

Aug. 19, 1924.

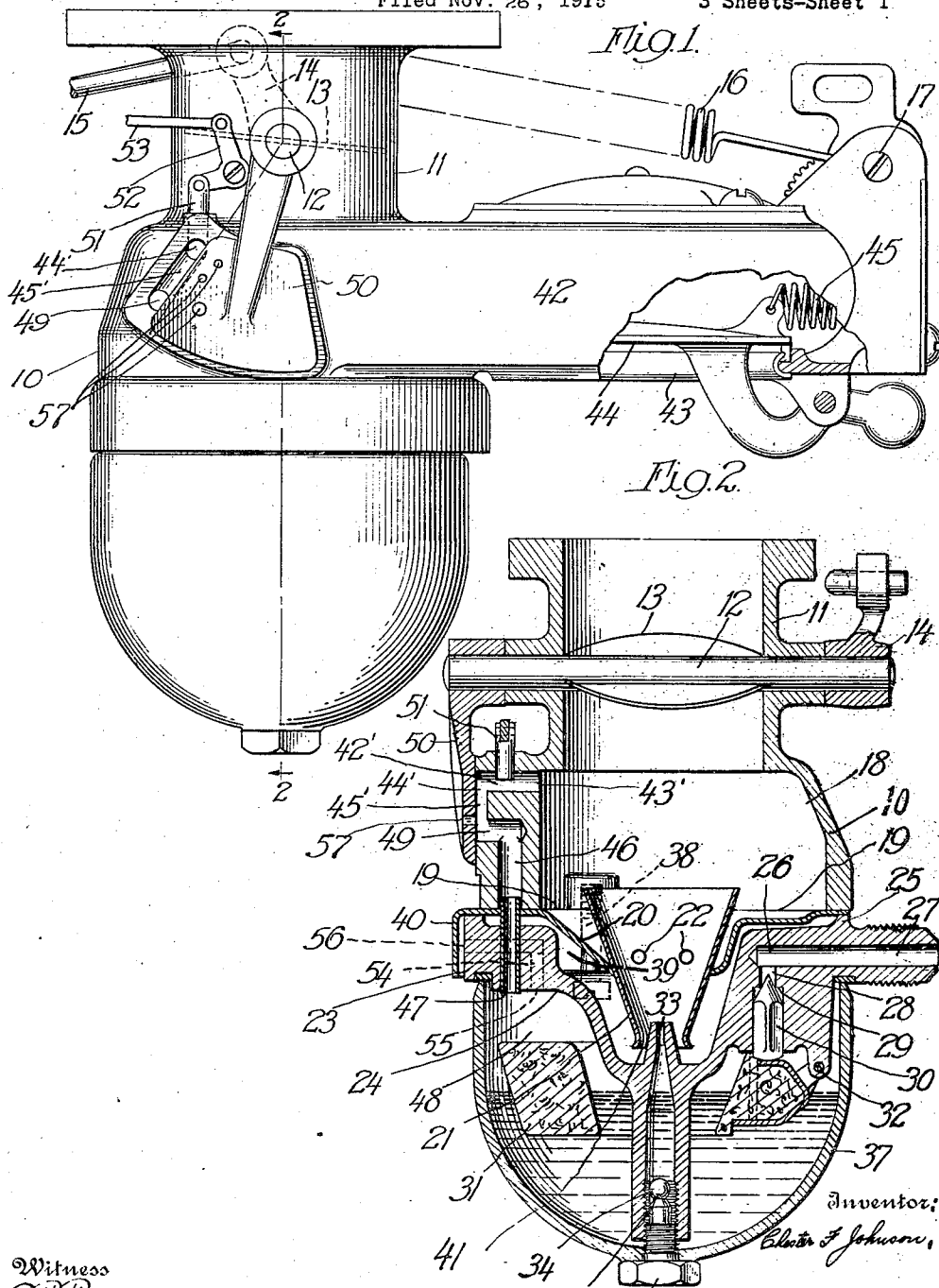
1,505,565

C. F. JOHNSON

CARBURETOR

Filed Nov. 26, 1915

3 Sheets-Sheet 1



Witness
E. R. Barrett.

By

Inventor:
C. F. Johnson,
Attorney

Aug. 19, 1924.

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CARBURETOR

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3 Sheets-Sheet 2

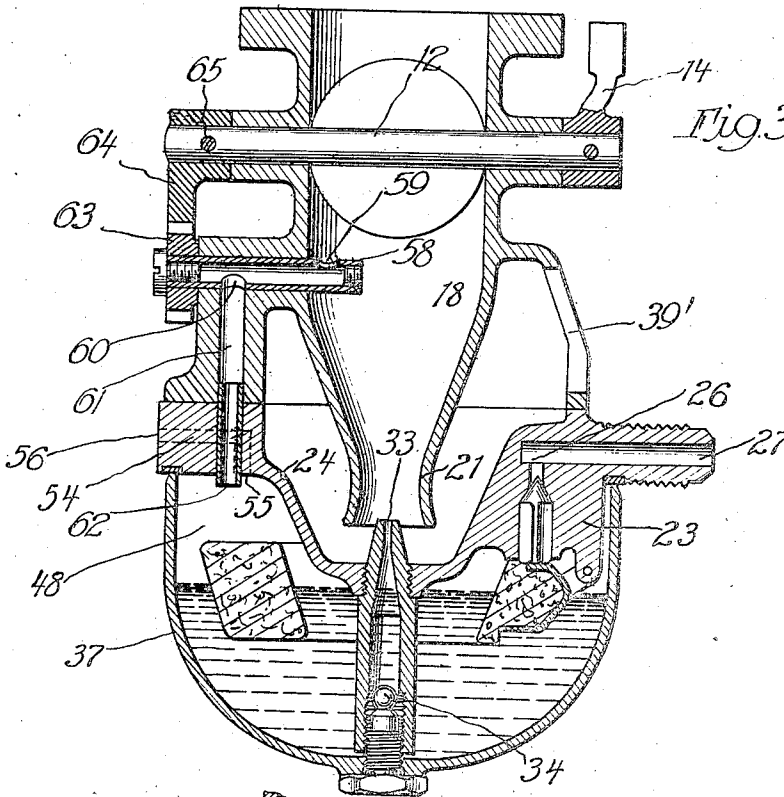


Fig. 3

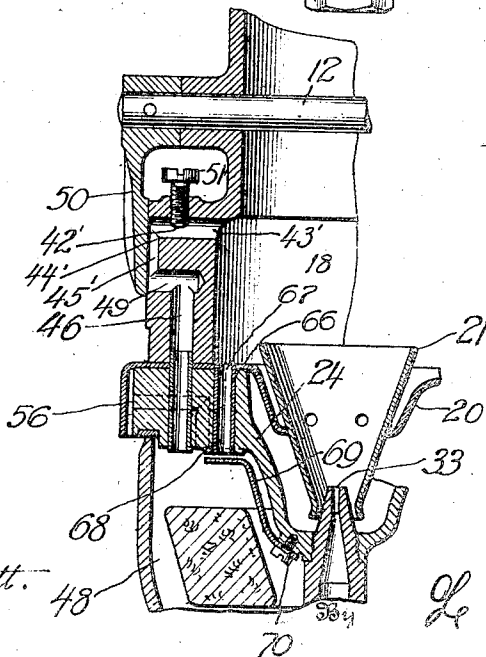


Fig. 4

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3 Sheets-Sheet 3

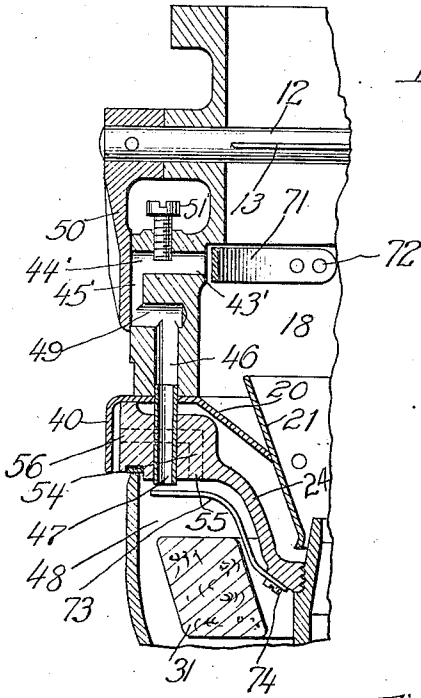


Fig. 5

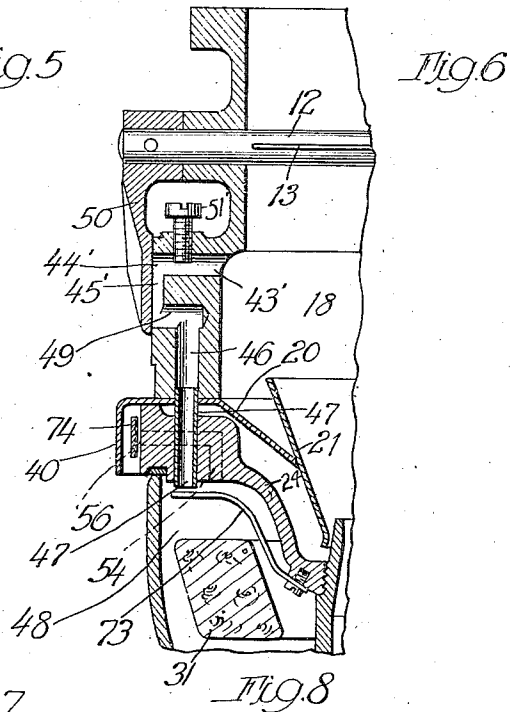


Fig. 6

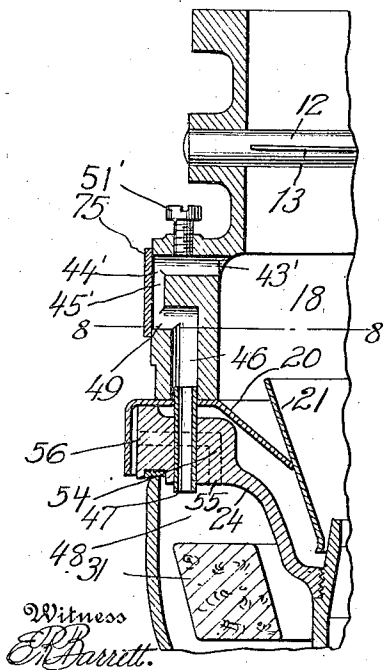


Fig. 7

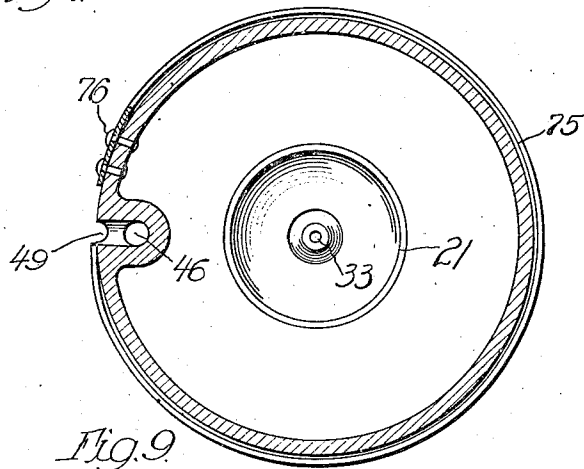


Fig. 8

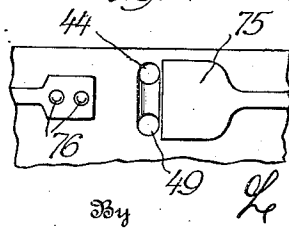


Fig. 9

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UNITED STATES PATENT OFFICE.

CHESTER F. JOHNSON, OF DETROIT, MICHIGAN.

CARBURETOR.

Application filed November 26, 1915. Serial No. 63,468.

To all whom it may concern:

Be it known that I, CHESTER F. JOHNSON, a citizen of the United States, and resident of Detroit, Wayne County, State of Michigan, have invented certain new and useful Improvements in Carburetors, of which the following is a specification.

This invention relates to carburetors. More particularly this invention relates to means for controlling the relative proportions of fuel and air of the motor mixture, throughout the entire speed and throttle ranges of the motor under constant or varying climatic conditions.

In hydrocarbon motors, considerable difficulty has been experienced in endeavoring to produce a carburetor which will give a satisfactory mixture under various operating conditions. While maximum power may be produced in well designed motors equipped with prior carburetors when properly adjusted for certain climatic conditions and running with a wide open throttle; and while a motor, so equipped, may easily have the proper mixture while running under a so-called closed throttle condition, it has been found very difficult to get the most satisfactory and efficient mixture at intermediate throttle positions and, therefore, most carburetors are adjusted to give the proper quality of mixture for maximum power when the throttle is wide open and they are also adjusted and designed, so that the proper quality of mixture is fed to the motor while running on the closed throttle position, which has been found to be the most sensitive running position, regardless of intermediate throttle positions. In many cases, the mixture is far from ideal while the carburetor is running on intermediate position, or is operating under different climatic conditions from those which it was adjusted for. On the other hand, while maximum power can be obtained only with a nearly correct mixture, yet one may enjoy excellent results with a mixture which is too thin for maximum power, and at the same time obtain greater fuel economy.

However, a carburetor, which will give the proper or desired mixture, at any and all throttle positions, may be produced by providing means, as will be described; such a carburetor may be provided with means for varying the quality of the mixture, or for maintaining a mixture of the desired quality,

while the motor is running on partially closed throttle positions, without affecting the quality of the mixture in the two more important or extreme throttle positions; namely, closed and wide open.

To eliminate various difficulties heretofore encountered; to regulate and vary the quality of mixture for the most ideal motor running under diverse conditions, and to attain the desired results, I have provided means for varying the pressure on the fuel in the float chamber, so that the flow of fuel from the nozzle may be retarded or increased, with or without auxiliary air valves or supplementary nozzles. This may be done by causing the suction in the mixing chamber to act on the surface of the liquid in the fuel chamber, by means of a passage connecting these two chambers, and the degree of suction through this passage may be controlled by suitable valve means restricting the action of the vacuum therein, or by a valve regulating the opening of a port connecting this passage with the pressure of the atmosphere, or by both.

While the vacuum in the mixing chamber may be utilized for varying the pressure on the surface of the fuel in the float chamber, any other suitable means may be used and the valve mechanism for controlling the float chamber pressure may be operated by automatic means responsive to temperature change, such as a thermally operated valve; it may also be manually controlled, or one of the valves may be connected with the operating mechanism of the throttle so that the opening and closing of the ports affecting the pressure on the liquid in the float chamber bears a definite relation to the throttle position. Thus, a carburetor may be produced whose efficiency is not altered by varying climatic or operating conditions.

A carburetor, provided with an auxiliary air valve of the spring type, such as illustrated in the accompanying drawings, may be so designed and the valve closing spring may be so adjusted to give the proper mixture of gas at the slower or throttled speeds of the motor, such as when idling, also when the throttle is wide open. But with such an arrangement, the quality of the mixture may not, as stated above, be properly maintained when the throttle is only partially closed; therefore, the mixture becomes slightly over rich in intermediate positions. On the other

hand, in many cases, if the carburetor is designed and adjusted to give the correct quality of mixture for maximum speed or power at the open throttle, or during very slow idling of the motor, it will give throughout the rest of the throttle movement some one (almost any one desired) quality of mixture, and this quality cannot be changed without altering either the closed throttle or open throttle quality, or both.

To obviate this difficulty, the suction in the mixing chamber may be brought into communication with the top of the float chamber when partially throttling the motor, thus decreasing the pressure therein, and retarding the flow of fuel from the fuel nozzle, to produce a desired mixture.

It will be understood from what has been said that by proper designing of a carburetor comprising a single fuel nozzle and air intake passage, a carburetor may be designed, wherein the mixture may be maintained, by volitional or automatic control, practically uniform, or varied at will, if desired, at all speeds of the motor and at all ranges of the throttle opening, if provided with my pressure regulator properly equipped with valve means, the opening and closing of which bears a proper relation to the positions of the throttle, or to the velocity of the gases flowing through the carburetor, and, of course, the action of this valve means may be controlled or qualified by means sensitive to varying climatic conditions.

One of the objects of this invention, therefore, is to provide simple and efficient means for obtaining uniform or variable fuel mixture, as desired, for various speeds or throttle positions of the motor.

Another object is to provide automatic means for maintaining the desired quality of mixture under different operating climatic conditions.

Other objects will appear from the following description, taken in connection with the accompanying drawings, which form a part of this specification, and in which:

Figure 1 is a side elevation showing portions broken away, of a carburetor provided with an auxiliary air valve, and embodying a form of this invention;

Figure 2 is a vertical sectional view substantially on the line 2—2 of Figure 1;

Figure 3 is a vertical sectional view of a so-called "valveless carburetor" embodying this invention;

Figure 4 is a fragmentary vertical sectional view of a modified form of this invention;

Figures 5, 6 and 7 illustrate other modifications;

Figure 8 is a transverse sectional view of the modified form shown in Figure 7, substantially on the line 8—8 thereof; and

Figure 9 is a fragmentary side elevation

of the regulating band and its securing means, as applied to the modification shown in Figures 7 and 8.

Referring to the drawings, particularly Figures 1 and 2, 10 indicates the main body, comprising an upwardly extending cylindrical portion 11, in which may be arranged a shaft 12, carrying a throttle 13. An operating arm 14 is suitably arranged on the shaft 12, and has pivotally secured thereto an operating link 15 and a spring 16, which may be suitably secured at its opposite end, as at 17, to the body 10. The lower portion 18 of the body forms a mixing chamber and is provided with an opening 19, across which is arranged a downwardly inclined diaphragm or partition 20, having a downwardly tapering mixing or carbureting tube 21 arranged in the center thereof.

It will be noted that the tube 21 is provided with perforations 22 to permit draining off of the fuel which may condense in the body and accumulate on the diaphragm.

A float chamber is provided, which consists of a central member 23, comprising a head or cover 24, and upwardly extending lugs or flanges 25, adapted to abut against the diaphragm. The cover 24 is provided with a port 26 and nipple 27, which is adapted to be connected with a source of fuel. The cover is also provided with a downwardly extending channel 28, which also forms a seat 29 for a valve 30, which is adapted to be actuated by the usual float 31, pivoted as at 32 to the cover. A fuel nozzle of proper proportions, having a discharge port 33 and an intake port 34, is illustrated as formed integral with the cover 24 and is formed with an internally threaded portion 35, in which may be arranged a plug 36, which also serves to hold a bowl or shell 37 in position.

It will be noted that the cover 24 may be secured to the body 10, as by bolts 38 and is provided with a lateral port 39, which is adapted to be protected by the downwardly extending flanges 40 of the diaphragm 20. This port, it will be understood, forms a primary intake for the air which is adapted to be directed downwardly by the diaphragm 20 and to be then drawn upwardly through the tube 21, after entering therein, as at 41. The body 10 has a portion formed integral therewith, extending laterally from the mixing chamber, forming a valve chamber 42, which has formed therein an auxiliary air intake port 43, adapted to be closed by a valve member 44 and spring 45, which is adapted to have a variable tension applied thereto.

It will be understood that the valve chamber 42 is in constant communication with the mixing chamber 18.

A mixture regulator is provided, which will now be particularly described. Formed

in the body 10 is a channel or passage 42', provided with a port 43' at its inner end communication with the mixing chamber and a port 44' is also provided at its outer end, in constant communication with another channel or groove 45', formed in the body 10. Another channel or passage 46 is provided with a port 47 at its lower end, communicating with the upper part of the float chamber 48. It is also provided with a port 49 arranged at its opposite end in constant communication with the channels 45' and 42'. A valve member or shutter 50, which may be secured to the throttle shaft 12, and operated thereby, is adapted to cause the ports 44' and 49 to communicate with the atmosphere, or to be cut off therefrom, so that they are left only in communication with each other. A valve 51 may be arranged in one of the channels, such as 43', and may be adapted to be operated through a suitable means, such as a bell crank 52 and the link 53, which may extend to a point adjacent the driver's seat, where it may be properly manipulated, or a threaded valve 51', such as shown in Figures 4, 5, 6 and 7, may be used. Another channel or vent 54, having a port 55 in the float chamber in constant communication with atmospheric pressure, as at 56, is provided.

Having thus described the construction of the carburetor shown particularly in Figures 1 and 2, the operation will be understood as follows: It will be understood that when the throttle is almost closed and the motor is running idly, the primary air is drawn in the intake port 39, thence through the opening 41 and mixing with gasoline issuing from the fuel nozzle, as at 33, into the mixing chamber 18. Of course, as the suction of the motor increases, the auxiliary air valve 44 is opened and increases the supply of air to the carburetor.

With a carburetor of the general type, illustrated in Figures 1 and 2, without a pressure regulator such as I have provided, the nozzle and air passages are so proportioned and designed that a proper mixture is formed when the throttle is in the closed position and the motor is running slowly; and the tension on the spring 45 of the auxiliary valve 44 is so adjusted that the carburetor will produce a satisfactory mixture for producing maximum power of the motor while running on open throttle, but in many cases, as indicated above, such a carburetor would not give a satisfactory or economical mixture while the motor is running on intermediate throttle positions. With the adjustments and proportions of the various parts, as described, the valve member or shutter 50 may be so arranged that just after the throttle is opened appreciably, the ports 44' and 49 have their communication with the atmosphere cut off, so that the suction or

vacuum in the mixing chamber is caused to act through the channels 42', 45', and 46, directly on the surface of the fuel in the float chamber, thus tending to decrease the pressure therein, and to retard the flow of fuel from the nozzle at 33. The valve 51 is adapted to be adjusted to give the proper degree of suction from the mixing chamber to the float chamber. As it is found in many cases that motors having throttle positions where the mixture feeding to the motor is leaner than desired, properly proportioned openings or ports 57 may be provided in the shutter 50 to permit atmospheric pressure to increase the pressure in the float chamber during the predetermined lean period; thus it will be seen, that means are provided for varying the quality of the fuel mixture in definite relation to the various positions of the throttle, and additional means are provided for qualifying or varying the mixture, as desired, for different throttle openings; this latter means being in the form of a valve 51, which may be used to obtain the most economical running mixture for the motor when maximum power is not desired.

It will be understood that the shutter 50 may be brought into action only while the motor is throttled, and in the form shown in the drawings the valve 50 is adapted to uncover the ports 44' and 49, bringing them into communication with the atmosphere when the throttle is wide open, so that in the open throttle position, the vacuum on the mixing chamber does not act directly on the surface of the fuel in the float chamber.

Referring particularly to Figure 3, it will be understood that this carburetor is not provided with an auxiliary air valve, the entire supply of air entering the carburetor through the ports 39' and flowing downwardly therefrom to adjacent the lower end of the tube 21, thence it travels in the same direction, with the same function, and with the same result as in the carburetor previously described. I am enabled to eliminate the auxiliary air valve, and obviate the necessity of supplementary fuel nozzles by properly proportioning the size of the fuel nozzle 33 relative to the air passages, and providing this carburetor with my float chamber pressure regulator, which will now be particularly described.

Suitably arranged in the upper part of the mixing chamber 18 is a transversely arranged tube 58, which may be revolvably mounted, and provided with a port 59 communicating with the mixing chamber. The tube is also provided with another port 60 in constant communication with a channel 61, provided with a port 62 in communication with the upper part of the float chamber 48. It will also be seen that operating means, in the form of a gear 63, is arranged on the tube 58 and secured thereto, in mesh

with a segmental gear 64 secured to the throttle shaft 12, as by pin 65. The ratio between these gears may be two to one, and they may be so connected that when the throttle is wide open, the port 59 is in the position shown in the drawings, causing the full suction of the motor to be exerted on the surface of the fuel in the float chamber, and as the throttle is gradually closed, the tube is revolved, so that when the throttle is finally in closed position, the port 59 is turned downward, so that the suction of the mixing chamber not only does not tend to decrease the pressure in the float chamber, but, on the other hand, the incoming gas directed against the port 59 tends to increase the pressure in the float chamber. It is believed that the construction and operation of this so-called valveless carburetor, which is made possible by the use of my invention, will be clearly understood from the above description.

Referring particularly to Figure 4, it will be noted that in addition to the parts used in the carburetor, illustrated in Figures 1 and 2, another channel 66, having a port 67 in constant communication with the mixing chamber, and a port 68, adapted to be automatically brought into communication with the float chamber, is provided, the latter port being adapted to be restricted by the thermally operated valve member 69. This thermally operated valve member may be of any well known thermo-sensitive metal, and may be secured to the cover 24, as by the screw 70. This thermo responsive device is so constructed that when the temperature of the metal decreases, it contracts against the port 68 closing the same, thus decreasing the action on the float chamber of the vacuum from the mixing chamber 18, and vice versa.

It will be clearly understood that this carburetor is provided with an automatic means sensitive to temperature changes, which qualifies the fuel mixture accordingly.

Figure 5 shows an application of a thermally operated valve member 71, of circular form, which may be secured in position in the mixing chamber 18, as by pins or rivets 72, and adapted to close the port 43', as the temperature of the carburetor is decreased and to open the port 43' as the temperature increases. Another thermally operated valve member 73, which may be secured to the cover 24, as by screws 74, may be provided, which is adapted to restrict the port 47 when the temperature of the carburetor decreases; in other words, the action of a valve member 50, which is connected to the throttle shaft 12, may be qualified by either or both of these automatic valve members 71 and 73.

Figure 6 illustrates a carburetor which has a thermally operated valve member 73

applied thereto, for the same purpose as the valve member shown in Figure 5. This carburetor is also provided with a circular thermally operated valve band 74, which is adapted to restrict the opening in the port 56 in the vent or channel 54, thus decreasing the pressure in the float chamber as the temperature of the carburetor increases; thus the action of the valve member or shutter 50 is qualified by an automatically or thermally operated valve.

Figures 7, 8 and 9 illustrate a carburetor which has substituted in place of the shutter 50, which is adapted to be manually operated, a circular valve member 75, which may be secured to the mixing chamber 18, as by rivets 76, and is adapted to close off the communication of the ports 44' and 49 with the atmosphere as the temperature of the carburetor or the atmosphere increases, with the same effect as the shutter valve 50, as described, in connection with Figures 1 and 2; thus, it will be seen that the pressure regulator shown in Figure 7 is purely automatic, as affected by variation in climatic operating conditions.

While I have illustrated and described various modifications and applications of my invention, it will, of course, be understood that they are merely illustrative, and various other modifications and changes may be made by one skilled in the art, without departing from the spirit and scope of the invention intended to be covered thereby.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. In a carburetor, a fuel chamber provided with a port adapted to communicate with the atmosphere, a mixing chamber provided with a port adapted to communicate with the atmosphere, a throttle valve, another valve adapted to control the communication of said ports with the atmosphere, and interconnected means for operating said valves.

2. In a carburetor, a throttle valve, a fuel chamber provided with an air passage, a mixing chamber provided with an air passage, a valve for controlling the flow of air through one of said passages, both of said passages being adapted to communicate with the atmosphere, and valve means operable with said throttle valve for controlling the communication of said passages with the atmosphere.

3. In a carburetor, the combination with a throttle valve a fuel chamber provided with a port adapted to communicate with the atmosphere, and a mixing chamber provided with a port adapted to communicate with the atmosphere, of valve means operable with said throttle valve for closing off the communication of said ports with the atmosphere thereby causing the suction of the

mixing chamber to retard the flow of fuel from the fuel chamber.

4. In a carburetor, the combination with a throttle valve a fuel float chamber, provided with a passage adapted to connect a portion of the fuel chamber above the normal level of the fuel with the atmosphere, and a mixing chamber provided with a passage adapted to communicate with the atmosphere, of valve means operable with said throttle valve for cutting off the communication of said passages with the atmosphere and adapted to cause the suction within the mixing chamber to vary the pressure on the fuel in the fuel chamber.

5. In a carburetor, the combination with a throttle valve a fuel float chamber, provided with a passage adapted to connect a portion of the fuel chamber above the normal level of the fuel with the atmosphere, and a mixing chamber provided with a passage adapted to communicate with the atmosphere, of valve means operable with said throttle valve for cutting off the communication of said passages with the atmosphere, and a valve adapted to restrict the opening in one of said passages.

6. In a carburetor, the combination with a throttle valve a fuel chamber, a mixing chamber, a fuel nozzle feeding fuel thereto, a primary air intake and an auxiliary air intake also leading to said mixing chamber, said fuel chamber and said mixing chamber each being provided with an air passage adapted to communicate with the atmosphere, and a valve operable with said throttle valve for connecting said passages together and cutting off their communication with the atmosphere.

7. In a carburetor, the combination with a float chamber, of a mixing chamber, a fuel nozzle and a plurality of air intakes connected therewith, and a spring closed valve controlling the passage of air through one of said air intakes, said fuel chamber and said mixing chamber each being provided with an air passage adapted to communicate with the atmosphere or to communicate with each other, a valve for connecting said pas-

sages together, a throttle valve, and interconnected means for operating both of said valves.

8. In a carburetor, a carbureting chamber having a throttle controlled mixture outlet and air and fuel inlets, a constant level chamber supplying said fuel inlet with liquid fuel, and means operating with the throttle to control the pressure in said constant level chamber for restricting the flow of fuel upon intermediate suctions and permitting full flow on high suctions.

9. In a carburetor, a carbureting chamber having a throttle controlled mixture outlet and air and fuel inlets, a constant level chamber supplying said fuel inlet with liquid fuel, and means operating with the throttle to control the pressure in said constant level chamber for restricting the flow of fuel upon intermediate suctions and permitting full flow on high suctions and low suctions.

10. In a carburetor, a carbureting chamber having air and fuel inlets and a mixture outlet, a throttle in said mixture outlet, a reservoir for supplying said fuel inlet with liquid fuel, a restricted air inlet for said reservoir, a passageway between said chamber and said reservoir over the fuel level therein, and means operating with the throttle for controlling a larger air inlet to said reservoir.

11. In a carburetor, a carbureting chamber having a throttle controlled mixture outlet and air and fuel inlets, a float chamber with which said fuel inlet is in communication, a float therein and a valve operated by said float to control the admission of fuel to said chamber, and means interconnected with the throttle to control the pressure in said float chamber for restricting the flow of fuel upon intermediate suctions and permitting full flow on high suctions.

In testimony whereof I affix my signature in the presence of two witnesses.

CHESTER F. JOHNSON.

Witnesses:

RICHARD HARFST,
F. L. DAVIS.