

April 25, 1939.

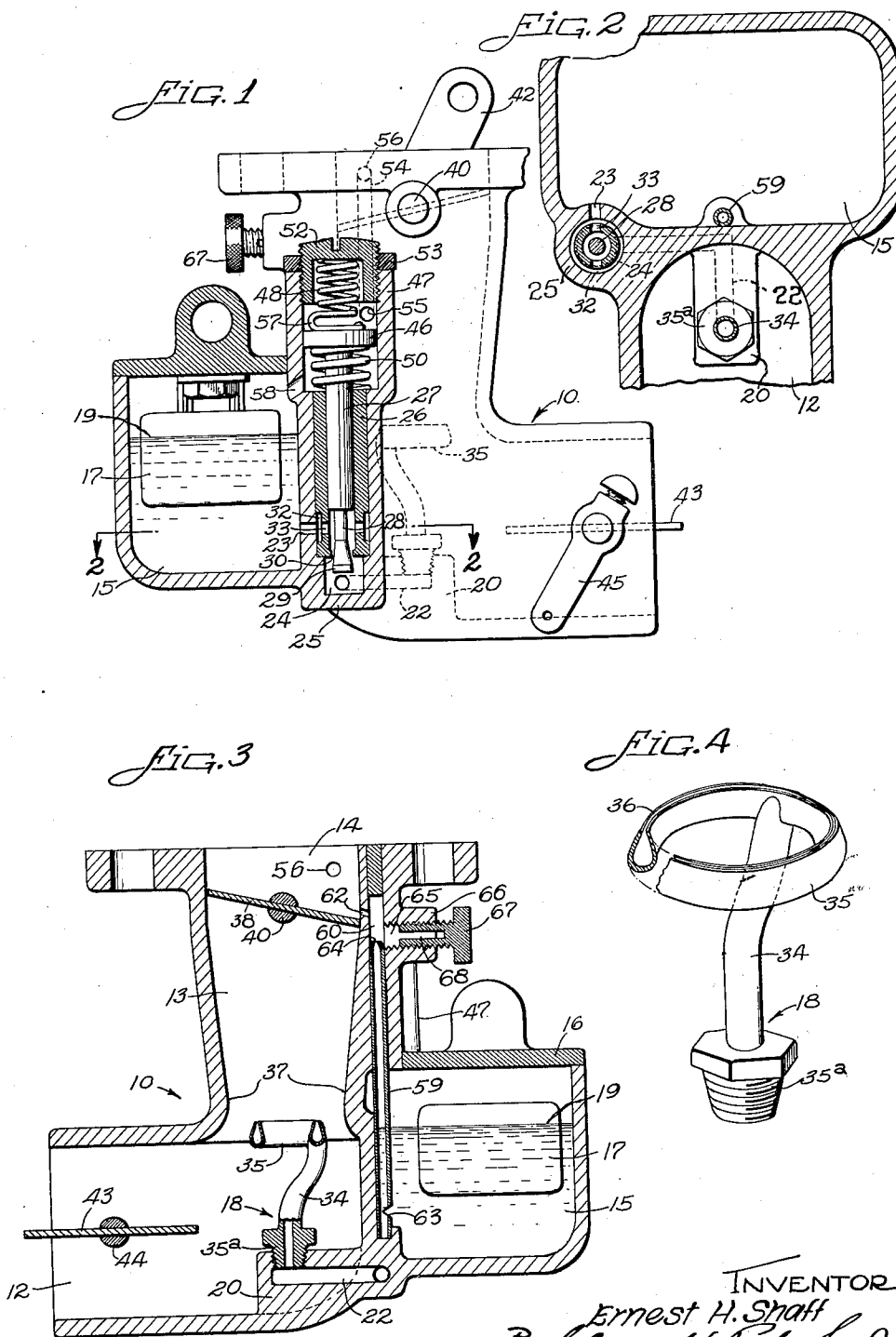
E. H. SHAFF

2,156,128

CARBURETOR

Filed Oct. 31, 1934

2 Sheets-Sheet 1



INVENTOR
Ernest H. Shaff
By *Clarence H. Tucker*
ATTORNEYS

April 25, 1939.

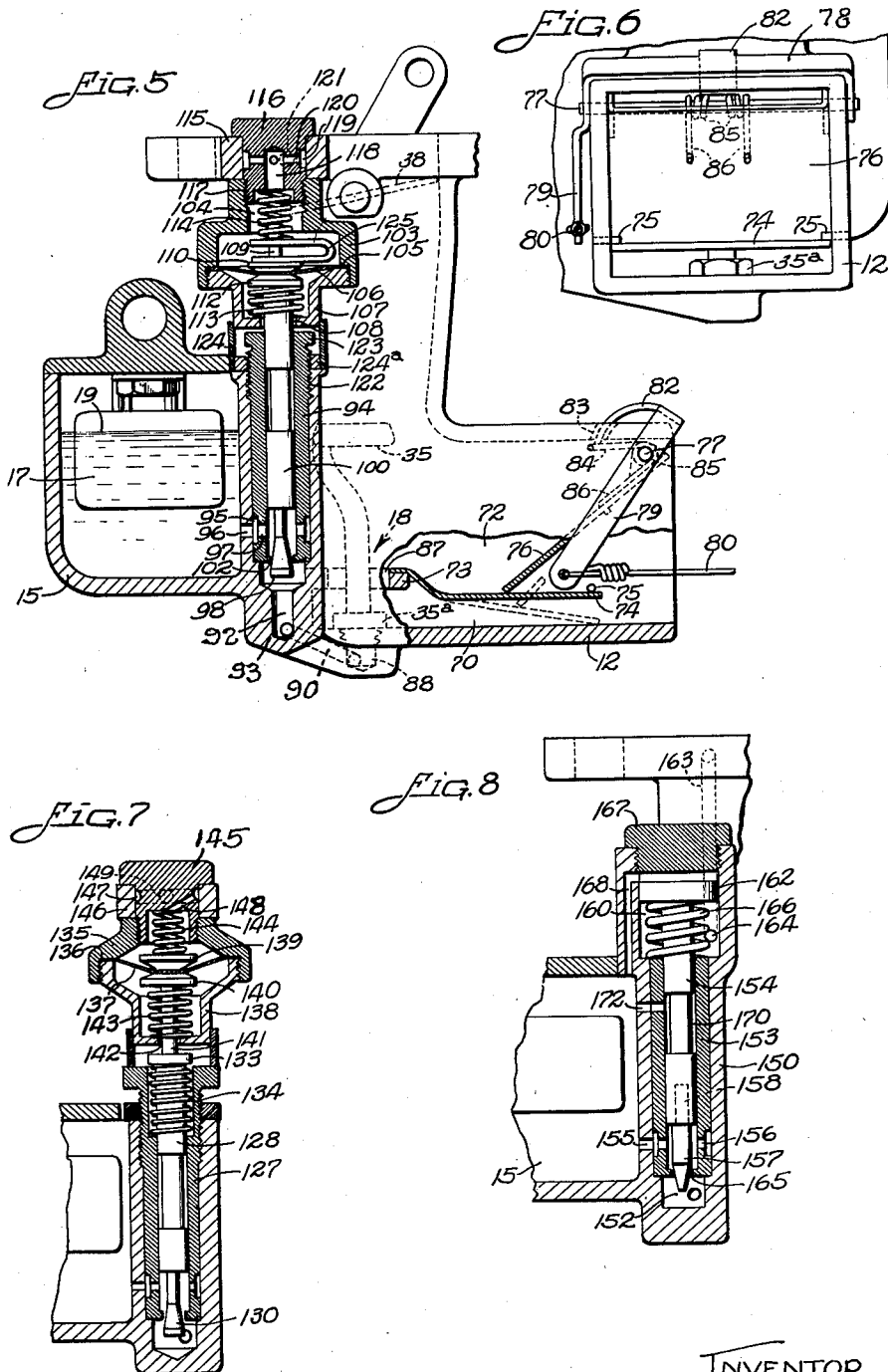
E. H. SHAFF

2,156,128

CARBURETOR

Filed Oct. 31, 1934

2 Sheets-Sheet 2



INVENTOR

Ernest H. Shaff

By *Chas. H. Parker, Esq.*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,156,128

CARBURETOR

Ernest H. Shaff, Grand Haven, Mich., assignor to
Bendix Products Corporation, South Bend,
Ind., a corporation of Indiana

Application October 31, 1934, Serial No. 750,758

7 Claims. (Cl. 261—64)

This invention relates generally to carburetors and more particularly to carburetors adapted for use with internal combustion engines such as are employed in automobiles.

5 This application discloses certain improvements upon the device disclosed in my copending application Serial No. 435,394, filed March 13, 1930.

The fuel requirement for an internal combustion engine is variable during operation due to various factors such as the temperature of the engine or the surrounding atmosphere, the speed of the engine, or the load applied thereto; and the general object of the present invention is to provide a carburetor embodying new, improved and automatically operable means whereby such variable fuel requirements may be met quickly with greater precision and more simply than has heretofore been possible.

20 Another object is to provide an improved fuel regulating device of a unitary character directly operated by suction of the moving engine and adapted to furnish a rich or lean mixture automatically as required.

25 Another object is to provide a carburetor embodying a new and improved fuel discharge means of a character which will insure proper atomization of the liquid fuel as it passes into the main body of the carburetor.

30 Another object is to provide improved idler jet means for a carburetor of the foregoing character.

Other objects reside in the provision of a carburetor embodying a novel combination of simple parts resulting in a compact, inexpensive device which may be easily regulated to secure the desired results and which will function uniformly at all times to secure even running and smooth operation of the internal combustion engine with which the carburetor is used.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings, in which:

45 Figure 1 is a vertical elevation, partly in section, of a carburetor embodying one form of fuel regulating means.

Fig. 2 is a sectional plan view taken on substantially line 2—2 of Fig. 1.

50 Fig. 3 is a transverse sectional elevation through the carburetor showing in detail the construction of the improved idler jet and the fuel discharge member.

Fig. 4 is an enlarged perspective view of the improved fuel discharge member.

Fig. 5 is a side elevation, partly in section, of a carburetor embodying another form of the invention.

Fig. 6 is an end elevation of the intake chamber of this carburetor.

Figs. 7 and 8 are fragmentary sectional elevations of modified forms of fuel regulating means.

While the invention is susceptible of various modifications and alternative constructions I have shown in the drawings and will herein describe in detail, the preferred embodiments, but it is to be understood that I do not thereby intend to limit the invention to the specific forms disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

In the drawings, the invention is illustrated as embodied in a carburetor having a hollow body 10 providing an L-shaped passage constituting a horizontal air inlet chamber 12 communicating with a vertical mixing chamber 13 having a discharge outlet 14. Opposite the chamber 12, the body 10 has an upwardly opening fuel reservoir 15 closed in any suitable manner as by a plate 16 and adapted to contain a supply of liquid fuel. Fuel is delivered to the reservoir 15 in any well known manner from a fuel tank (not shown), and the usual float 17 serves to maintain the fuel at a constant level relative to the top of a fuel discharge member 18; as indicated at 19 in Figs. 1, 3 and 5. This carburetor is of the type wherein engine suction is utilized in controlling the flow of fuel to the discharge member, for securing at all stages of operation the fuel-air proportion best calculated for efficient, smooth running of the engine; and novel suction responsive means, presently to be described, furnishes the necessary fuel control.

Within the inlet chamber 12, a horizontally extending projection 20 provides a base for the fuel discharge member 18, fuel being received from the float chamber 15 through a horizontal passage 22 communicating with the chamber through a port 23 and a vertical bore 24 formed in a vertically extending member 25 providing a chambered container for the suction responsive fuel control means disposed exteriorly of the body 10 adjacent the reservoir 15. While the member 25 may be formed as a separate unit secured in any desirable manner to the body 10, as a matter of practical expediency it is preferably formed as an integral part thereof as is also the reservoir 15. As shown, the member 25 may be formed

conveniently at one side of the juncture of the reservoir 15 with the body 10 (Fig. 2).

Within the bore 24 there may be fitted a bushing 26 which is adapted to slidably receive a valve stem 27 having at its lower end a reduced portion 28 carrying a valve 29. This valve may be of frusto-conical shape and is adapted to engage with a valve seat 30 at the lower end of the bushing 26. In the outer wall of the bushing 26 is an annular channel 32, and ports 33 communicate with the interior of the bushing adjacent the reduced portion 28 of the valve stem to permit the passage of fuel from the float chamber 15 past the valve 29 when the latter is open. Where the member 25 is formed of a material that may be bored to form a smooth, true bearing surface, the bushing 26 may, of course, be dispensed with.

Fuel delivered through the passage 22 flows into the fuel discharge member 18 through a generally vertically extending tube 34 having a discharge head 35 at its upper end. A screw base 35^a at the lower end of the tube 34 provides means for conveniently removably securing the discharge member in place, as in a suitably tapped aperture over the passage 22 in the projection 20. Preferably the head 35 is formed as a hollow ring secured to the upper end of the tube 34 in any suitable manner or it may be formed integral therewith. A preferably continuous, narrow slot 36 is formed in the upper part of the tube 35 and the wall of the tube adjacent the slot is projected upwardly so that the ring will have a substantially oval cross section as best seen in Fig. 3, this shape being calculated to concentrate the force of the upwardly moving air over the slot so as to withdraw most effectively the fuel spray issuing therefrom. The slot 36 may be very narrow, a width of about .010 inch having been found satisfactory in practice to secure efficient vaporization.

In its lower part the chamber 13 is formed as a Venturi tube 37 and the fuel discharge head 35 is positioned in the throat of this tube where the force of inrushing air is most concentrated. Then as the fuel spray withdrawn from the discharge head and the air move on through the tube they are thoroughly mixed to form an efficient combustible mixture.

The amount of air drawn into the mixing chamber 13 and thereby the amount of suction applied to the fuel discharge head 35 is governed by a throttle valve 38 mounted in the upper part of the mixing chamber 13, a rock shaft 40 being journaled at opposite ends in the wall of the body 10 and having at one end an arm 42 adapted to be connected with the usual control means manipulative by the operator. A conventional choke valve 43 fixed on a rock shaft 44 and operable by a lever 45 connected to manipulative means (not shown) is positioned in the inlet chamber 12 and may be closed to shut off the in-flow of air when an exceptionally rich fuel mixture is desired as when starting the cold engine.

As the engine speed increases there will be a corresponding increase in suction tending to increase the velocity of air issuing into the mixing chamber 13 past the fuel discharge head 35. This tends to increase the amount of fuel withdrawn through the discharge head 35 to a degree in excess of engine requirement for economical operation, unless means are provided for controlling the flow of fuel to the discharge member. In the present instance, this control is automatically

exercised by the valve 29 which is adapted to restrict the flow of fuel from the reservoir 15 to the discharge member proportionately to the increase in engine suction.

To actuate the valve 29, therefore, I provide means sensitive to the engine suction and connected to the valve stem 27. Thus, a piston 46 is fixed at the upper end of the stem 27 and is reciprocable within a cylinder 47, herein shown as an enlargement of the upper end of the bore 24. Springs 48 and 50 are adapted to exert pressure against the upper and lower faces, respectively, of the piston 46 to maintain the same in a normally neutral position within the cylinder 47, the spring 50 being preferably slightly stronger than the spring 48. In this normal position of the piston the valve 29 will be kept open to permit a relatively free flow of liquid fuel to the passage 22. An adjustable screw plug 52 closes the top of the cylinder and forms a seat for the spring 48, the plug being adjustable to adjust the tension of the spring against the piston to regulate the normal opening of the valve 29 as desired, a lock nut 53 securing the plug in any adjusted position.

Engine suction is adapted to form a vacuum on one side of the piston 46, herein shown as the upper side, whereby the piston will be drawn upwardly in the cylinder 47 and thereby draw the valve 29 toward the seat 30 to control the flow of liquid fuel past the valve. Communication between the body 10 and the cylinder 47 in order to secure the effect of the engine suction is provided herein by a passage 54 in the wall of the body 10 opening into the cylinder through a port 55 and to the interior of the body 10 through a port 56 between the throttle valve 38 and the discharge opening 14.

Temperature changes both of the atmosphere and of the engine affect the degree of vaporization of the fuel and thus affect the quantity of fuel necessary to create a given amount of engine power. The necessary adjustment of the fuel supply to compensate for these variations may be automatically effected by securing a thermostat 57 between the upper side of the piston 46 and the spring 48, the thermostat being of substantially U-shape and of a character to contract when heated to decrease the tension of the spring 48. Equalizing expansion of the spring 50 will force the piston and thus the valve 29 upwardly to restrict the passage of fuel. Thus, the tension of the springs will be varied in response to temperature changes to secure the proper adjustment of the valve 29.

While the piston 46 is preferably closely fitted to the wall of the cylinder 47, the stem 27 may be relatively loosely fitted in the bushing 27 so as to minimize friction. However, there must be sufficient clearance about the piston to permit movement in the cylinder, in consequence of which a certain amount of air will escape to the part of the cylinder above the piston when the engine suction creates a vacuum. Moreover, upward movement of the piston increases the space therebelow which creates a suction which must be compensated for; or due to the loose fit of the stem 27 some liquid fuel will be drawn into the space below the piston which might, if not otherwise provided for, escape past the piston and be drawn into the carburetor in a relatively unatomized condition and disrupt the smooth, even running of the engine. Hence, a port 58 leading from the space in the cylinder below the piston opens to the upper part of the

reservoir 15 to furnish an air relief port and to return any liquid that might escape past the stem 27. A small amount of liquid will, however, cling to the cylinder wall and provide some lubrication for the piston 46 to minimize friction.

At first, I found that the piston 46 would stick in the cylinder 47 due to the close fit necessary for proper operation, in spite of the lubrication provided by the liquid as described. However, I have discovered that by coating the periphery of the cylinder with a substance that will prevent friction this sticking is entirely prevented and a close fit giving improved results is possible. For example, I have found that chromium plating gives excellent results.

When idling the engine, the throttle valve 38 will be closed to shut off the fuel supply from the fuel discharge member 18. I have therefore provided means independent of the fuel discharge member 18 for supplying a limited amount of fuel as required at the idling speed of the engine. In the present instance, this comprises a tube 59 extending upwardly from within the reservoir 15 to an auxiliary mixing chamber 60 in the wall of the body 10 adjacent the throttle valve 38 (Fig. 3). A port 62 forms a communication between the auxiliary chamber 60 and the interior of the body 10 above the valve 38 in its closed position. As high suction is created through the port 62 due to closure of the mixing chamber 13, fuel will be drawn up through the tube 59 through a port 63 and will discharge into the chamber 60 through a restricted nozzle 64. Air must be mixed with the fuel in order to form a combustible mixture and is introduced to the chamber 60 through a bore 65 formed in a boss 66 which is internally threaded to receive a regulating screw 67 having a central slot 68. By manipulation of the screw 67 to increase or decrease the exposure of the outer end of the slot 68 accurate regulation of the amount of air for any given condition may be had. Suction through the port 62 simultaneously forcibly draws air through the passage 65 and fuel through the nozzle 64 which will mix thoroughly in the chamber 60 and then pass through the port to the engine through the discharge opening 14.

While the invention has thus far been described in connection with what is known as a "plain tube" carburetor the same may be embodied with equal effectiveness in a carburetor of the "air valve" type as shown in Fig. 5. In essential respects the latter form of carburetor is the same as the former except that the inlet chamber 12 is divided into a plurality of air passages, herein shown as a lower or primary air passage 70 and an upper or secondary air passage 72.

Division of the chamber 12 into the primary and secondary air passages is effected by means of a relatively short division wall 73 integral with the rear wall of the body 10 and a flexible spring extension 74 secured in any suitable manner to the end of the wall 73 and extending between the side walls of the chamber 12 which may for the purpose be of rectangular shape as seen in Fig. 6. The uppermost position of the spring extension 74 is defined by stationary pins 75, and the flexibility of the extension permits its outer end to be bent downwardly toward the lower wall of the chamber when it is desired to close the primary air passage to any extent as in choking the engine to start the same when cold.

For moving the flexible division wall, I provide a flap valve 76 suspended from a shaft 77 extending across the top of the secondary air passage 72 and passing through the side walls thereof. Positioned over the top wall of the inlet chamber and supported at its ends by the outer ends of the shaft 77 is a yoke 78 having as an extension of one end an arm 79 connected as by a rod 80 to any suitable manual operating means. An arcuate downwardly extending finger 82 is carried by the yoke 78 and passes through an aperture 83 in the upper wall of the inlet chamber. The free end of the finger 82 bears against a horizontally extending loop 84 of a spring 85 which is coiled about the shaft 77 and has downwardly extending ends 86 bearing against the valve 76. Normally the spring 85 maintains the valve 76 in light abutment against the resilient extension wall 74. However, when the arm 79 is actuated to move the yoke 78 counter-clockwise as viewed in Fig. 5, the finger 82 will depress the spring loop 84 and place the spring under sufficient tension to urge the valve 76 against the member 74 with force enough to cause the latter to assume the light dotted line position indicated in Fig. 5, thereby closing the primary air passage to any desired extent.

Air drawn through the primary passage 70 is directed upwardly through an opening 87 in the division wall 77 past any suitable form of fuel discharge means, herein for convenience illustrated as of the form shown in Fig. 4. For this purpose the lower end of the discharge member 18 extends through the opening 87 and is secured in the lower wall of the chamber over a well 88 which is tapped at its upper end to receive the screw base 35^a. Thus, the air stream issuing through the opening or port 87 will be effectively concentrated about the head 35 to draw vaporized fuel therefrom most efficiently.

Fuel is delivered to the well 88 through a passage 90 communicating with a vertical bore 92 in a rib portion 93 projecting from the body 10 adjacent the fuel reservoir 15. The upper part of the bore 92 is of enlarged diameter to receive a bushing 94 which has an annular channel 95 adjacent a port 96 in the wall of the reservoir 15. Fuel passing through the port 96 and into the channel 95 may enter the bushing through a plurality of ports 97. For controlling the passage of fluid from the bushing into the bore 92 a valve 98 is secured to a stem 100 slidably mounted within the bushing. Movement of the valve 98 toward or away from a valve seat 102 will thus control the flow of fuel to the fuel discharge member.

Suction responsive means of somewhat different construction than that shown in Fig. 1 may be employed for controlling the valve 102. As herein shown, a hood member 103 having a bore 104 is disposed coaxially above the bore 92 and adapted to receive the upper end of the stem 100. Below the bore 104, the body of the hood opens into a space of substantial diameter, and an annular shoulder 105 is formed adjacent the lower edge, providing a seat for a relatively loose diaphragm 106 of suitable flexible material, such as a specially prepared airtight fabric, which is secured in place against the shoulder by means of a chambered nut 107. The hood and nut together, it will be observed, form a substantial chamber divided by the diaphragm 106.

The stem 100 passes through an aperture 108 in the nut 107 and has a reduced portion 109 at its upper end which passes axially through the

diaphragm 106. A pair of convex disks 110 and 112 rigid with the stem and disposed above and below the diaphragm, respectively, provide an air tight connection between the valve stem and the diaphragm.

Resilient suspension of the valve stem 100 in a position to normally maintain the valve 102 open is effected by means of a spring 113 which forms a support between the disk 112 and the nut 107, and a spring 114 within the bore 104 which surrounds the upper end of the reduced portion 108 of the stem and exerts downward pressure upon the upper disk 110 to counterbalance the spring 113.

A rigid support for the hood 103 is provided by an apertured horizontal ear 115 integral with and extending laterally from the upper end of the body 10. Through this ear extends a bolt 116 which threadedly engages within the upper end of the bore 104 as at 117 and tightly secures the hood against the ear. The lower surface of the plug provides a seat for the spring 114, and within the bolt 116 is a vertical bore 118 which communicates with an annular channel 119 through a plurality of radial ports 120. Coincident with the channel 119 is a port 121 opening to the interior of the body 10 above the throttle valve 38. Engine suction will be effective through the passageway thus provided through the bolt 116 to create a vacuum condition in the space above the diaphragm and cause the latter to flex upwardly. Because of the rigid connection between the diaphragm and the valve stem 100 the latter will be caused to follow the movement of the diaphragm when the engine suction reaches an intensity which will overcome the force of the spring 114. The valve 102 will thus be carried toward its closed position in proportion to the intensity of the engine suction, and the flow of fuel to the discharge member 18 is thereby directly controlled.

Adjustment of the valve 102 to compensate for changes in operating conditions may be secured by rotating the bushing 94 which is preferably in screw threaded engagement, as at 122, with the upper end of the member 93. For convenience in adjusting the bushing an integral nut 123 is formed at its upper end which may be exposed for manipulation when desired by shifting a loose sleeve 124, the latter being provided to keep dust or dirt from the bushing. A lock nut 124^a locks the bushing in adjusted position.

As in the form of suction responsive means shown in Fig. 1, a thermostatic element 125 may be interposed between the spring 114 and the upper disk 110 to vary the tension of the spring suspension as required by changes in atmospheric or engine temperatures, whereby a further accurate relative adjustment of the valve 102 is secured. The carburetor will thus be maintained at all times in a condition to secure the most efficient and economical operation of the engine.

The modified form of suction responsive means shown in Fig. 7 differs from that previously described in comprising valve and suction responsive means formed as separate cooperative units. Thus, in this instance, a manually adjustable bushing 127 slidably supports a valve stem 128 carrying a valve 130 at its lower end for controlling the flow of fuel. A head 133 on the upper end of the stem 128 forms an abutment for a spring 134 seated within an enlargement of the bore in the upper end of the bushing 127, the spring being designed normally to urge the stem and valve upwardly into valve closing position.

Above the bushing, a centrally apertured hood member 135 has near its lower edge a shoulder 136 providing a seat for the edge of a loose air-tight diaphragm 137 which is secured in place by a chambered nut 138. Upper and lower disks 139 and 140 fast with the upper end of a short stem 141 serve to clamp the diaphragm 137 therebetween and render the stem 141 responsive to movement of the diaphragm. The lower end of the short stem extends through an aperture 142 in the nut 138 and rests upon the head 133. Springs 143 and 144 provide a sensitive resilient cushion for supporting the stem 141 and are arranged to force the same against the head 133 with sufficient pressure to normally keep the valve 130 open.

The central aperture of the hood is adapted to threadedly receive a bolt 145 for securing the hood rigidly against a supporting member 146, which may be similar to the ear 115. An annular channel 147 about the periphery of the bolt, and a duct 148 connecting the channel with the space above the diaphragm 137 provide communication with the interior of the carburetor body, a port 149 opening into said body near the channel 147 completing the passage through which the effect of the engine suction may become operative to move the diaphragm. Because of the sensitive construction of this form of the fuel control, an exceedingly critical adjustment is possible.

In the suction sensitive fuel control shown in Fig. 8, the valve is arranged to move downwardly to reduce the flow of fuel. Thus an elongated member 150, which may be in the form of an integral rib on the carburetor body 10, has a vertical bore 152 in which may be fitted a bushing 153 forming a guide for a slidable valve stem 154. The flow of liquid from the fuel reservoir 15 is through a port 155 in the wall of the reservoir and ports 156 in the lower end of the bushing past a needle valve 157, which is here shown as a separate part of smaller diameter than the stem 154 and having a threaded portion 158 which connects with the lower end of the stem. Adjustment of the valve 157 is possible by turning the same relative to the stem 154.

At its upper end the bore 152 is enlarged to form a cylinder 160 within which a piston 162 fast on the upper end of the stem 154 is adapted to reciprocate. Communication between the interior of the carburetor body and the cylinder 160 is established by an angularly formed passage 163. In the present instance, the passage 163 is shown as communicating through a port 164 below the piston 162, whereby engine suction will draw the piston 162 downwardly and thereby move the valve stem 154 in a similar direction to carry the valve 157 toward a valve seat 165, thus controlling the flow of fuel through the lower end of the bore 152. A spring 166 provides a resilient support for normally maintaining the piston 162 in its uppermost position whereby the valve 157 will be kept open. A screw plug 167 closes the upper end of the cylinder 160, and an angular passage 168 connects the space above the piston 162 with the upper part of the reservoir 15 so that air from the upper part of the reservoir may be drawn into the cylinder 160 when the piston 162 is depressed by engine suction. Gasoline vapor contained in the air drawn from the reservoir 15 will condense in the cylinder 160 and provide lubrication for the piston 162.

Since the stem 154 is comparatively loosely slidable within the bushing 153, liquid fuel will tend to travel up from the valve 157 toward the

cylinder 160 and will eventually enter the cylinder due to the suction of the engine which acts to create a vacuum therein. Hence, a liquid trap 170 in the form of a portion of reduced diameter intermediate the ends of the stem 154 is provided for catching the fuel passing upwardly along the stem, and a port 172 communicates with the trap 170 to return the liquid to the reservoir.

To summarize briefly, the operation of the carburetor shown in Figs. 1, 2, 3 and 4 is as follows:

When the engine is in a quiescent state, the fuel valve 29 will be in its widest open position. As the engine is cranked, very little suction is created so that the piston 46 will not be moved to any appreciable extent, the spring 48 serving to maintain it near its lowermost position, and the fuel valve will remain fully open. The throttle valve 38 and the choke valve 43 will be adjusted in the usual manner during starting and a rich supply of fuel will be drawn from the discharge member 18 to start the engine.

As soon as the engine begins firing, it will turn over more rapidly, thereby increasing the degree of suction and acting to move the piston 46 and with it the valve 29, the latter being carried toward closed position so as to reduce the amount of fuel available and thus provide a somewhat lean fuel mixture. This result accrues due to the fact that while the amount of fuel passing to the discharge member is restricted, the quantity of air passing the discharge head 35 will remain constant except as controlled by the throttle or choke valves.

In idling the engine, the throttle valve 38 will be closed, resulting in a substantially complete closing of the mixture chamber 13. The full force of engine suction will then operate to close the valve 29 and to draw a supply of fuel sufficient for idling through the port 62 from the auxiliary mixing chamber 60. Idling speed will be governed by adjusting the screw 67 which operates to control the amount of air mixed with the fuel.

When the car is placed in gear and the clutch engaged so as to put the engine under load, the engine speed, of course, is reduced with a corresponding reduction in the engine suction. This, together with the simultaneous opening of the throttle valve, permits the piston to return to its normal position and the fuel valve 29 will be moved toward open position. Thus a rich fuel mixture is provided as above described with reference to the engine starting operation.

As the car gets under way and more speed is desired, the accelerator is advanced so as to further open the throttle valve 38, whereby additional air is drawn through the chamber 13, causing the suction between the throttle valve and the outlet 14 to be further reduced and insuring an unrestricted, rich fuel supply. After the car has reached the desired speed, as determined by the setting of the throttle valve, however, the rich fuel mixture becomes unnecessary. Accordingly, as the amount of air that may be drawn past the throttle valve reaches the maximum, the engine suction will increase and again move the piston 46. Thus the fuel valve 29 will be moved slightly toward closed position so that a relatively lean fuel mixture will be supplied for maintaining the speed attained.

Changes in atmospheric temperature or the engine temperature will also affect the valve 29 through the action of the thermostat 57 which

operates to vary the tension of the spring and thereby the normal adjustment of the suction sensitive means, to provide a leaner or richer mixture as necessary.

The operation of the carburetor shown in Figs. 5 and 6 is in essential respects the same. Thus, when the engine is cold, the valve 98 will be full open, and as the engine is cranked the comparatively light suction created will not sufficiently move the diaphragm 106 to effect the open position of the fuel valve. In this operation, the operator will actuate the arm 79 to cause the finger 82 to press against the arms 84 of the spring 85 and thus depress the flap valve 76 which will force the resilient division extension 74 toward the dotted line position shown in Fig. 5 to restrict the amount of air passing the fuel discharge member to secure a rich fuel mixture.

After the engine begins firing, the valve 76 will be released and the resilient member 74 will return to its horizontal position, leaving the primary air passage 70 open so that a strong up draft of air will issue through the opening 87 past the discharge head 35 and cause a leaner air-fuel supply to be delivered to the engine. It will be understood that the throttle valve 38 will normally be maintained in a slightly opened position to permit the passage of a small amount of fuel-air mixture for idling purposes. When the throttle 38 is opened to race the engine or to gain speed, air will also be delivered through the secondary air passage 72 by the opening of the valve 76 due to the pressure of incoming air. Hence the supply of air to the mixing chamber will be increased and a leaner mixture results.

When the engine is placed under load the engine speed is reduced with a resultant decrease in suction and the unrestricted flow of fuel to the discharge member provides a rich fuel mixture. Then, as the car gets under way and the engine speed determined by the setting of the throttle valve has been attained, the amount of air which may be drawn past the valve will reach the maximum and the engine suction will increase so as to move the diaphragm 106. Thus, the fuel valve 98 will be moved toward closed position and restrict the flow of fuel to the discharge member 12 so that a relatively lean fuel mixture will be supplied for maintaining the speed attained.

While several forms of suction responsive fuel valve control means have been shown, it should be understood that either form may be substituted for the other; and although certain particular forms have been shown in combination with the carburetor as a matter of expediency for purposes of illustration, this should not be construed as a limitation, as any form of the suction responsive means may be used therewith.

From the foregoing it will be apparent that I have provided a carburetor having improved apparatus for automatically varying the richness of the fuel mixture responsive to the requirements of the engine. Moreover, the improved fuel discharge means insures more efficient vaporization of the fuel than in devices heretofore in use. Consequently, the present carburetor furnishes to the engine a supply of thoroughly mixed fuel and air which is at all times as lean as may be used and which will cause the engine to run evenly and smoothly.

Subject matter not claimed herein is claimed in my copending application Serial No. 435,394, above referred to, and in my copending application Serial No. 212,738, filed June 9, 1938.

I claim as my invention:

1. In a carburetor having a hollow body providing an inlet chamber and a mixing chamber having a discharge opening therefrom, a throttle valve in said mixing chamber, a fuel discharge member having a vaporizing head between said chambers, means for controlling the flow of fuel to said discharge member, a resilient horizontal division wall in said inlet chamber dividing the latter into primary and secondary air passages below and above said wall respectively, a flap type valve in said secondary passage pivotally mounted at one edge and engageable with said division wall at its opposite edge, means for normally resiliently holding said flap valve lightly against said division wall, and operating means for pressing said flap valve against said division wall to close said primary passage for choking the engine.

2. In a carburetor having a hollow body including an inlet chamber, a resilient division wall dividing said chamber into primary and secondary air passages, a flap valve normally closing the secondary air passage to force a concentrated air flow through said primary air passage, and means for actuating said valve to force the same against said resilient division wall to carry the latter across said primary air passage for closing the latter.

3. In a carburetor of the class described, means defining an air passage having an outlet and adapted for a uni-directional flow of air toward said outlet, a fuel discharge member comprising a vertically extending tube with one end extend-

ing into said passage, a hollow tube discharge ring on said end and in communication with the interior of the tube, and a narrow slot in the side of said ring facing toward said outlet for the escape of fuel vapor into the air flowing through and around said ring.

4. In a carburetor, a primary air inlet, a secondary air inlet, a movable wall separating said inlets, and common means for moving said wall and closing both of said air inlets.

5. In a carburetor, a primary air inlet, a secondary air inlet, a yielding wall separating said inlets, and a choke valve in the secondary air inlet adapted to yieldingly close the same and upon further movement to move the yielding wall to a position where it closes the primary air inlet.

6. In a carburetor, a primary air inlet, a secondary air inlet, a movable wall separating said inlets, and a choke valve movable to a position where it closes the secondary air inlet and to a further position where it moves the movable wall to a position where the wall closes the primary air inlet, and yielding means for moving said choke valve to said positions.

7. In a carburetor, an air inlet, a movable wall dividing the inlet into variable primary and secondary air inlets, and an air valve movable to a position where it obstructs the secondary air inlet and moves the wall to a position where it obstructs the primary air inlet.

ERNEST H. SHAFF.