F. G. WASHBURN.

CARBURETOR.

APPLICATION FILED JULY 24, 1919.

1,418,499. Patented June 6, 1922.

Fig. 1.

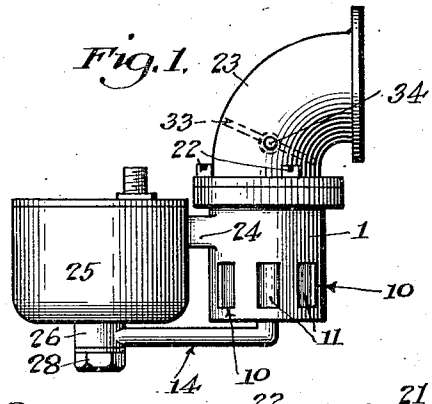


Fig. 2.

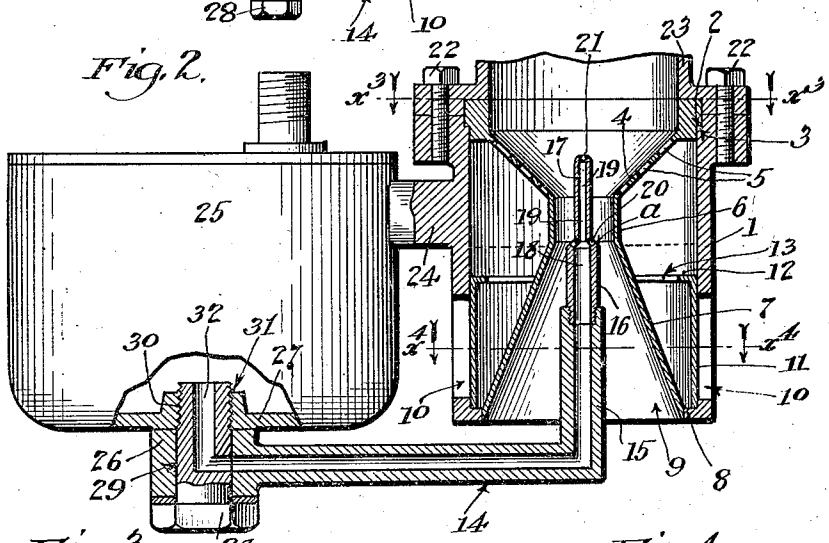


Fig. 3.

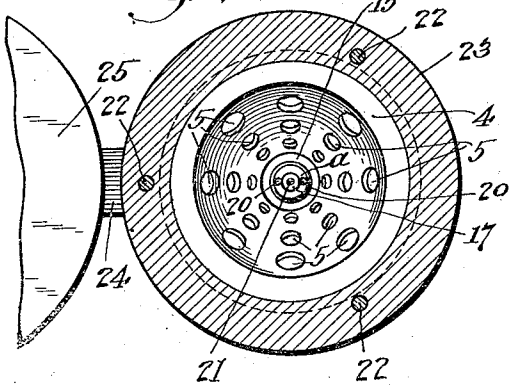
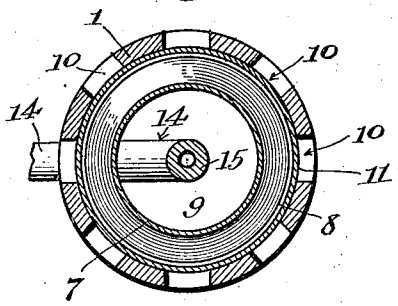


Fig. 4.



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CARBURETOR.

1,418,499. Specification of Letters Patent. **Patented June 6, 1922.**

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To all whom it may concern:

Be it known that I, FREDERICK G. WASHBURN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Carburetor, of which the following is a specification.

This invention relates more particularly to the fuel and air mixing features of a carbureter and also to certain structural relations between the float chamber and the mixing chamber and fuel supply tube.

An object of the invention is to simplify carbureter construction and at the same time provide for high efficiency at various engine speeds or loads.

Another object is to provide a construction which will insure the efficient mixing of air with the fuel and the mixing with the fuel of an additional or auxiliary quantity of air varying in volume with the speed or load of the engine.

Another object is to so construct the carbureter that an auxiliary supply of air will be admitted to the mixing chamber around the nozzle tip in such a way that the auxiliary air will flow inwardly and upwardly.

Another object is to so construct the carburetor that at low speeds the fuel supply will be mainly drawn from a lower level and will be mixed with the main air supply, and at higher speeds the fuel will be also drawn from a higher level and mixed with the auxiliary air supply.

To effect the foregoing objects, the carburetor is of novel form.

Other objects and advantages will appear in the subjoined detailed description.

The accompanying drawings illustrate the invention:

Figure 1 is a side elevation of a carburetor built in accordance with the provisions of this invention.

Fig. 2 is an enlarged side elevation of the carburetor, the mixing chamber and its parts and the fuel supply tube and the connection between the fuel supply tube and the float chamber being shown in vertical mid section.

Fig. 3 is a fragmental plan section on line indicated by x^3—x^3, Fig. 2.

Fig. 4 is a fragmental plan section on line indicated by x^4—x^4, Fig. 2.

There is provided a hollow or tubular body 1 having an internal annular shoulder 2 near its upper end. On the annular shoulder 2 is seated the external annular shoulder 3 of an inverted hollow frusto-conical member 4 provided at intervals therearound from end to end thereof with auxiliary air inlet perforations 5. Air passing from outside of the frusto-conical member 4 will be directed inwardly and upwardly by the ports 5. The lower end of the member 4 connects with and, in this particular instance, is integral with a tubular member 6. The lower end of the tubular member 6 connects with and, in this instance, is integral with a hollow frusto-conical member 7. The lower end of the member 7 is open to the atmosphere and is inserted inside of an internal flange 8 at the lower end of the body 1. The members 4, 6 and 7 together form a Venturi tube, the bore of which constitutes an air passage 9 that expands from its intermediate portion upwardly and downwardly.

The lower portion of the body 1 is provided at intervals therearound with auxiliary air ports 10, the degree of opening of which is controlled by a suction-operated sleeve air valve 11, the air passing through the ports 10 being adapted to flow beneath the lower end of the valve 11 when said valve is raised. When the valve 11 is in its lower or closed position the lower end of the valve seats upon the flange 8.

The valve 11 is provided at its upper end with an internal annular flange 12 surrounding the opening 13 in the upper end of the valve, said opening being slightly smaller than the inside diameter of the valve and permitting air to flow from the interior of the valve upwardly between the flange 12 and frusto-conical member 7. It will be readily understood that under low engine speeds, or when the engine suction is relatively low, the valve 11 will remain in closed position, and that at higher engine speeds, or when the engine suction becomes greater, the difference in pressures upon the upper and lower ends of the valve 11 will cause the valve 11 to rise to a degree corresponding to the difference in pressures.

Inserted in the passage 9 is an L-shaped fuel supply tube indicated in general by the character 14, the vertical leg 15 of the tube being arranged axially of the body 1 and passage 9. In the upper end of the vertical leg 15 of the fuel supply tube is inserted a nozzle comprising lower and upper sections 16, 17 respectively, the lower section having

its duct 18 of larger diameter than the duct 19 of the upper section. The lower nozzle section 16 terminates at its upper end adjacent the lower end of the member 6 and at this point the nozzle wall is tapered inwardly and upwardly as indicated at *a*. In the tapered nozzle portion *a* are discharge orifices 20 which are directed aslant upwardly and outwardly. The upper end of the nozzle section 17 is provided with a discharge orifice 21. The nozzle section 17 extends entirely through the member 6 and projects well into the member 4 so that some of the perforations 5 are below the level of the orifice 21, and other of the perforations 5 are above the level of the orifice 21. Because of the contracted throat of the passage 9, it is clear that, when suction is produced in the member 4, the velocity of the air adjacent the nozzle orifice 20 will be higher than the velocity of the air adjacent the nozzle orifice 21.

Fastened to the upper end of the body 1 by cap screws 22, or the like, is an elbow 23 forming the outlet member of the carburetor. This outlet member 23 is adapted to be connected to the intake manifold of an internal combustion engine, not shown. The lower end of the outlet member 23 seats upon the upper end of the member 4 so as to hold said member firmly on the seat 2. The body 1 is connected by an arm 24 to the float chamber 25 of the carburetor, thus leaving the passage 9 unobstructed excepting for the fuel supply tube 14 and nozzle 16, 17. The outer end portion of the fuel supply pipe 14 forms a T 26 which fits against the bottom 27 of the float chamber, and a cap screw 28 extends through the vertical bore 29 of the T, the cap screw 28 being screw-threaded at 30 into an opening 31 in the bottom 27 of the float chamber. The cap screw 28 is provided with an L-shaped duct 32 which communicates at its lower end with the bore of the tube 14 and at its upper end with the interior of the float chamber 25.

The float chamber 25 may be provided with any suitable mechanism for maintaining the liquid fuel therein at a predetermined level so that the level of the fuel will remain constant in the nozzle when the engine is not in operation. The fuel level in the nozzle will preferably be just below the level of the nozzle orifices 20.

A throttle valve is provided and, in this instance, the throttle valve is positioned in the outlet member 23 and is indicated at 33. The throttle valve 33 is mounted on an axis 34 which may be turned by any preferred means, not shown.

In actual operation, the engine, not shown, to which the outlet member 23 is connected, on being started into operation in the usual manner creates suction in the air passage 9 so as to cause air to flow through said passage. In starting the engine into operation the throttle valve will be but slightly opened and the suction produced in the body 1 above the air valve 11 will not be sufficient to raise said valve. The velocity of the air through the air passage 9 becomes a maximum adjacent the discharge orifice 20 and the fuel will discharge from said orifices into the column of air flowing through the air passage 9, but the fuel will not discharge from the orifice 21.

When higher speed or power of the engine is desired, the throttle valve 33 will be opened to a greater degree and the ensuing increased degree of suction produced in the body 1 above the valve 11 raises said valve so as to open the ports 10, thus allowing auxiliary air to flow into the body 1, thence through the perforations 5 inwardly and upwardly around the tip of the nozzle.

When the increased suction takes place adjacent the nozzle the fuel level is raised sufficiently in said nozzle to cause discharge of some of the fuel through the nozzle orifice 21, and this additional fuel also mixes with the column of air flowing through the air passage 9 and this mixture is diluted by the auxiliary air admitted through the perforations 5.

Thus it is clear that under higher engine speeds or greater loads on the engine, the higher nozzle orifice 21 as well as the lower orifice 20 sprays fuel into the air passage 9. When the throttle valve is but partly open and the air valve is closed, the velocity of the air current being higher adjacent the orifice 20 causes the fuel to flow freely from the orifice 20 so as to produce a rich mixture. When, however, the valve 11 opens, some of the engine suction becomes available to draw air into the carburetor through the auxiliary air ports 10, and consequently the velocity of air passing through the smaller portion of the air passage 9 does not increase proportionately to the increased demands of the engine. However, though the velocity of the air may not increase proportionately adjacent the orifices 20, said orifices will continue to discharge fuel, and the somewhat increased degree of vacuum produced adjacent the nozzle 21 will cause discharge of fuel from the orifice 21.

It is to be noted that all of the air admitted to the carburetor passes freely upwardly and that the air passage 9 is free and unobstructed throughout its length excepting for the tube 14 and nozzle 16, 17. The wider the throttle is opened the higher the valve 11 will be raised so as to increase the degree of opening of the auxiliary air ports 10, which results in a freer flow of air into the carburetor so that the mixture will not become too rich at higher engine speeds, the suction adjacent the nozzle being neu-

tralized to some degree by the admission of the auxiliary air, as the suction increases.

It is understood that such changes and modifications may be made in the invention as lie within the spirit and scope of the appended claim, and that the invention includes such changes and modifications.

I claim:

In a carburetor, in combination, a tubular body, an inverted hollow frusto-conical member inside of the body provided at intervals therearound with auxiliary air inlet perforations and otherwise closing the upper end of the tubular body, a tubular member joined to the lower end of the frusto-conical member, a hollow frusto-conical member joined to the lower end of said tubular member and closing the lower end of the hollow body and having its lower end open, and a nozzle in the frusto-conical member projecting through the tubular member into the inverted frusto-conical member and comprising lower and upper sections, the lower section having a duct of larger diameter than the duct of the upper section and there being an orifice in the nozzle communicating with the larger duct adjacent the lower end of the tubular member and there being an orifice in the nozzle communicating with the smaller duct at the upper end of the nozzle, there being ports in the tubular body and space for the passage of air from the ports to the inlet perforations.

Signed at Los Angeles, California, this 18th day of July, 1919.

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Witnesses:

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