

July 22, 1924.

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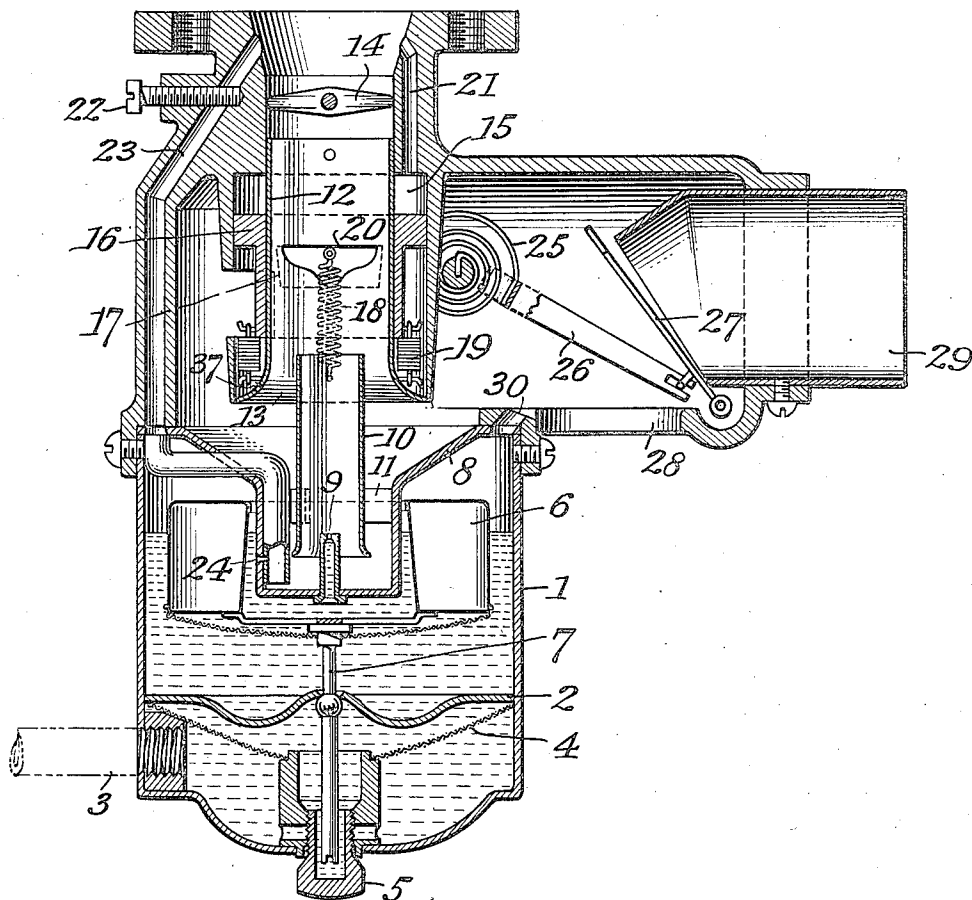
C. F. WALLACE

CARBURETOR

Filed June 26, 1920

2 Sheets-Sheet 1

Fig. 1.



INVENTOR

Charles F. Wallace.

BY
Kerr, Page, Cooper & Hayward
his ATTORNEYS

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Fig. 2.

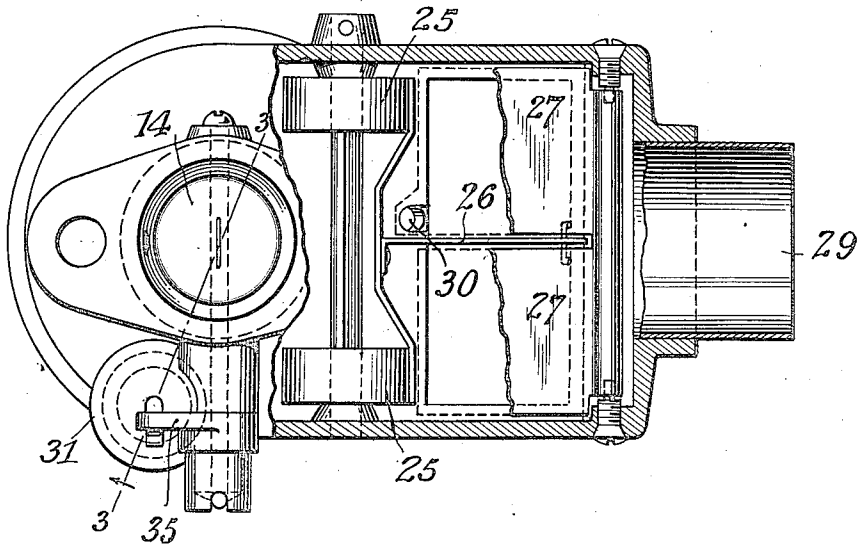
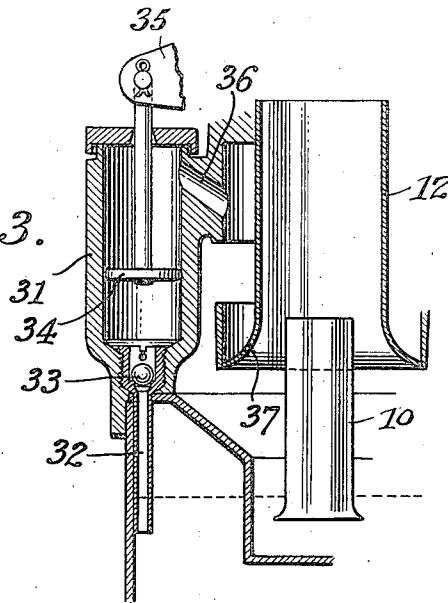


Fig. 3.



INVENTOR
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UNITED STATES PATENT OFFICE.

CHARLES F. WALLACE, OF WESTFIELD, NEW JERSEY.

CARBURETOR.

Application filed June 26, 1920. Serial No. 392,134.

To all whom it may concern:

Be it known that I, CHARLES F. WALLACE, being a citizen of the United States, residing at Westfield, in the county of Union, in the State of New Jersey, have invented certain new and useful Improvements in Carburetors, of which the following is a full, clear, and exact description.

The invention set forth and claimed in this application for Letters Patent, resides in a novel form of carburetor for internal combustion engines, and consists in improvements in the construction of such a device primarily designed and intended to accomplish the results stated below.

One of the primary objects of the improvements is to control the mixture of gas and air, that is to say, the proportion of the fuel to the air by the load on the engine in order to secure the maximum of economy under all ordinary driving conditions. This object is accomplished by utilizing the degree of vacuum in the engine to enrich or to impoverish the mixture.

It will be understood that the function of my improved carburetor is to impoverish the mixture to accomplish maximum economy, up to a predetermined load on the engine, at which point the mixture is enriched to the point of maximum power.

Another object of the improvement is to maintain constant mixtures and uniform conditions of carburation by preserving the temperature of the mixture substantially constant. This I accomplish by thermostatically proportioning the amounts of hot and cold air admitted to the carburetor, whereby a substantially constant temperature of the mixture is maintained irrespective of the atmospheric temperature.

Another object of the invention is to effect the priming of the engine, and this I accomplish by the opening and closing of the throttle, which in such operation operates a pump and creates a sudden rush of air which sprays the fuel. On closing the throttle, a partial vacuum is created, which partially vaporizes the fuel in the manifold. The subsequent rush of air through the manifold, when the throttle is opened again, brings the mixture to the engine. This feature has great practical advantages and is highly effective, for besides being purely automatic it obviates excess choking and all dash board connections and manipulation.

A further object of the invention is to

permit of acceleration without the usually attendant popping and back firing in the carburetor, and this I accomplish by automatically enriching the mixture momentarily with the opening of the throttle sufficiently long to establish normal air and fuel proportions.

Finally an object of the invention is to provide for idling adjustment and this I do independently of all other carburetor adjustments, and by means which when once set to compensate for air leaks into the manifold and engine around valves or pistons, will give a constant mixture under all degrees of vacuum.

Under the requirements of present practice those features only of my improved carburetor which relate to the control of the explosive mixture are herein claimed. For a better understanding of the invention, however, the device, its purposes and functions are herein described in full and all other features than those mentioned which are not set forth in the claims are made the subject of other applications for Letters Patent.

The means by which the objects above enumerated are secured are illustrated in detail in the accompanying drawings, in which,

Fig. 1 is a vertical sectional view of my improved carburetor.

Fig. 2 is a top plan view of the same, certain parts of the casing being in section, and

Fig. 3 is a section on the line 3—3 of Fig. 2.

The numeral 1 designates the fuel or float valve chamber of the carburetor. This chamber is divided into two compartments, an upper and a lower, by a suitable partition 2, containing a valve controlled central opening. Fuel is admitted to the lower compartment under proper pressure through an inlet tube 3 under a strainer 4. The compartment also serves as a sedimentation chamber which is drained when necessary by a removable screw plug 5.

In the upper compartment is an annular float 6, to which is attached a valve stem 7 having an enlargement thereon which controls the passage through the partition 2 and shuts off the fuel when it has risen to a predetermined level in the said upper-compartment.

The fuel compartment is substantially closed from the body of the carburetor by a partition 8, having a central depression ex-

tending down into the annular float, and in the bottom of such depression and at the center of the carburetor is inserted the fuel inlet 9 with its orifice at approximately the normal surface level of the fuel. An air tube 10, supported by a spider 11, projects down into the depression in partition 8 and surrounds the fuel orifice 9.

Secured in the upper part of the body of the carburetor is a fixed tube 12 which extends downward and over the upper end of the air tube 10. It is of substantially greater diameter than the tube 10, so as to form an air passage 13 around the latter and at its upper end is located the throttle valve 14. Extension of the carburetor walls form an annular space or chamber 15 around the tube 12, and in this space is located and operated a piston valve 16, which closely surrounds the fixed tube 12. The piston valve has connected with it two springs or sets of springs 18 and 19 and contains a rectangular opening or slot 17, and the tube 12 contains an opening or slot 20 of empirically determined shape as shown in Fig. 1. There is thus formed a regulable port whose area is controlled by the rising and falling of the piston valve 16.

The annular chamber 15 is connected by a passage 21 with the space above the throttle, whereby any vacuum that may exist above such throttle acts to raise the piston valve 16 against the force of the springs 18 and 19. The length of the springs 19 is such as to leave the port fully open when there is a vacuum of one or two pounds above the throttle. When the vacuum above the throttle is at its maximum, then the effect on the piston valve 16 against springs 19 is such as to raise the valve to a point where the port 20 is closed. When the vacuum above the throttle is approximately one pound or less, the tension of springs 18 is sufficient to close more or less the said port 20 by pulling down the valve 16 and thereby enriching the mixture.

It is a fact that the degree of vacuum above the throttle is always a true measure of the load on the engine regardless of its speed, and to secure the best or maximum economy in fuel consumption, the proportion of fuel in the mixture must vary with the load. In other words, the proportion of fuel in the mixture should be decreased for this purpose as the load is increased. This is accomplished by the degree of the vacuum above the throttle, which acting upon the piston valve 16 and lowering it in proportion to the load, controls the port 20 admitting more air to the mixture as the load increases. The rate at which the proportion of fuel in the mixture is thus decreased is predetermined by the shape of the port 20.

It will be observed that in the position of the parts shown in Fig. 1 the port 20 is

fully open. The vacuum above the throttle in this case can be any thing desired, but for practical purposes it may be assumed to be between one and two pounds. The valve 16, however, is not at this time in its lowest possible position, but only approximately half way down. If now the vacuum be assumed to fall beyond this limit the valve 16 falls still further under the action of the springs with the result that the port 20 is again more or less closed. This further fall of the valve is caused by the action of the spring 18 as has been above set forth, and it obviously enriches the mixture to meet the condition required for full load.

An extra fuel supply is necessary at idling speeds and load to compensate for air admixtures to the engine by reason of leaks around valve pistons, joints and the like, and this is obtained by idling adjustment of a screw controlling valve 22 in a passage 23 leading from the fuel chamber to a point above the throttle. This passage has a restricted fuel orifice 24 through which fuel is supplied in proportion to the amount of air drawn through passage 23.

In the main chamber is a thermostatic spiral 25, which is attached to and operates a bar or lever 26. Said bar is connected to a pivoted air valve 27 mounted to cover either one of two ports, one 28 in the carburetor case for cold air, the other in a tube or passage 29 for hot air from a heating chamber surrounding the exhaust as is common in carburetor constructions. The thermostatically operated valve is so proportioned that at a predetermined temperature in the chamber of approximately 100° the hot air inlet will be opened and the cold air inlet closed. At 150° the hot air inlet will be closed and the cold air inlet opened. 100° is chosen as being above the maximum atmospheric temperatures. When, therefore, the temperature of the incoming air reaches a predetermined point, the thermostatic spiral operates to close the hot air and to fully open the cold air inlet. Its construction and adjustment are such that it will take any position intermediate these two so as to admit air of predetermined temperature to form the mixture.

It will be understood that to obtain maximum power at high speed, a comparatively cold mixture is necessary, and this may be secured by having the valve 27 unbalanced due to the fact that the cold air inlet is of larger cross section than the hot air inlet, so that on any increased flow of air the valve tends to close the latter and open the cold air inlet and because the cold air inlet is of larger area than the hot air inlet. In this way the predetermined temperature setting of the thermostat is automatically secured.

On starting the engine, the valve 27 by the

action of the spring thermostat closes the opening 28 and a passage 30 between the float or fuel chamber and that containing the thermostat 25, but leaves it still open to some extent to the atmosphere, the orifice of the said passage being cut away for this purpose, as shown in Fig. 1. The passage 29 being at this time open, affords a passage for the air to the carburetor, but, as has been explained, this passage is relatively contracted and produces, therefore, a choking effect, due to the resistance of the hot air passage 29 and results in an abnormally rich mixture when the engine is running cold. As soon as the incoming air becomes sufficiently heated, its effect upon the thermostat causes the latter to lift the valve 27 fully from the opening 28 and the passage 30, the resistance of the hot air passage is cut out, and the mixture at once becomes normal.

In the drawing the valve 27 is shown in as near the position which it occupies when shutting off the hot air entering through the passage 29.

The primary object of the thermostat and its control is to regulate the temperature of the incoming air to form the mixture, regardless of atmospheric temperatures, and thus prevent the mixture from being affected by changes in density of air due to changes in temperature.

In order to prime the engine on starting the means illustrated in Figs. 2 and 3 are employed. In these 31 designates a cylinder connected at its lowest port by a tube 32 with the float or fuel chamber, which tube contains a ball valve 33. Within this cylinder 31 is a loose fitting piston 34 which is connected to the throttle by a lever 35. When, therefore, the throttle is opened the piston is moved and draws fuel from the float chamber into the cylinder, from which said fuel overflows through a passage or port 36 by gravity into an annular trough like compartment formed by an upturned flange on the tube 12, and from such compartment gradually through a contracted orifice 37 in the lower end of said tube 12 into the stream of incoming air so as to give a proper starting mixture.

In further explanation of this it may be stated that the piston 34 has a fairly loose fit in the cylinder 31. This fit is such that it will raise the fuel with a rapid, but not with a slow movement. On the down stroke of the piston the fuel is forced up around the piston 34 as it is prevented from flowing back by the check valve 33. The fuel is discharged from the pump into the annular chamber or cup in the bottom of 12 surrounding the tube 10. The function of this cup is to cause the fuel to be fed to the carburetor in a uniform manner through the contracted orifice 37. This orifice is of such

dimensions as to empty the cup in about ten seconds. There is also a suction produced at the orifice 37 by the velocity of the air past it.

The same device is manifestly useful for securing the richer mixture required for momentary accelerating, and is operated by the throttle in the same way.

The above described carburetor is in many important respects new in the art both as regards construction and function. It is extremely simple in design, it may be assembled and taken apart with the utmost ease, and it requires no adjustment for any purpose, but when once set operates perfectly under all conditions.

What I claim as new and of my invention is:

1. In a carburetor, the combination with means for mixing fuel and air of a valve to regulate the mixture controlled by the vacuum above the throttle and an opposing resistance, the position of the valve varying in such manner that the mixture is rich at maximum vacuum gradually leaned as the vacuum decreases to a predetermined value and again enriched on a further decrease in vacuum.

2. In a carburetor, the combination with the means for mixing fuel and air of a piston valve, a port controlled by the said piston for regulating the mixture, a passage to the piston chamber leading from the space beyond the throttle, and means for opposing the movement of the piston to so position the valve that the mixture is rich at maximum vacuum, gradually leaned as the vacuum decreases to a predetermined value and again enriched with a further decrease in vacuum.

3. In a carburetor, the combination with the means for mixing fuel and air of a piston valve in a cylindrical chamber connected with the space beyond the throttle, whereby said piston is operated according to the degree of vacuum in said space, a port for admitting air to the mixture controlled by said piston, and two springs of different force connected with said piston valve, for the purpose set forth.

4. In a carburetor, the combination with a means for delivering fuel, of a tube surrounding said means, a port in said tube to admit air to the mixture, a piston valve surrounding said tube and connected with the space beyond the throttle, and controlling the area of said port in accordance with the degree of vacuum beyond the throttle, and springs of different force connected with said piston valve.

5. In a carburetor, the combination with a float or fuel chamber having a fuel delivery orifice, of a tube of larger diameter than the fuel orifice surrounding the same, a second tube of larger diameter surrounding said tube, and having a port therein, a piston

valve connected with the space beyond the throttle and operated by the vacuum in said space to control the area of said port, and springs of different force opposing the movement of said piston valve produced by a vacuum.

6. In a carburetor, the combination with means for mixing fuel and air of means for regulating the fuel content of the mixture, controlled by a vacuum above the throttle and a varying opposing force which produces a rich mixture at maximum vacuum a leaner mixture as the vacuum decreases to a predetermined value and a richer mixture on a further decrease of vacuum and thermostatic means for controlling the temperature of the air in the mixture.

In testimony whereof I hereto affix my signature.

CHARLES F. WALLACE.