If the engine speed slowly responds, the variable stop **71** is slowly retracted and the bias of the spring **67** drives the throttle linkage **65**, gradually opening the venturi **34**. Thus, the venturi **34** is allowed to open only an amount appropriate to the engine speed, no sudden inordinate pressure increase occurs within the outlet passage **13**, and the air-fuel mixture is not adversely affected by sudden accelerator linkage movement.

Conversely, if for a given accelerator linkage position, the engine speed decreases as a result of increased engine load, for example a steep uphill climb, the governor **68** and variable stop **71** will reduce the venturi size accordingly. The increased engine load will result in decreased engine speed causing the shaft **70** to rotate more slowly and causing the governor **68** to contract. Variable stop **71** will extend into engagement with the throttle linkage **65**, compressing the spring **67** and driving the venturi members to a position of decreased opening. The governor **68** is calibrated to limit the venturi opening to the optimum opening for any particular engine speed.

Limiting the venturi opening in the fashion described limits fuel consumption and mixture is maintained appropriately by the pressure operated valves **44**. Yet this limiting of the venturi opening sacrifices very little power since, for a loaded engine, only a slight power increase is available beyond optimum throttle opening and fuel supply.

Also, limiting the venturi size for optimum opening at any given engine speed prevents an increased flow of fuel to the engine beyond the amount necessary for optimum operation. More efficient fuel consumption results, and less unburned hydrocarbons are emitted, even under operating conditions, such as heavy engine loading, which usually result in a significant increase in these objectionable exhaust emissions.

A further arrangement is diagrammatically illustrated in FIG. **6** which is capable of further decreasing fuel consumption and exhaust emissions. An auxiliary throttle control arrangement **72**, shown in FIG. **6** as a solenoid, is connected, via conventional linkage **73**, to the rotatable venturi members. Upon actuation of the auxiliary provisions **72**, the rotatable members are driven slightly past their idle position, closing the opening **33** entirely about the jet **35**. At the same time, a fuel cut off valve **74** is driven closed by linkage **75** to cut off the idle fuel supply. Actuation of these provisions prevents passage of all but the slightest amount of air and closes the fuel supply entirely during, for example, a long downhill coast. No fuel is consumed and no exhaust is emitted.

In FIGS. **1**, **5** and **6**, pressure operated valves **44** are employed to control incrementally the supply of fuel as the venturi opens. Alternatively, a fuel-metering needle valve may provide continuous fuel variation with venturi adjustment and may be pressure operated. A fuel-metering needle valve **76** is schematically illustrated in FIG. **7**. Valve **76** is mechanically actuated by a metering rod **77**, rather than in response to pressure variations. Idle mixture control is afforded by an adjustable setscrew **78** which limits the restriction in valve **76**. As the venturi **34** is opened beyond its idling condition, the supporting shaft **22** rotates to vary the position of the metering rod **77** through appropriately selected linkage **80** coupling the shaft **22** and the rod **77**. A needle **81**, within the valve **76**, is retracted from its associated aperture, increasing the fuel supplied through the valve **76** and the fuel supply line **51**. Consequently, the quantity of fuel emitted from the jet **35** increases continuously with increased venturi opening to provide correct mixture at all throttle positions.

An additional needle valve **82** enriches the air-fuel mixture by increasing the fuel supplied through the supply line **51**. This eliminates the need for the conventional choke butterfly valve usually included in a carburetor air intake passage. Rather than reducing the air content of the mixture in the manner of a conventional choking arrangement, the needle valve **82** opens to enrich the mixture for low temperature engine starting conditions. The valve **82** may be operated by a manually retractable handle **83** and a connecting pull wire **84** for operator control, or a coolant or exhaust temperature responsive bimetal may be employed automatically to control the valve opening. The valve **82** is appropriate for use with any of the fuel supply systems described above, to eliminate the need for conventional choking apparatus. The variable venturi **34** will, then, be the only variable restriction included in the associated flow path through the carburetor from inlet passage **15** to outlet passage **13**.

The carburetor of FIG. **8** includes an alternative idle mixture control arrangement. Here the quantity of fuel supplied at idle is constant. During idling, a fixed fuel intake aperture **41**, like that shown in FIG. **5**, supplies fuel via the line **51**. Mixture control at idle is afforded by an adjustable valve **85** in the premixing air inlet **36**. A setscrew **86** is positioned for precise control of air drawn past the valve **85**.

A single fuel metering valve **87** combines the functions of the valves **82** and **76** of FIG. **7**. The valve **87** includes a retractable needle **88**, actuated by a metering rod **90**. As the rotatable venturi defining members are turned, the shaft **22** rotates to move valve control linkage, schematically illustrated as a crank arm **91** terminating in an enlarged slotted end **92**. A pin **93**, affixed to the metering rod **90**, extends through the slotted end **92** of the crank arm **91**. The pin **93** extends also through a further slotted member **94**. Member **94** is movable by a manually retractable handle **95** and connecting pull wire **96**, as shown, or by a suitable bimetal.

WIth the venturi **34** in its smallest or idle condition, the valve needle **88** seats or moves farthest within its associated aperture, closing or most greatly restricting the valve **87**. The pin **93** is located at or near corresponding slot ends of the slotted members **92** and **94**. Movement of either slotted member in a needle-retracting direction gradually opens the valve **87** increasing the rate at which fuel is supplied. For cold starting, the slotted member **94** is moved upwardly to cause upward movement of the metering rod **90**. This enriches the mixture at the venturi **34**. The venturi opening is unaffected since the pin **93** moves within the slot of the crank end **92** without disturbing the position of the crank **91** and the shaft **22**. Engine speed is then increased by opening the venturi **34**. The shaft **22** turns until the slotted crank end **92** engages the pin **93** and begins to draw the pin **93** and valve needle **88** upwardly to increase the rate of fuel supply as the venturi is opened. Movement of the pin **93** by the slotted crank end **92** increases the opening of the valve **87** without affecting the position of the slotted member **94** and its associated control means.

From the foregoing, it will be seen that the carburetor described provides improved air-fuel mixture flow and distribution, carefully controlled throttle adjustment without a conventional throttle plate, and precise mixture control at idle and various throttle conditions by the employment of any of a number of fuel supply means.

It will be recognized that the schematically illustrated mechanical linkages, fuel control means, and other provisions may take a number of forms, appropriate to particular requirements, without departure from the spirit of the invention as defined in the appended claims. Additionally, it will be recognized that individual fuel control provisions of any one of the fuel supply systems described above may be employed interchangeably in other of the described supply systems. For example, idle mixture is achieved in several ways, any one of which might by employed in combination with any one of the means for increasing the fuel supply rate as the venturi is opened.

I claim:

1. A variable venturi carburetor including an air intake passage, an air-fuel mixture outlet passage, a pair of mutually rotatable members having converging surfaces between the intake and outlet passages, aligned channels of varying cross section formed in the converging surfaces and combining where the surfaces converge to define a venturi communicating between the intake and outlet passages, means for controlling the rotary positions of the rotatable members to control the size of the venturi opening, and fuel supply means opening into the venturi, said channels having portions extendible outwardly of the air-fuel mixture flow path, said rotatable members being formed to define means for returning fuel from the outwardly extending channel portions centrally to the mixture flow path, the channels and the outlet passage having conforming ends, said conforming ends meeting and the channels opening gradually to the outlet passage when the venturi opening is greatest to provide a more streamlined flow path from the venturi opening through the outlet passage at greatest venturi opening, the variable venturi opening defined by the channels comprising the only means for variably restricting the air-fuel mixture flow path from the venturi entrance through the associated carburetor outlet, and the only inward protrusion in the flow path through the carburetor forming a venturi restriction therein at any rotary position of the rotatable members, the channels increasing in cross section in the direction of the outlet passage, said outwardly extendible channel portions forming pockets in the housing at said end of the outlet passage, said rotatable members being rotatable in opposition to the flow direction through the carburetor to expand the venturi and close the pockets, the channel surfaces at the outwardly extending portions sloping inwardly and downwardly toward the center of the venturi for any venturi condition from restricted idle condition through largest opening, thereby preventing drainage of fuel away from the flow path to collection locations from idle through greatest venturi and said channel surfaces providing said means for returning fuel centrally to the venturi, said fuel supply means opening centrally into said venturi at a central location of smallest cross section for any rotary position of the rotatable members, the rotatable members being movable beyond the normal idle position to close the venturi entirely about the fuel supply means, the fuel supply means comprising a means for varying the fuel supply to the venturi in response to altered pressure conditions downstream thereof, a premixing means adding air into the fuel supply means, and means for supplying a preset idle amount of fuel.

2. The carburetor according to claim 1, further including means for driving the rotatable members beyond their normal idle positions to close the channels about the fuel supply means opening into the venturi to entirely close the venturi and means for preventing the passage of any fuel through the carburetor when the rotatable members are driven beyond their normal idle positions to close the channel about the fuel supply means.

3. A variable venturi carburetor including an intake passage, an outlet passage, a pair of mutually rotatable members having converging surfaces between the intake and outlet passages, aligned channels of varying cross section formed in the converging surfaces and defining a venturi communicating between the intake and outlet passage with a central circular portion of smallest diameter, means for controlling the rotary positions of the rotatable members to control the size of the venturi opening, fuel supply means including a fuel supply line opening into the venturi at a jet closely proximate the central circular portion for any venturi size, at least one pressure operated valve opening into the fuel supply line remote from said jet to vary the rate of fuel supply through the line, passage means communicating between the outlet passage downstream of the venturi and the at least one pressure operated valve for controlling the valve by pressure variations influenced by venturi size changes and communicated to the valve from the outlet passage, and mixture control means for controlling mixture at small venturi openings independently of the at least one pressure operated valve, the passage through said carburetor being free of any throttle restriction other than said venturi, said aligned channels having channel bottoms sloping downwardly towards the central, circular venturi opening for all venturi conditions from idle to greatest opening.

4. The carburetor according to claim 3, including a plurality of said pressure operated valves, each connected with the outlet passage by said passage means, and responsive to different pressures to open sequentially as the venturi opens and to sequentially increase the rate of fuel supply.

* * * * *