April 10, 1928. 1,665,239

C. F. WALLACE

CARBURETOR

Filed March 15, 1922 2 Sheets-Sheet 1

Fig. 1.

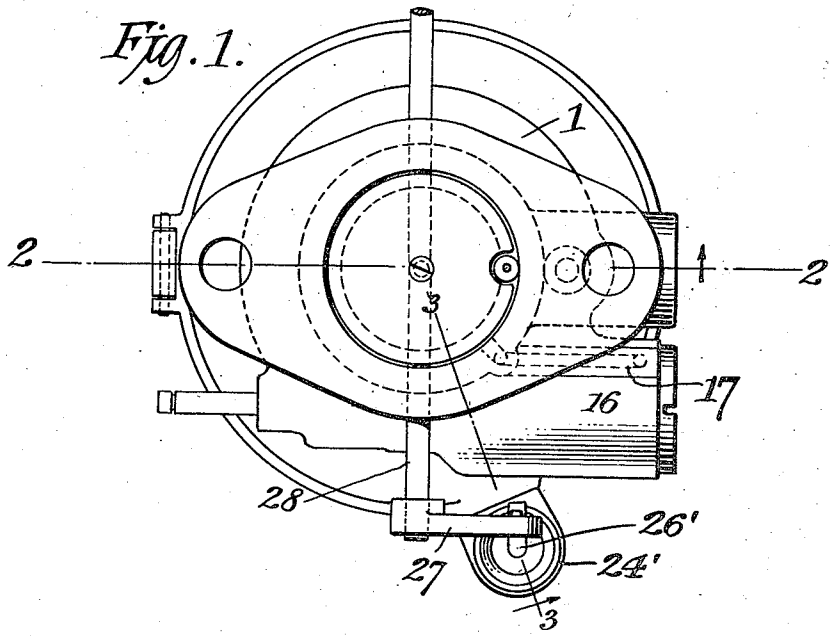
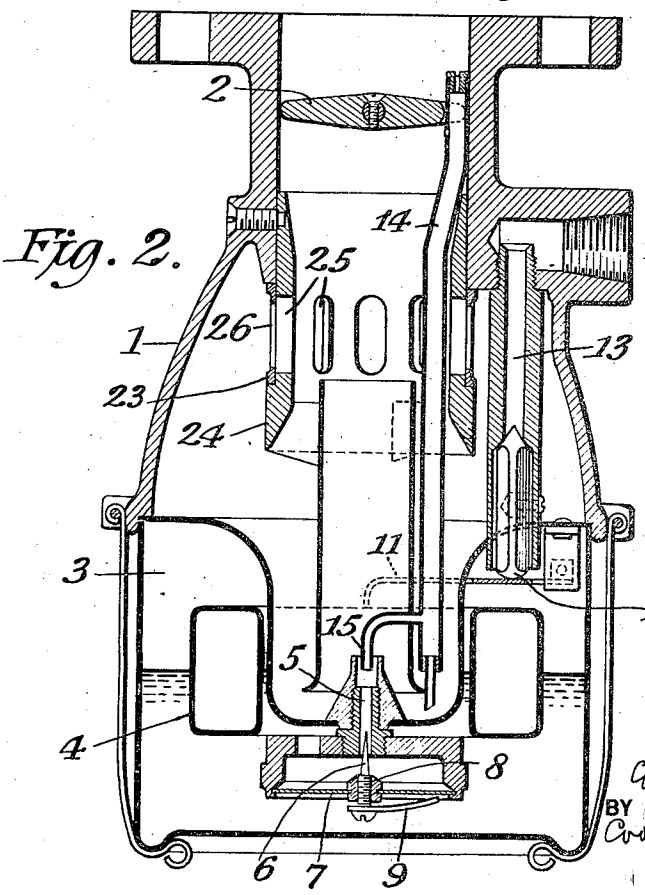


Fig. 2.



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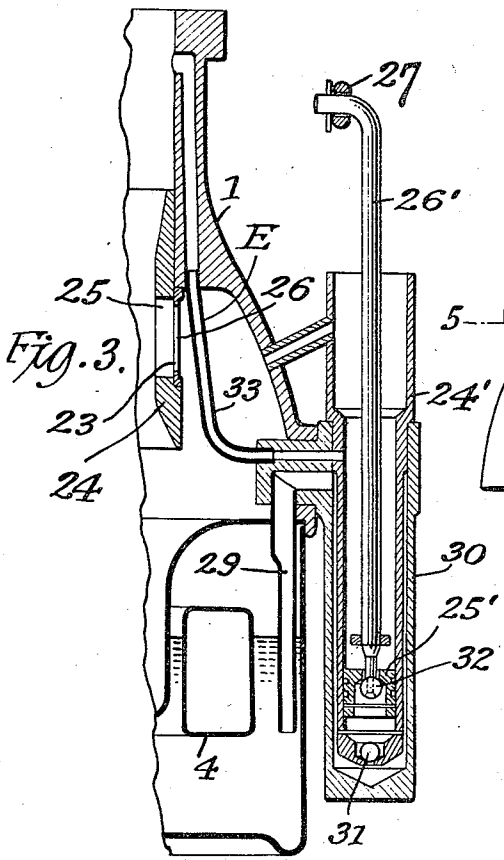


Fig. 3.

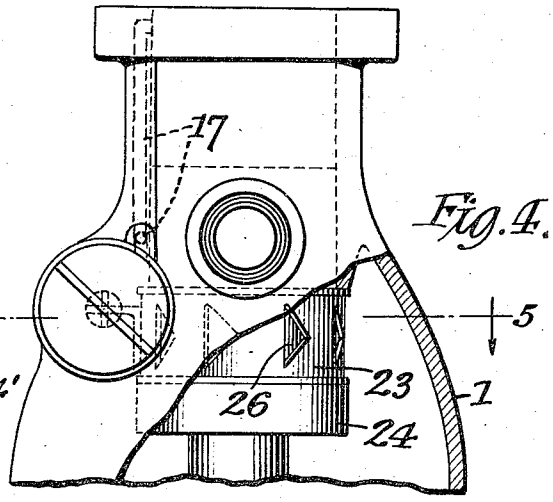


Fig. 4.

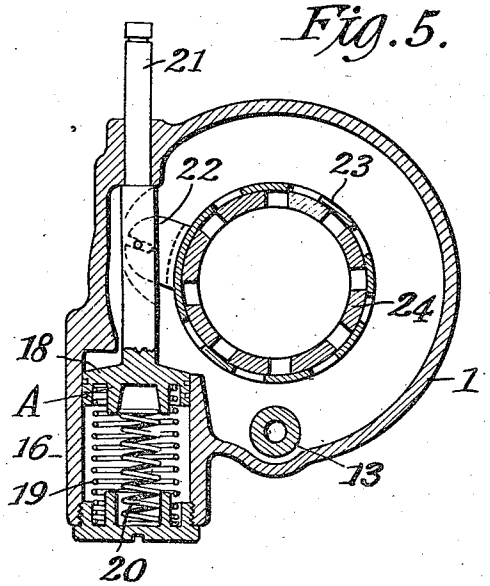


Fig. 5.

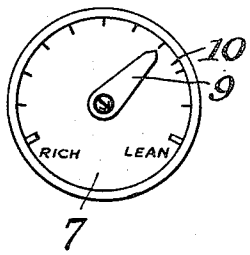


Fig. 6.

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UNITED STATES PATENT OFFICE.

CHARLES F. WALLACE, OF WESTFIELD, NEW JERSEY, ASSIGNOR TO WALLACE & TIERNAN CO., INC., OF BELLEVILLE, NEW JERSEY, A CORPORATION OF NEW YORK.

CARBURETOR.

Application filed March 15, 1922. Serial No. 543,996.

My present invention resides in an improved form of carburetor for internal combustion engines, such as are more particularly used in the driving of automobiles, and the nature and purpose of my improvements will be more readily comprehended from the following prefatory considerations.

Experiments have amply demonstrated that a carburetor giving uniform gas and air ratios is not desirable, mainly for the reason that the mixtures for maximum power should be rich, say one part gas to twelve parts of air, but such a mixture is very inefficient and uneconomical under other conditions where maximum power is not required, and for the further reason that the mixture for maximum economy varies with the load on the engine and is practically independent of its speed. This range is one part gas to seventeen parts of air for full load to one part gas to twelve parts air for no load. This is now recognized by the authorities.

In carrying out my invention I take advantage of the now ascertained and recognized fact that the vacuum, or the depression in the intake manifold of the engine bears a fair relation to the load on the same when the throttle is fixed, and by this means I vary the character of the mixture with the load on the engine. In other words, I have devised a carburetor which operates to vary the mixture with the degree of vacuum in the manifold to follow the curve of maximum economy up to practically full load, and thereafter to enrich the mixture up to the point of maximum power.

In these latter, Fig. 1 is a top plan view of my new carburetor.

Fig. 2 is a vertical central section of the same in the line 2—2 of Fig. 1.

Fig. 3 is a vertical section on the line 3—3 of Fig. 1.

Fig. 4 is a part elevation and part sectional view of the upper portion of the device.

Fig. 5 is a horizontal section on the line 5—5 of Fig. 4, and

Fig. 6 is a view of an indicating dial for the thermostatic regulator.

In the general plan of construction and mode of operation the carburetor to which my improvements are herein shown as applied is of the usual and known character and requires but passing description. It comprises a casing 1, with a throttle valve 2 at the top, a gasolene compartment or chamber 3 at the bottom in which is a float 4, and the usual intermediate parts, passages and appurtenances.

From the chamber or compartment 3 leads the fuel inlet passage 5, and the capacity of said passage is varied and controlled by a needle valve 6, carried by a thermostatic diaphragm 7. This diaphragm is composed of two metals and is adapted to rise and close to a greater or less extent the passage 5 under an increase in temperature. The needle valve 6 is carried by a threaded stem 8 which is adjustable by means of an arm or pointer 9 which travels over a scale 10.

As the temperature of the gasolene and that of the carburetor is approximately the same the rate of flow of the fuel through the passage 5 will be varied according to the temperature of the air passing through the device, less being passed at high temperature than at low.

The level of the fuel in the float bowl chamber is maintained constant by means of an arm 11 which is engaged by the float 4 and closes a valve 12 in the gasolene tube 13 and thus shuts off the flow when the float rises to a predetermined level.

In addition to the usual parts of the carburetor, I employ a tube 14 with a contracted opening into the intake manifold at the top, and which extends down through the throttle to the lower part of the air chamber where it has a branch 15 opening into the fuel passage 5 and a contracted opening into the main air chamber. By the depression or vacuum created in the manifold beyond the throttle fuel is drawn through the tube in proportion to the degree of such vacuum. In this way I take advantage of the high vacuum beyond the throttle to draw up fuel at low speed.

Arranged horizontally with respect to the carburetor proper is a cylinder 16, the rear of which is connected by a passage 17 with the air chamber. In this cylinder is a piston 18 with which two spiral springs 19 and 20 of different tension cooperate. Normally the vacuum back of the piston draws the latter into the cylinder against the push of the said springs. The piston carries a rod 21, which engages an ear or lug 22 projecting from a movable damper cylinder 23 surrounding the depending cylinder 24 in

which are a circular row of apertures 25. The cylinder 23 has corresponding apertures 26 of triangular shape, and the result secured by this device is as follows:

According to the degree of vacuum in the cylinder 16 back of the piston, and this depends upon the load on the engine as long as the throttle remains in fixed position, being greater the less the load, the piston will be drawn more or less into the cylinder. Upon the first movement the outer spring 19, which is the weaker, will be compressed and the inner or stronger spring 20 will not be reached or compressed until the vacuum has reached a predetermined amount usually from two to about four pounds. Any greater vacuum will then tend to compress spring 20. These two springs are of such strength as to shift the outer cylinder 23 over the initial perforated cylinder so as to vary the proportion of the air in the mixture. All air going to the carburetor through passages other than that around the fuel orifice serves to dilute the mixture. The opposition of the springs is completely overcome by the high vacuum in the manifold and the damper is in the extreme position and shuts off practically all the air through the ports in the main cylinder. With increasing loads and decreasing vacuums the damper opens the ports up to a predetermined vacuum when the ports are fully open. With a further decrease in vacuum the damper abruptly reduces the port opening by reason of the shape of the damper. The position of the piston shown in Fig. 5, for example, would indicate maximum load on the engine or a vacuum of from one to about three pounds, depending upon the engine characteristics.

The carburetor described functions in such manner as to vary the mixture of gas and air in proportion to the vacuum in the manifold to follow the curve of economy up to practically full load, and thereafter to enrich the mixture up to the point of maximum power. An illustration: the mixture for maximum power may be, for example, one of gas to twelve of air, up to two of gas to sixteen of air, depending upon the load on the engine. Under normal running conditions the mode of operation is such that the mixture is that for maximum economy, for all conditions except full load. However, when a heavy demand is imposed upon the engine and it comes under full load, then the maximum power becomes the thing desired and the degree of vacuum in the engine causes the piston 18 to take such position, determined by the strength of the springs, that the mixture will be enriched to the point of maximum power.

This is determined by the character of the passages through the apertures in the two cylinders 24 and 23, and the strength of the springs 19 and 20, which fix the position of the rotating cylinder that regulates the mixture.

In order to provide an efficient means of priming, the carburetor is equipped with the pump shown in Figs. 1, 3 and 4. This device comprises a small cylinder 24 attached to the casing 1 and provided with a piston 25', the rod 26 of which is operated by an arm 27, fixed to a shaft 28 passing through the center and secured to the throttle. When the throttle is opened the piston 25 is raised and draws fuel through the tube 29 into an outer cylindrical casing 30, and through a check valve 31 into the cylinder 25. The piston also contains a check valve 32 and as it rises it operates as a lift pump and brings the liquid up to the level of a passage 33 which opens into the space beyond the throttle in the manifold and is hence under the influence of the full vacuum of the engine so that the fuel is therefore drawn immediately into the manifold of the engine. There is no drain in the bottom of the pump so that the valves are always submerged in liquid.

In this device the fuel orifice is located in the center of the float chamber and is therefore free from variations in the head of fuel over such orifice, because no matter what position out of the true horizontal the carburetor may take under driving conditions, the fuel level remains the same and true over the orifice.

Extended experience has demonstrated the very marked efficiency and value of this carburetor. It provides against all ordinary contingencies met with in driving under all manner of conditions. It is highly economical and reliable in its operation, and adds very materially to the maintenance of the best conditions of use and operation.

What I claim is:

1. In a carburetor, a throttle, a means for regulating the ratio of fuel and air, comprising, in combination, a cylinder connected with the vacuum space above the throttle, a piston therein, two springs of different tension adapted to be successively compressed by the piston, and an air damper controlled by said piston for varying the proportion of air in the charges according to the vacuum which controls the position of said piston.

2. In a carburetor, the combination with a throttle, of a means for regulating the ratio of fuel and air controlled by the degree of vacuum above the throttle comprising a cylinder connected to the vacuum space above the throttle, a piston in said cylinder, a plurality of successively acting springs cooperating with the piston to resist movement of the piston in one direction and to effect movement of the piston in the opposite direction, and devices movable by the piston for regulating the proportions of air and fuel in the mixture passing the throttle.

3. In a carburetor, the combination with a throttle, of a means controlled by the degree of vacuum above the throttle comprising a cylinder connected to the vacuum space above the throttle, a piston in said cylinder, a plurality of successively acting springs co-operating with the piston to resist movement of the piston in one direction and to effect movement of the piston in the opposite direction, an air and gas passage to the intake provided with slots in its walls, a cylinder rotatable about the slotted portion of said passage and having triangular openings to cooperate with the slots in the passage, and connections whereby the movements of the piston in either direction will carry the triangular openings past the slots.

In testimony whereof I hereto affix my signature.

CHARLES F. WALLACE.