June 24, 1941. E. A. WINFIELD 2,246,825

CARBURETOR

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Fig. 1.

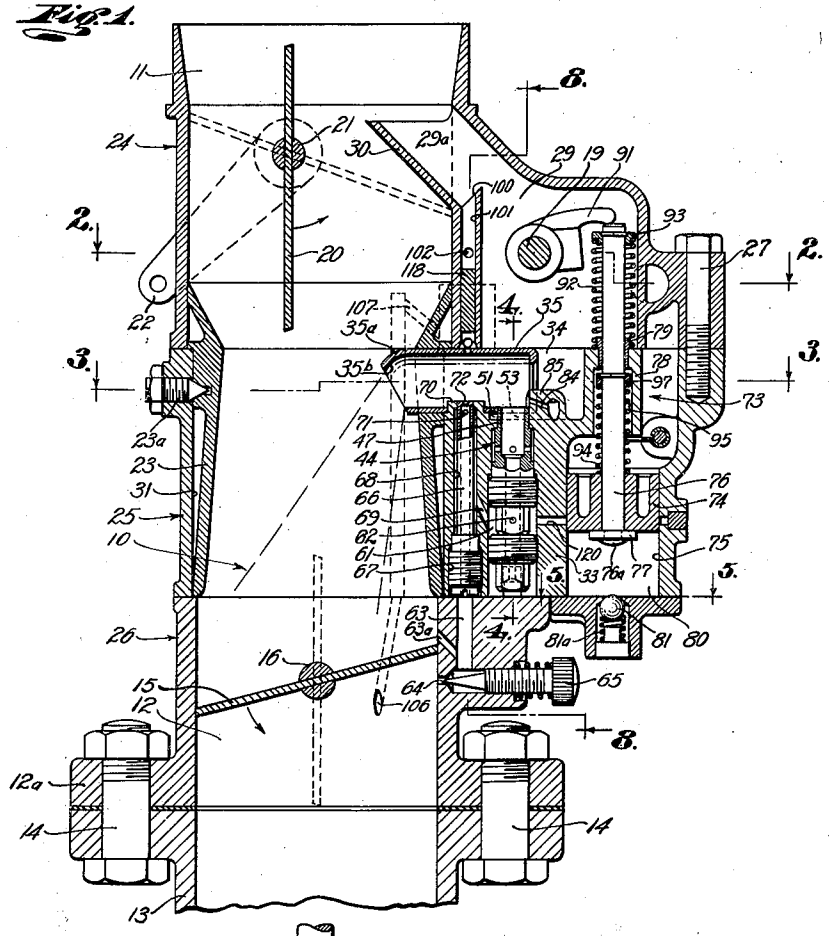
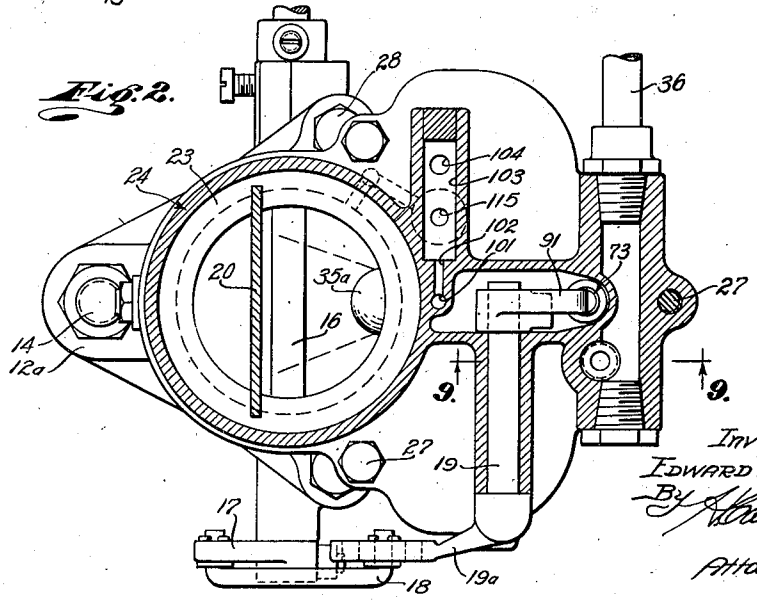


Fig. 2.



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Fig. 3.

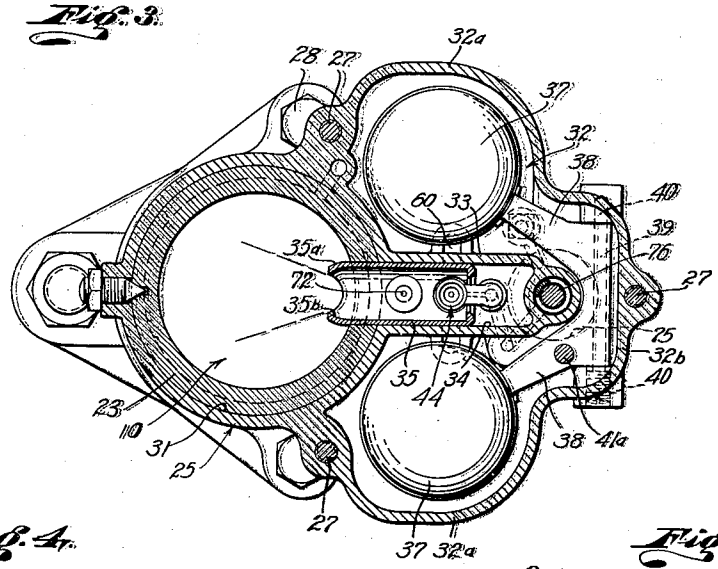


Fig. 4.

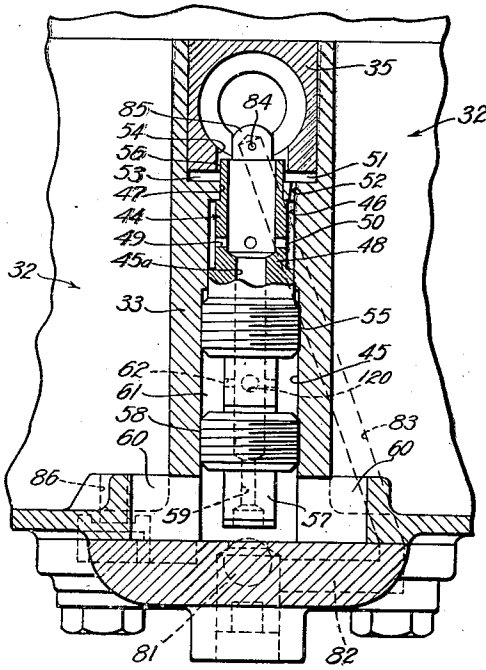


Fig. 5.

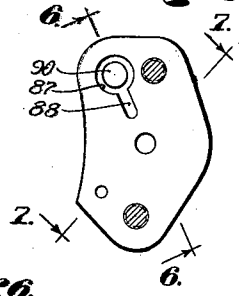


Fig. 6.

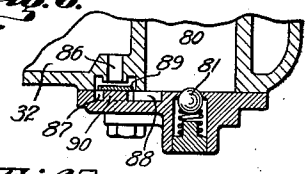
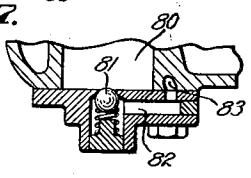


Fig. 7.



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Fig. 8.

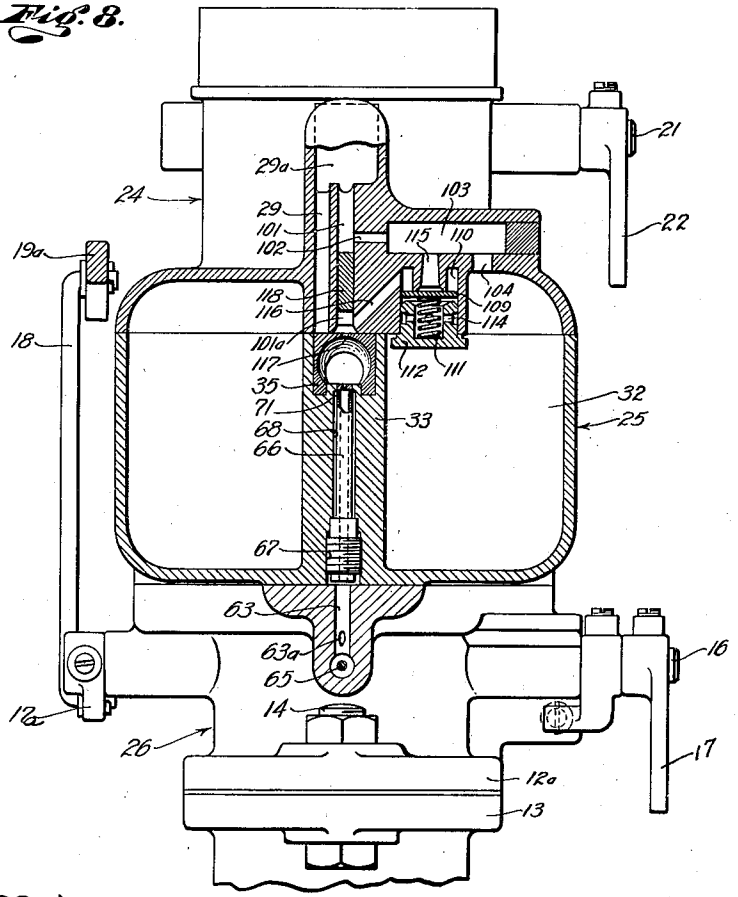


Fig. 9.

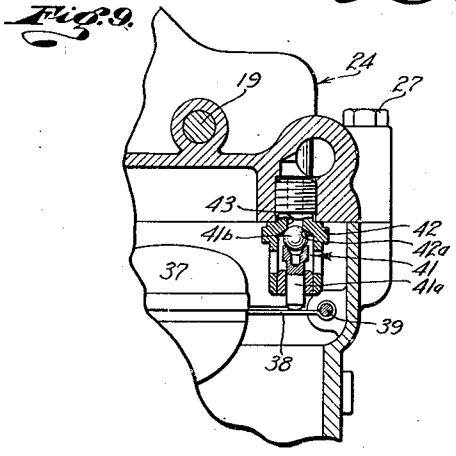
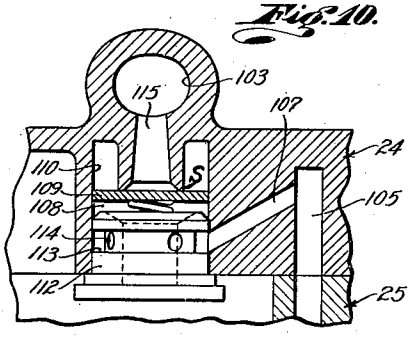


Fig. 10.



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UNITED STATES PATENT OFFICE

2,246,825

CARBURETOR

Edward A. Winfield, Los Angeles, Calif.

Application April 24, 1939, Serial No. 269,665

14 Claims. (Cl. 261—34)

This invention has to do with carburetors for internal combustion engines, and has for its primary object to incorporate in a carburetor various structural and operating improvements that afford greater efficiency and completeness of performance under all operating conditions, and that render the carburetor generally adaptable to various types and sizes of engines. The present application is a continuation in part of my earlier application on Carburetor, Serial Number 85,093, filed June 13, 1936.

In one of its major aspects, the invention provides various improvements in carburetors of the type in which the primary metering of fuel occurs in what may be termed an air diversion passage, through which air is diverted from the main suction passage of the carburetor at the inlet side of the venturi, and is returned together with fuel, into the venturi to be mixed with the main air stream flowing to the engine. One important object is to provide in conjunction with the air diversion passage an improved body or float chamber construction in accordance with which it is made possible to position the main and accelerating fuel nozzles in compact arrangement directly below the diversion passage and, at least as to the main fuel nozzle, centrally with relation to the float chamber, so that fuel delivery from the nozzle is not appreciably affected by tilting the carburetor in any direction. This same arrangement permits convenient and compact placement and accommodation of other parts including the idling by-pass, accelerating fuel piston and the various fuel passages, all as will later appear.

Another important feature is the provision of means whereby the fuel and air mixture formed in the diversion passage is most effectively directed into the main suction passage to insure completeness and uniformity of distribution in the main air stream. In accomplishing this object I provide at the outlet end of the diversion passage a baffle surface, preferably as a part of the fuel metering tube projecting into the venturi, which acts to direct the primary fuel and air mixture in a path such that it spreads in a cone-shaped pattern toward the center of the suction passage and in the general direction of the air flow. The same baffle surface may be used to deflect and aid in the atomization of the accelerating fuel stream discharged into the diversion passage or metering tube.

In the past it has been attempted to vent the fuel supply chamber above the liquid level to the suction passage of the carburetor, and at the same time to prevent such reductions in the fuel chamber pressure due to the suction passage depressions communicated through the vent passage, as will interfere with maintenance of the proper effective fuel head and fuel delivery rate from the supply chamber. From tests of the various methods heretofore proposed, it has been determined that none is capable of maintaining within the fuel chamber the desirably high pressure, i. e., closely approaching atmospheric pressure, or full atmospheric pressure, throughout the range of engine operation, and particularly at high speeds. The invention achieves ideal performance in this regard in that it permits atmospheric or substantially atmospheric pressure to be maintained in the fuel chamber at all air velocities and pressure conditions in the suction passage.

A further control is maintained with respect to the fuel chamber pressure to effect fuel economy, principally within the range of cruising speeds under light load and partly open throttle position. The fuel chamber above the liquid level is communicable with the depression existing in the suction passage, by way of an economizer passage controlled by a valve which in turn is controlled by the manifold or suction passage pressure at the outlet side of the throttle. Normally the valve is closed, but under predetermined conditions determined by manifold depression and air velocity in the suction passage, the valve opens to place the supply chamber fuel under reduced pressure and to therefore decrease the rate of fuel delivery to the engine.

The invention embodies further features and advantages, particularly with reference to improvements in the accelerating fuel supply means and its association with the main fuel nozzle, and the adaptability of the carburetor, by reason of its sectional characteristics, to variation to suit different engine or manifold connection sizes by certain economical and simple substitutions of parts without necessitating changing entire carburetors. These features, however, as well as additional objects and details, will be most readily understood and explained to better advantage in the following description of the invention in one of its typical and illustrative forms. In the drawings:

Fig. 1 is a view showing in vertical section a typical form of carburetor embodying the invention;

Fig. 2 is a cross section on broken line 2—2 of Fig. 1;

Fig. 3 is a cross section on broken line 3—3 of Fig. 1;

Fig. 4 is an enlarged fragmentary section taken on line 4—4 of Fig. 1;

Fig. 5 is a fragmentary plan as viewed from line 5—5 of Fig. 1;

Figs. 6 and 7 are cross sections on lines 6—6 and 7—7 respectively, of Fig. 5;

Fig. 8 is a vertical section on line 8—8 of Fig. 2; and

Figs. 9 and 10 are fragmentary sections on lines 9—9 and 10—10 respectively of Fig. 2.

For purposes of illustration and description, I have shown a typical embodiment of the invention in a down-draft carburetor, with the understanding, however, that the showing of this particular type is not to be regarded as limitative on those features of the invention not specifically claimed in conjunction with a down-draft carburetor. Referring to the drawings, the carburetor in its preferred form comprises a suction passage 10 having an air inlet 11 and a fuel and air mixture outlet 12, the flanged end 12a of which is attached to the engine manifold 13 by bolts 14. The air flow to the engine is controlled by suitable throttle, typically the usual butterfly valve 15 carried on shaft 16 and operated by lever arm 17, see Fig. 2, and connected by lever 17a and link 18 with arm 19a integral with the later described accelerating fuel piston actuating shaft 19. Choke valve 20 positioned within the inlet 11, is mounted on a shaft 21 offset from the axial center of the suction passage and operated in the usual manner by a lever 22 attached to its outer end. A restriction of suitable shape, preferably in the form of a venturi 23, is located in the suction passage 10 between the throttle 15 and choke valve 20, the venturi being formed as a separate part and retained within the suction passage by set screw 23a.

The carburetor body may be made in three sections 24, 25 and 26, secured together by screws 27 and 28, see Fig. 3. Section 24 is a casting shaped to form the upper portion of a passage 29 through which a portion of the air stream taken in through the inlet 11 is diverted from the main suction passage 10. As will later appear, this diverted air stream is returned to the main suction passage at or directly beyond the throat of the venturi 23, and during its course of flow, serves in conjunction with certain of the fuel supply parts of the carburetor, as the direct or primary fuel metering means. The mouth 29a of the air diversion passage 29 is formed by a scoop-shaped baffle 30 projecting into the suction passage a distance sufficient to cause a substantial flow of air to be deflected into passage 29. As illustrated, the mouth of baffle 30 is disposed in a plane substantially normal to the direction of air flow in the suction passage inlet, and the inclination of the baffle is in the general direction of the air diversion passage.

Body section 25 has a vertical bore 31 which receives the venturi 23, and contains the fuel supply chamber generally indicated at 32, see Fig. 3, formed by walls 32a and 32b spaced from the sides and end of a vertically extending wall 33 lying in the vertical radial plane of the suction passage. Wall 33 has an upper cavity 34 which forms the lower end of the air diversion passage 29 at the mouth of the later described fuel metering tube 35. The flow of fuel from line 36, which may lead from any suitable supply source, into the fuel chamber 32, is controlled by a float operated mechanism comprising individual floats 37 attached to arms 38 pivoted on a shaft 39 terminating at 40 in the wall of the fuel chamber. As shown in Fig. 9, arms 38 support a valve 41 contained within a ported bushing 42, the valve controlling the admission of fuel through passage 43 in accordance with the position of the float assembly, and thereby maintaining a constant fuel level in the supply chamber. The valve assembly 41 comprises a supporting stem 41a guided within the bushing and carrying a steel ball 41b, constituting the valve proper, which between engagement with the seat 42a is permitted to rotate on the stem and thereby wear uniformly and evenly. This feature is of importance in that whereas the usual valves often in a short time develop leakage due to wear resulting from vibratory impacts with their seats, the present valve is found to maintain, by virtue of its uniform wear, fluid tight engagement with its seat after long usage.

Wall 33 contains a main fuel nozzle, generally indicated at 44, received within bores 45 and 46, the latter opening at its upper end through a reduced diameter bore 47 into the channel-shaped recess 34 in the top of wall 33. The main fuel nozzle 44 comprises a tube 48, see Fig. 4, threaded at 55 into bore 45 and having a plurality of air inlet orifices 49, the upper diameter of the tube being less than the diameter of bore 46 so as to provide a surrounding air space 50 into which air is bled from space 51 by way of a restricted orifice 52. The reduced diameter portion of the nozzle tube 48 has a snug fit within bore 47, and the upper discharge end of the tube projects into bore 54 in the bottom of the fuel metering tube 35 with a small clearance at 56. The air bled through orifice 52 is taken into space 51 through its communication at 53, see Fig. 1, with the lower portion of the air diversion passage beneath the inlet end of the metering tube 35. The nozzle tube 48 is engaged at its lower end by a short tube 57 threaded at 58 into bore 45 and having a calibrated, reduced diameter orifice 59 through which the main fuel stream is drawn upwardly into the nozzle bore 45a. Tube 57 is replaceable by other tubes of different bore sizes, when it is desired to vary the fuel restriction at the orifice 59. Bore 45 and the lower end of tube 57 are in open communication with the fuel supply chamber 32 through openings 60 in opposite sides of the wall 33.

The lower end of tube 48 is annularly spaced at 61 from the wall of bore 45 to form a chamber into which fuel is delivered from the accelerating fuel piston bore, as will presently appear, and from which the fuel is drawn through orifices 62 into the tube bore 45a. Fuel taken into the tube through orifices 59 and 62 is discharged into the metering tube 35 by virtue of the air velocity and depression therein, elevation of the fuel being aided by the air admitted through orifices 49 and atomization of the fuel entering the metering tube facilitated by admixture with the air being drawn through the clearance space 56 at the top of the tube. It is important to observe that the main fuel nozzle 44 is located centrally within the fuel supply chamber 32, both transversely thereof and longitudinally in the horizontal direction of wall 33. As a result, the fuel level standing above the main fuel nozzle, and the normal proper functioning of the nozzle, will not appreciably be affected by tilting of the carburetor in any direction.

As illustrated in Fig. 1, the lower body section 26 contains an idling by-pass passage 63 through

which at closed throttle positions, fuel is drawn into the suction passage air stream through orifice 64 located at a suitable point beyond the throttle, the effective size of orifice 64 being regulated by the usual needle valve 65 and the usual air bleed orifice being provided at 63a. Bore 63 communicates at its upper end with a tube 66 threaded into counterbore 67 and spaced along its upper extent from bore 68 to provide a fuel passage communicating by way of bore 69 with the fuel containing recess 61 in the main fuel nozzle bore 45. The upper end of tube 66 fits snugly within the bore of an upwardly projecting boss 70, and directly below this boss fuel is taken into the tube through orifice 71 by the idling by-pass suction acting to draw fuel upwardly within the space in bore 68 to the orifice level. A restricted air bleed into the idling by-pass passage from within the fuel metering tube 35, occurs through calibrated orifice 72 in the upper end of tube 66.

The carburetor also includes an accelerating fuel supply means, generally indicated at 73, whereby upon relatively sudden throttle opening, an added amount of fuel is injected into the air diversion passage to give an abnormally enriched mixture for acceleration. The parts at 73 comprise a piston 74 operating in a vertical bore 75 in the wall 33 and carried on a rod 76 having at its lower end a flange 77. Rod 76 extends upwardly through the tubular guide boss 78 formed integrally with the wall 33, the rod being directly guided within bushing 79. Bore 75 opens at its upper end into the fuel chamber 32 to provide constantly available fuel above the piston for delivery to the main fuel nozzle, as will later appear. During downward movement of the piston, fuel is discharged from the displacement chamber 80 past check valve 81 through passage 82, see Fig. 7, into a vertically extending passage 83 from which the fuel is discharged into the metering tube 35 through a diagonally extending bore 84. As shown in Fig. 1, bore 84 is contained within a web 85 projecting upwardly from wall 33 at the base of the air diversion passage 29. As shown in Fig. 6, fuel is taken into the displacement chamber 80 from the supply chamber 32 by way of opening 86, space 87 and passage 88, space 87 containing a disk-type check valve 89 normally resting on boss 90 to permit free communication between the fuel chamber and passage 88. Upon sudden downward movement of the piston 74, however, disk 89 is forced upwardly to close opening 86, thus checking return flow from the displacement chamber into the supply chamber, requiring the fuel discharge to occur past the check valve 81 to the accelerating fuel nozzle 84.

The operating connection between the throttle 15 and the piston 74 comprises an arm 91 carried on shaft 19 within the diversion passage 21 and engaging the upper end of rod 76. Downward movement of the piston rod is resisted by a coil spring 92 centered on the boss 78 by bushing 79 and bearing against a flange 93 on the upper end of the rod. The latter is movable within and relative to the piston 74 so as to permit lost motion between the parts enabling the piston to have delayed downward movement upon sudden opening of the throttle and depression of the rod 76. The downward moving force on the piston is transmitted through coil spring 94 received within counterbore 95 and bearing at its upper end against a keeper ring 97 held in place by lock washer 98.

In the broad aspects of the invention, any suitable means may be provided for maintaining a fuel metering restriction in the air diversion passage 29. Preferably, I use an inserted metering tube 35 of rectangular or square outside cross-sectional shape fitting within the cavity 34 in the top of wall 33, and having its discharge end 35a projecting into the suction passage at substantially the throat of the Venturi 23. The tube is set down over boss 70 at the upper end of the idling by-pass tube 66, as previously described, and the bottom of the tube at its inlet end is slotted to receive the upwardly projecting web portion 85 which contains the accelerating fuel discharge passage 84. The outlet end 35a is particularly shaped for the purpose of causing the fuel and air mixture being discharged from the tube, to be patterned and directed into the main suction passage in a course that will insure most effective distribution and thorough admixture with the main air stream under all conditions and throttle positions.

The outlet end of the metering tube has a carefully designed configuration presenting an inclined baffle or fuel directing surface 35b that causes the mixture of primary air with fuel discharged from the main nozzle to be projected in a cone-shaped pattern, as indicated by the dashed lines, downwardly and centrally within the Venturi bore, and also serves similarly to diffuse and project the accelerating fuel being discharged from the nozzle 84 against the inclined baffle surface, in a downwardly spreading fan-shaped pattern. In this manner, the fuel is uniformly dispersed in the air stream at a point in advance of the throttle so that at all positions of the throttle, the portions of the fuel and air mixture taken past its opposite edges will be uniformly proportioned. The downwardly angular or curved baffle surface 35b of the metering tube may be formed by taking initially a tube having a substantially hemispheric end, and cutting off the end of the tube, assuming its position to be as shown in the drawings, at an angle of approximately 30° with respect to the vertical.

As a means for preventing reduction in the fuel supply chamber pressure as a result of high rate of fuel withdrawal therefrom, as during high speed open throttle engine operation, I provide a pressure connection with the supply chamber above the liquid level, from a point in the diversion passage 29 at which it is found possible to obtain a pressure that will prevent any substantial or appreciable reduction in the supply chamber pressure under the conditions stated. Referring to Fig. 1, I place at the lower end of the inclined air diversion baffle 30, an opening 100 directly in the path of the diverted air stream, with the plane of the opening disposed substantially normal to the line of air flow along the bottom surface of the baffle. The air thus is projected directly into the opening, as distinguished from being directed past an opening in a side wall parallel to the line of air flow, so that a velocity as well as static pressure is applied to the opening. This pressure is communicated through passage 101 and a transverse bore 102 into a chamber 103, see Fig. 8, in open communication through bore 104 with the supply chamber 32 above the fuel level therein. From measurements taken of the supply chamber pressure, it has been determined that even during maximum rates of fuel withdrawal from the

chamber, it is possible to maintain substantially atmospheric pressure on the fuel surface, and thereby avoid reduction below the proper and required rate of fuel delivery to the engine.

The invention also provides an improved type of economizer which acts to lean the fuel mixture taken to the engine when operating at part-open throttle and at intermediate cruising speeds when a normally rich mixture is not required. The economizer system comprises a vertically extending passage **105**, see Figs. 1 and 10, leading from an opening **106** that may be placed at any suitable location beyond the throttle so as to be subjected to manifold pressures. Passage **105** connects at its open end through an inclined passage **107** with a chamber **108** containing a disk valve **109** having slight clearance from the chamber bore **110** and normally closed against its seat S by a coil spring **111** supported by bushing **112**. Passage **107** leads to an annular groove **113** in the bushing, depression being communicated to the under side of the valve **109** through openings **114**. The valve **109** controls communication between the upper interior of the supply chamber **32**, via passage **115**, chamber **103** and bore **104**, and a passage **116** to which the venturi or metering tube depression is communicated through calibrated orifice **117** in the top of the tube and the lower end **101***a* of bore **101** below the plug **118**.

In describing the operation of the carburetor, it may first be assumed that the engine is idling, with the throttle **15** in substantially closed position. The fuel supply to the idling tube bore **68** via passage **69** is elevated by suction communicated from the outlet side of the throttle to orifice **71**, and together with air being bled in opening **72**, is discharged from the idling orifice **64**. Now assuming the throttle to be gradually moved toward open position, the air bleed through orifice **63***a* discontinues as it is passed by the throttle edge, and fuel is discharged therefrom to augment the flow from the idling orifice **64**. Thereafter, the fuel discharge from both orifices gradually diminishes as the throttle opens and the main fuel nozzle is brought into operation. During idling operation, the rate of air flow through the diversion passage **29** is insufficient to cause fuel, or at least any substantial amount of fuel, to be discharged from the main fuel nozzle **44**, but as the throttle is opened to a position of say from 10° to 15° from fully closed position, the rate of air flow through the diversion passage, and increased suction communicated from the main venturi, produce a sufficient depression in the metering tube **35** to gradually bring the main fuel nozzle into operation. Thereafter, fuel continues to discharge from the main nozzle under all normal and high speeds of engine operation. I have previously described how, by virtue of pressure communication from opening **100** in the diversion passage to the fuel supply chamber, the proper and required rate of fuel discharge from the main nozzle **44**, and also from the accelerating fuel nozzle **84**, are maintained throughout the range of high speed engine operation.

Assuming now that the engine is to be accelerated by sudden opening movement of the throttle, the corresponding downward movement of rod **76** occurs without immediately imparting a corresponding downward movement to the piston **74**. Instead, the rod moves down through the piston, compressing spring **94**, and the spring thereafter gradually expands, forcing the piston down to discharge fuel from chamber **80** to the accelerating fuel nozzle **84**, over a period of time prolonged sufficiently to furnish increased fuel throughout the acceleration range. On the other hand, when the throttle is gradually opened, the piston may move downward without substantial compression of the spring **94**, to slowly displace the fuel through passages **88** and **86** back into the fuel supply chamber **32**. During comparatively slow opening movement of the throttle, some fuel may discharge past check valve **81**. The proportion of fuel discharged past the valve for a given rate of downward piston movement less than that which will cause the check disk **89** to seat, will depend upon the resistance offered by valve **81** to opening against the pressure created under the piston. Upon reaching its lowermost position, the rounded end **76***a* of rod **76** may, though not necessarily, be adapted to engage and hold the check valve **81** open, thereby maintaining a supply of fuel to the accelerating nozzle at wide open throttle positions. It will be understood, of course, that at the end of the piston travel and during its upward return movement, disk **89** will drop away from opening **86** to restore the fuel supply to the displacement chamber.

Referring now to the economizer system, it may be assumed that the engine is operating at part-open throttle corresponding to normal or cruising speeds and under light load. The manifold depression communicated through port **106** and passages **105** and **107** to the under side of the valve **109** during operation at closed throttle, and partly open throttle positions within the normal or cruising speed range, causes the valve to open against the resistance of spring **111**, and to communicate the venturi or metering tube depression through passages **116**, **103** and **104** to the fuel supply chamber. Under these conditions, the air flows through the venturi at a velocity sufficient to create a variable reduction in pressure on the fuel in the supply chamber, the amounts of depression being governed by the relative sizes of orifice **117** and the larger air bleed orifice **102**. As will be understood, under the conditions described, the reduction of pressure on the fuel serves to reduce the amount of fuel being discharged to the suction passage. It may be further explained that the economizer system is ineffective during idling operation, since the rate of air flow through the venturi is insufficient to create any material depression that would be communicated to the supply chamber. Also, during operation at full open throttle position, the manifold depression is insufficient to open the valve **109**.

The economizer and accelerating fuel supply systems may be regarded as operating in conjunction to provide the desired leanness in the fuel mixture for intermediate speed, light load operation, and for giving a desirably enriched mixture under high speed open throttle operation. Referring again to Fig. 1, as the piston **74** approaches the limit of its down movement resulting from opening of the throttle, the piston uncovers passage **120** and thereby causes excess fuel to be available to the main fuel nozzle **44** by delivery from the chamber above the piston into the annular chamber **61** surrounding the nozzle tube. As will be apparent, this arrangement provides an extremely simple and yet accurately functioning means for supplementing the main nozzle fuel supply for high speed operation.

A further important advantage in the present

carburetor is its adaptability to change for the purpose of accommodating different size engines and manifold connections, without having to replace the entire carburetor or the principal parts thereof. In order to adapt the carburetor to different size manifold connections, it is necessary only to disconnect and substitute a lower section 26 of the proper size or bore diameter, the same size and arrangement of passages communicating with passages in section 25 being retained, and to remove and replace the venturi 23 with another venturi having a port diameter corresponding to or having proper relationship with, the port size of the replacing lower carburetor sectio 26. Thus, adaptation of the carburetor to all various size engines and manifold connections, can be made from a stock of sections 26 and venturis 23 of the different sizes, without necessitating any changes in the main carburetor assembly, other than perhaps minor adjustments.

I claim:

1. In a carburetor including a fuel supply chamber, a vertically extending suction passage containing a throttle and having an air inlet and an outlet; the combination comprising, means forming an air diversion passage extending downwardly above the level of fuel in the supply chamber and through which a substantial portion of the suction passage air stream is diverted therefrom and then returned to the suction passage at an elevation above the bottom of the supply chamber without passing through said supply chamber, a vertically disposed wall extending from the side of the suction passage wall within said chamber and directly below the diversion passage, float means in the supply chamber at opposite sides of said wall, and means for feeding fuel from the supply chamber upwardly through a passage in said wall into the air stream in said diversion passage.

2. In a carburetor including a fuel supply chamber, a vertically extending suction passage containing a throttle and having an air inlet and an outlet; the combination comprising, means forming an air diversion passage extending downwardly above the level of fuel in the supply chamber and through which a substantial portion of the suction passage air stream is diverted therefrom and then returned to the suction passage at an elevation above the bottom of the said supply chamber without passing through said supply chamber, a vertically disposed wall extending from the side of the suction passage wall within said chamber and directly below the diversion passage, float means in the supply chamber at opposite sides of said wall, and means for feeding fuel from the supply chamber upwardly through a passage in said wall into the air stream in said diversion passage, the last mentioned passage being positioned centrally with relation to the supply chamber so that the delivery of fuel through the passage is not substantially affected by tilting of the supply chamber in any direction.

3. In a carburetor including a fuel supply chamber, a vertically extending suction passage containing a throttle and having an air inlet and an outlet; the combination comprising, means forming an air diversion passage extending downwardly above the level of fuel in the supply chamber and through which a substantial portion of the suction passage air stream is diverted therefrom and then returned to the suction passage at an elevation above the bottom of the supply chamber without passing through said supply chamber, a vertically disposed wall extending from the side of the suction passage wall within said chamber and directly below the diversion passage, float means in the supply chamber at opposite sides of said wall, means forming a restriction in said diversion passage above said wall, means for feeding fuel from the supply chamber through a passage in said wall into the air stream at said restriction, and means for bleeding air from the diversion passage into the fuel stream in the last mentioned passage before the fuel enters said restriction in the diversion passage.

4. In a carburetor including a fuel supply chamber, a vertically extending suction passage containing a throttle and having an air inlet and an outlet; the combination comprising, a venturi in said passage, means forming an air diversion passage extending downwardly above the level of fuel in the supply chamber and through which a substantial portion of the suction passage air stream is diverted therefrom and then returned to the suction passage at the throat of said venturi and at an elevation above the bottom of the supply chamber without passing through said supply chamber, a vertically disposed wall extending from the side of the suction passage wall within said chamber and directly below the diversion passage, float means in the supply chamber at opposite sides of said wall, and means for feeding fuel from the supply chamber through a passage in said wall upwardly into the air stream in said diversion passage at a rate in accordance with the rate of air flow therethrough.

5. In a carburetor including a fuel supply chamber, a vertically extending suction passage containing a throttle and having an air inlet and an outlet; the combination comprising a venturi in said passage, means forming an air diversion passage extending downwardly above the level of fuel in the supply chamber and through which a substantial portion of the suction passage air stream is diverted therefrom and then returned to the suction passage at the throat of said venturi and at an elevation above the bottom of the fuel supply chamber without passing through said supply chamber, a vertically disposed wall extending from the side of the suction passage wall within said chamber and directly below the diversion passage, float means in the supply chamber at opposite sides of said wall, means forming a restriction in said diversion passage directly above said wall, and means comprising a fuel displacement plunger within a bore in said wall for discharging fuel from the supply chamber through a passage in said wall into the air stream in the diversion passage at said restriction.

6. In a carburetor including a fuel supply chamber, a vertically extending suction passage containing a throttle and having an air inlet and an outlet; the combination comprising, means forming an air diversion passage extending downwardly above the level of fuel in the supply chamber and through which a substantial portion of the suction passage air stream is diverted therefrom and then returned to the suction passage at an elevation above the bottom of the fuel supply chamber without passing through said supply chamber, a vertically disposed wall extending from the side of the suction passage wall within said chamber and directly below the diversion passage, float means in the supply chamber at opposite sides of said wall, means for feeding fuel from the supply chamber through a fuel passage in said wall leading upwardly into the air stream in said diversion passage, and means for

bleeding air from the diversion passage into said fuel passage.

7. In a carburetor including a fuel supply chamber, a vertically extending suction passage containing a throttle and having an air inlet and an outlet; the combination comprising, means forming an air diversion passage extending downwardly above the level of fuel in the supply chamber and through which a substantial portion of the suction passage air stream is diverted therefrom and then returned to the suction passage at an elevation above the bottom of the fuel supply chamber without passing through said supply chamber, a vertically disposed wall extending from the side of the suction passage wall within said chamber and directly below the diversion passage, float means in the supply chamber at opposite sides of said wall, a horizontally extending tube mounted on the top of said wall and forming a restriction in said diversion passage, said tube having an outlet end projecting into and terminating within said suction passage, and means for feeding fuel from the supply chamber through a passage in said wall directly into the metering tube.

8. In a carburetor including a fuel supply chamber, a vertically extending suction passage containing a throttle having an air inlet and an outlet, and a venturi between said throttle and the inlet; the combination comprising, means forming an air diversion passage extending downwardly above the level of fuel in the supply chamber and outside the fuel supply chamber and through which a substantial portion of the suction passage air stream is diverted from a point between said venturi and said inlet and then returned to the suction passage at the throat of the venturi at an elevation above the bottom of the fuel supply chamber, a vertically disposed wall extending from the side of the suction passage wall within said chamber and directly below the diversion passage, a float means in the supply chamber at opposite sides of said wall, a horizontally extending tube mounted on the top of said wall and forming a restriction in said diversion passage, said tube having an outlet end presenting an inclined baffle surface within the interior of said venturi, and means for feeding fuel from the supply chamber through a passage in said wall directly into the metering tube.

9. In a carburetor including a fuel supply chamber, a suction passage containing a throttle and having an air inlet and an outlet; the combination comprising a venturi in said passage, means forming an air diversion passage through which a portion of the suction passage air stream is diverted therefrom and then returned to the suction passage at the venturi throat without passing through the supply chamber, a tube in the outlet of said diversion passage, means for feeding fuel from the supply chamber into said tube, the discharge end of the tube projecting into the venturi and having a baffle surface inclined in the direction of air flow through the suction passage to deflect the fuel and air mixture centrally and longitudinally therein, and means independent of said fuel feeding means for discharging accelerating fuel longitudinally within said tube against said baffle surface.

10. In a carburetor including a closed fuel supply chamber, a suction passage containing a venturi, a throttle and having an inlet and outlet; the combination comprising means for delivering fuel from the supply chamber to the venturi, means forming an economizer passage for communicating venturi created depression to the supply chamber above the fuel level therein, and valve means actuated in accordance with the suction passage pressure at the outlet side of the throttle, for controlling the communication of depression to the supply chamber through said economizer passage, said valve means comprising a wall forming a chamber, a valve element movable therein, a valve seat spaced from the wall of said chamber to form a space communicating with said economizer passage, said space being communicable through a passage in the valve seat with said supply chamber, a spring urging said valve element against the seat, and means forming a passage communicating the suction passage pressure at the outlet side of the throttle to said chamber to unseat said element against the resistance of the spring during normal operations of the carburetor at part-open throttle positions.

11. In a carburetor including a closed fuel supply chamber, a suction passage containing a venturi, a throttle and having an inlet and an outlet; the combination comprising means for delivering fuel from the supply chamber to the venturi, means forming an economizer passage for communicating venturi created depression to the supply chamber above the fuel level therein, and valve means actuated in accordance with the suction passage pressure at the outlet side of the throttle, for controlling the communication of depression to the supply chamber through said economizer passage, said valve means comprising a wall forming a cylindric chamber, a disc valve movable therein, a valve seat spaced from the wall of said chamber to form an annular space communicating with said economizer passage, said space being communicable through a passage in the valve seat with said supply chamber, a spring urging said valve disc against the seat, and means forming a passage communicating the suction passage pressure at the outlet side of the throttle to said chamber and uniformly against the surface of the disc adjacent said spring, to unseat said disc against the resistance of the spring during normal operations of the carburetor at part-open throttle positions.

12. In a carburetor including a closed fuel supply chamber, a suction passage containing a venturi, a throttle and having an inlet and an outlet; the combination comprising means for delivering fuel from the supply chamber to the venturi created depression to the supply chamber above the fuel level therein, and valve means actuated in accordance with the suction passage pressure at the outlet side of the throttle, for controlling the communication of depression to the supply chamber through said economizer passage, said valve means comprising a wall forming a valve chamber, a valve element movable therein, a valve seat spaced from the wall of said chamber to form a space communicating with said economizer passage, said space being communicable through a passage in the valve seat with said supply chamber, a plug closing one end of said chamber, a spring contained within a bore in said plug and urging said valve element against the seat, and means forming a passage communicating the suction passage pressure at the outlet side of the throttle through a port in the side of said plug into said bore and valve chamber, whereby said valve element is unseated against the resistance of the spring during normal operations of the carburetor at part-open throttle positions.

13. In a carburetor including a fuel supply chamber, a vertically extending suction passage containing a throttle and having an air inlet and an outlet; the combination comprising, means forming an air diversion passage extending downwardly above the level of fuel in the supply chamber and through which a substantial portion of the suction passage air stream is diverted therefrom and then returned to the suction passage at an elevation above the bottom of the supply chamber without passing through said supply chamber, a vertically disposed wall extending from the side of the suction passage wall within said chamber and directly below the diversion passage, float means in the supply chamber at opposite sides of said wall, means for feeding fuel from the supply chamber upwardly through a passage in said wall into the air stream in said diversion passage, means forming an economizer passage for communicating depression from said diversion passage to the supply chamber above the fuel level therein, and valve means actuated in accordance with the suction passage pressure at the outlet side of the throttle during normal operations at part-open throttle positions, for controlling the communication of depression to the supply chamber through said economizer passage.

14. In a carburetor including a fuel supply chamber, a vertically extending suction passage containing a throttle and having an air inlet and outlets; the combination comprising, means forming an air diversion passage extending downwardly above the level of fuel in the supply chamber and through which a substantial portion of the suction passage air stream is diverted therefrom and then returned to the suction passage at an elevation above the bottom of the supply chamber without passing through said supply chamber, a vertically disposed wall extending from the side of the suction passage wall within said chamber and directly below the diversion passage, float means in the supply chamber at opposite sides of said wall, means for feeding fuel from the supply chamber upwardly through a passage in said wall into the air stream in said diversion passage, and means for communicating pressure to the supply chamber above the fuel level therein through an opening located directly in the path of the diverted air stream and positioned so that the plane of the opening intersects the line of the diverted air flow and the air therefore flows against said opening to apply velocity-created pressure therethrough.

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