July 3, 1928. 1,675,344

W. S. GUTHRIE

CARBURETOR

Filed April 3, 1919

Fig. 1.

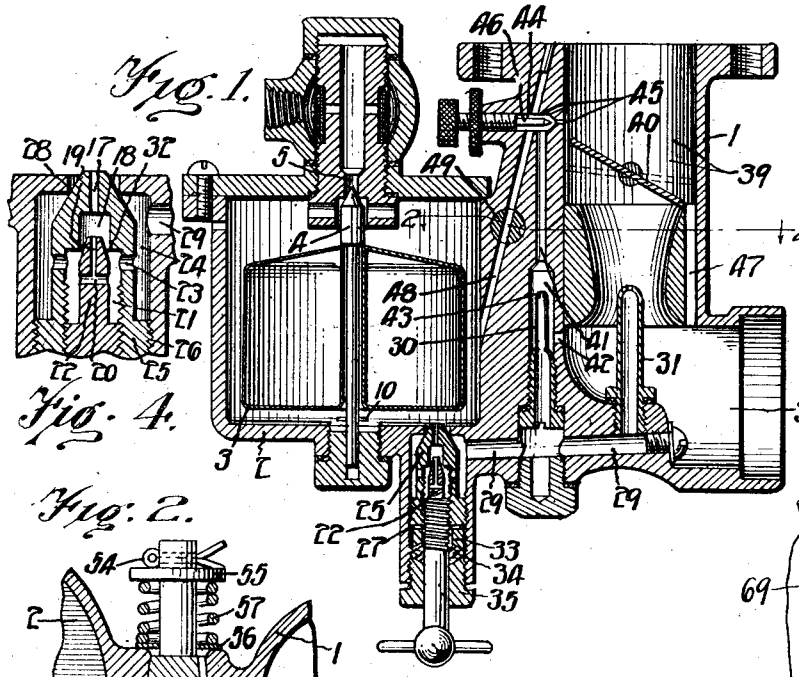


Fig. 4.

Fig. 2.

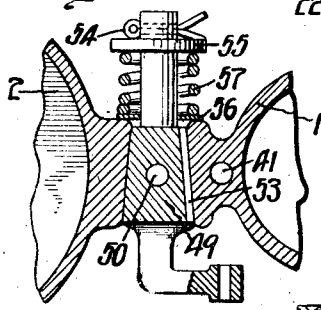
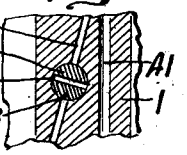


Fig. 3.



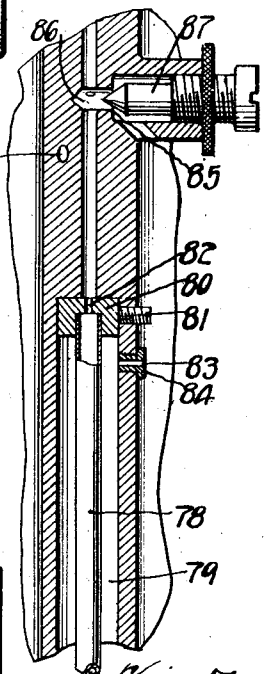


Fig. 7.

Fig. 5.

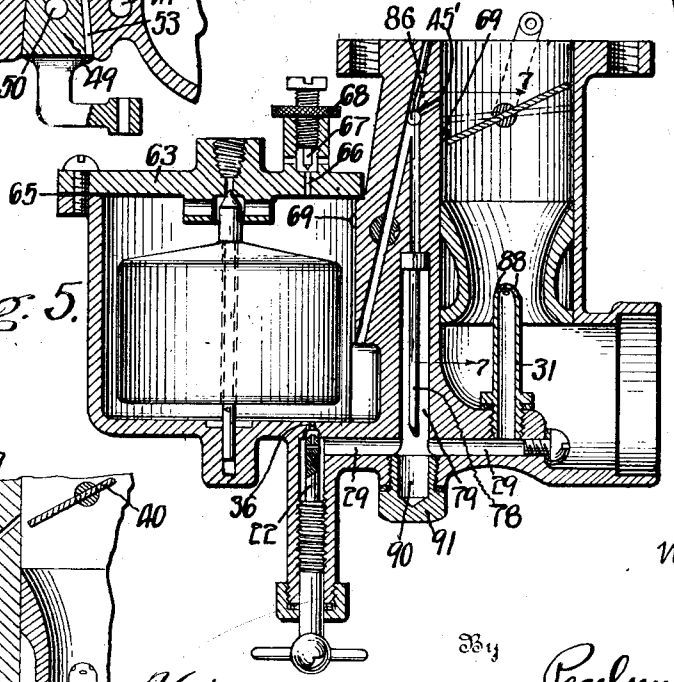


Fig. 6.

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UNITED STATES PATENT OFFICE.

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CARBURETOR.

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This invention relates to carburetors for internal combustion engines, the primary object being to provide a carburetor which is not only capable of efficient performance, but which may also be built at less expense than others having a comparable efficiency.

The invention especially consists of certain details of construction shown in the drawings and more fully described and pointed out in the claims.

Fig. 1 is a vertical section showing one embodiment of the invention. Fig. 2 is a partial section on line 2—2 of Fig. 1. Fig. 3 is a fragmentary section corresponding to Fig. 1, the valve being closed. Fig. 4 is an enlarged fragmentary section showing the valve for controlling the normal supply of fuel from the float chamber. Fig. 5 is a view, similar to Fig. 1, showing a modification. Fig. 6 is a fragmentary section corresponding to Fig. 5 and offset somewhat from the plane thereof. Fig. 7 is an enlarged section on line 7—7 of Fig. 5.

Referring to Figs. 1 to 4 inclusive, the body 1 has a main fuel reservoir 2 in which a float 3 controls the fuel valve 4 to open and close the inlet passage 5 to which the liquid is conveyed in the usual manner.

The fuel inlet valve 4—in the present case a needle valve—in the embodiment shown is preferably guided at both ends so the valve will not get out of line with its seat and thereby impair the same, and it has two portions of different diameters the smaller of which passes, preferably rather loosely, through the float 3 and in the present case guiding the latter; and a cross pin 10 or the equivalent is provided on the valve somewhat below the bottom of the float. It will thus be apparent that the float may have considerable free movement to accommodate jars and vibrations and relieve the valve seat largely from shocks it would get if the float and valve were closely connected. The construction is exceedingly cheap (the use of interposed levers or the like being eliminated), and it may be applied to devices other than carburetors.

The liquid flows out of the reservoir through passages 17—18—19—20 to a chamber 21, which surrounds the upper end of the needle valve 22, and thence through the openings 23 to a chamber 24 surrounding a removable bushing 25. Threads 26 and a screw-driver slot 27 permit the insertion and removal of the bushing; when the latter is in proper position, it bears upon the seat 28, thus limiting the flow to the restricted orifice 17, from which it finally passes by way of the passage 29 to the nozzles 30—31. The valve 22 is threaded in the bushing 25 to permit adjustment with respect to the seat 32. As a convenient means for preventing leakage, the collar 33, packing 34 and nut 35 may be employed, the object of the collar being to exclude the packing from the slot 27.

The orifice 17 is somewhat larger than the orifice 19 and determines the maximum flow, whereas the latter determines the minimum flow; it is evident that by properly adjusting the valve 20 in relation to the seat 32 any variation between maximum and minimum may be secured. In practice, the orifice 17 is calibrated to pass a trifle more fuel than is ordinarily needed to run the motor under normal conditions in warm weather at low altitudes; likewise, the orifice 19 is calibrated to pass a trifle less fuel than is needed under the same conditions. Consequently, while a more precise adjustment may be readily attained by turning the valve 22, unskilled drivers or workmen are prevented from upsetting the adjustment to such an extent as to very materially impair the running of the motor. Again, the jets 19 and 17 may be calibrated, respectively for high and low altitudes, thus enabling the user to adjust the carburetor for an intermediate altitude without the possibility of upsetting the motor to a very objectionable degree.

In Fig. 5, the bushing 25 is omitted, and the calibrated orifice 36 supplies the maximum flow. A construction having the jet in a bushing is preferred when the body is made of iron, the danger of rusting being obviated by making the bushing of brass or the like. A removable bushing is also convenient for properly calibrating the maximum flow of fuel.

Air enters the carburetor through the intake 37 and flows through the venturi 38 and the mixing chamber 39 out past the throttle 40.

When the throttle is almost closed for idling some of the air by-passes the venturi and the throttle by entering the auxiliary mixing chamber 41 through the port 42. It thereupon passes up around the aux-

iliary nozzle 30 and mixing with fuel discharging from the jet 43 flows up to the passage 44 and out into the chamber 39 beyond the air intake side of the throttle through the orifices 45, one of which may be controlled by the needle valve 46. The mixture thus supplied through the orifices 45 is entirely too rich for combustion and requires air from the venturi to make it combustible. When the throttle is opened more for the intermediate speeds, as shown in dotted lines, air from the passage 37 will flow up the auxiliary air passage 47 and lean out the mixture. The air passage 47 is formed in the wall of the venturi so as to by-pass the restricted portion thereof, and its outlet end is so positioned in respect to the throttle that it is directly subjected to the air pressure beyond the air intake side of the throttle when the latter is nearly closed for intermediate speeds. At high speed the nozzle 30 admits air to the passage 29 to check the flow of fuel which would otherwise be discharged from the nozzle 31.

When starting the motor, especially in cold weather, it is necessary to enrich the mixture; this I do by means of an auxiliary fuel passage 48 which connects the passage 44 with the chamber 2, independently of the fuel outlets which lead from said chamber to the jets or nozzles 30—31. The passage 48 may be opened or closed by means of the tapered valve 49 having a port 50 adapted to connect both portions of the passage 48 when in open position, Fig. 1, and also having a longitudinal groove 53 arranged to vent the lower portion of said passage when the valve is closed, Fig. 3, whereby leakage of fuel due to suction is avoided. A convenient means for holding the valve to its seat and for preventing accidental rotative movement consists in the cotter 54, the washers 55—56 and the spring 57. The usual choke valve may be employed to enrich the mixture for starting in place of the valve 49 when desired.

Referring to Figs. 5—6—7: The joint between the cover 63 and the float chamber is preferably made reasonably tight by having the parts fit closely, or the joint may be sealed as by a gasket 65 so the air vent 66 may be regulated to vary the air pressure in the reservoir 2 by the needle valve 67 and lock nut 68, or the port 66 may be calibrated for the particular motor. Then by drilling through the body to a point above the fuel level of the chamber 2 from a point just beyond the slightly open position of the throttle, as indicated at 69, Fig. 6, it is evident that the air pressure in the float chamber may be reduced at intermediate speeds and thereby decrease the flow of fuel from the reservoir 2, and thus provide a leaner mixture than would otherwise be supplied to the engine. The shape and size of the passage 69 is such as to reduce the pressure in the reservoir to effect a proper mixture.

In this modification, also, the nozzle 30 is replaced by an auxiliary passage in the form of a tube 78 positioned in an auxiliary fuel chamber 79. The tube 78 is secured in place at the upper end of the chamber 79, preferably by means of the bushing 80 and set screw 81, and the lower end of this tube 78 extends down below the level of the fuel in the chamber 79 when the motor is idling. The bushing 80 has a calibrated orifice 82 through which fuel flows from the interior of the tube upwardly to the auxiliary mixing chamber 86 and thence to the passage 45′; and air is admitted to the chamber 79 above the level of the fuel in the float chamber through a calibrated orifice 83, in a removable plug 84, Fig. 7. The orifice 83 may be drilled directly in the wall of the chamber 79 when the size for the motor is known. A port 85 open to the atmosphere admits air to the auxiliary mixing chamber 86, and is preferably provided with a needle valve 87 for adjustment purposes, it being observed that the outlet 45′ of the passage 86 is preferably positioned in the same relation to the throttle as are the ports 45 in Fig. 1, and for the same reason.

Assuming that the engine is running at the slowest speed, the air pressure in the chamber 79 is atmospheric, and the level of the fuel therein (and in the nozzle 31) is not lowered below th level of the fuel in the reservoir 2, since the gravity flow from the latter is sufficient to maintain the level. Therefore since the orifice 45′ is then subjected to a high suction on account of its position beyond the air intake side of the throttle valve, raw fuel passes up through the orifice 82 into the auxiliary mixing chamber 86 where it mixes with air from the port 85, and is finally discharged at a rapid rate through the passage 45′ into the main suction passage. The orifice 83 is made of such size as to restrict the admission of air to the chamber 79 at high engine speeds so that the proper flow from the nozzle 31 is then secured, it being understood that the air pressure in the auxiliary chamber 79, the passage 29 and the nozzle 31 at the high speeds falls considerably below that of the atmosphere.

In the particular type of carburetor shown in the drawings, the air pressure in the suction passage between the Venturi tube and the throttle will be atmospheric, or nearly so, when the throttle is in the idling position as shown in Fig. 5 by dotted lines. It therefore follows that the air pressure in the float chamber will be atmospheric when idling the engine, because the passage 69 is then inoperative since it is open to the suction passage below the throttle, and when

the throttle opening is increased to about the position shown in Fig. 6, the passage 69 is subjected to the strong suction beyond the throttle, and this causes the air pressure in the float chamber to fall below that of the atmosphere. This reduced pressure in the float chamber holds back the flow of fuel for the intermediate speeds of the engine. The valve 67 provides means for conveniently adjusting the air passage 66 to regulate the air pressure in the float chamber to effect a proper mixture. When the throttle is opened more widely the suction in the passage 69 becomes less effective and results in the rising of air pressure in the float chamber, which permits the fuel to flow more freely for greater power and speed. The needle valve 22 may be adjusted to effect a proper mixture for the higher speeds.

The atmospheric pressure in the float chamber as above described permits the fuel to flow to the auxiliary chamber 79 by gravity when idling the engine, the air pressure in the chamber 79 then being atmospheric. The nozzle 31 is made to discharge the fuel quite freely when the engine speed is accelerating, its discharge including the fuel stored in the chamber 79, and this provides a desirably rich mixture while the chamber 79 is being emptied. The partial vacuum in the float chamber at intermediate speed prevents the nozzle 31 feeding fuel at its full capacity at this speed, and the needle valve 22 prevents the nozzle discharging at its full capacity at high speeds. The discharge capacity of the nozzle 31 is such as to supply the fuel freely from the chamber 79 to accelerate the engine speed efficiently.

It will be understood that I may use the customary needle valve for controlling the flow of the fuel from the float chamber when desired in combination with one or more other features of the invention, or I may sometimes prefer to use a fixed orifice or the like. This also applies to the outlet from the auxiliary air passage 41 in Fig. 1—that is to say, that a single orifice 45 may be employed with a needle valve to control the passage of fluid through the same or a single calibrated orifice may sometimes be used without a needle valve.

I, therefore, do not wish to be limited except as set forth in the following claims.

I claim:—

1. A carburetor having a body provided with a mixing chamber, means for supplying air to the mixing chamber, a source of fuel supply, a fuel passage leading from said source of supply to said mixing chamber, an adjustable member for controlling the flow of fuel from the source of supply having a fuel passage, a valve adapted to be seated in said last mentioned fuel passage, said valve having a fuel passage through its ends permitting the flow of fuel when the valve is in closed position.

2. A carburetor having a body provided with a mixing chamber having means for supplying air thereto, a fuel reservoir, a fuel passage extending from said reservoir to said mixing chamber and an adjustable member arranged at the point of supply controlling the supply of fuel to said fuel passage, said adjustable member being provided with a fuel passage, a valve for controlling the last mentioned fuel passage, said valve having a passage communicating with the main fuel passage.

3. A carburetor having a mixing chamber provided with an air passage, a fuel chamber provided with an outlet, a pair of concentric chambers, a fuel passage leading from the outlet chamber to the mixing chamber and a pair of adjustable members provided with fuel passages for controlling the supply of fuel to said concentric chambers.

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