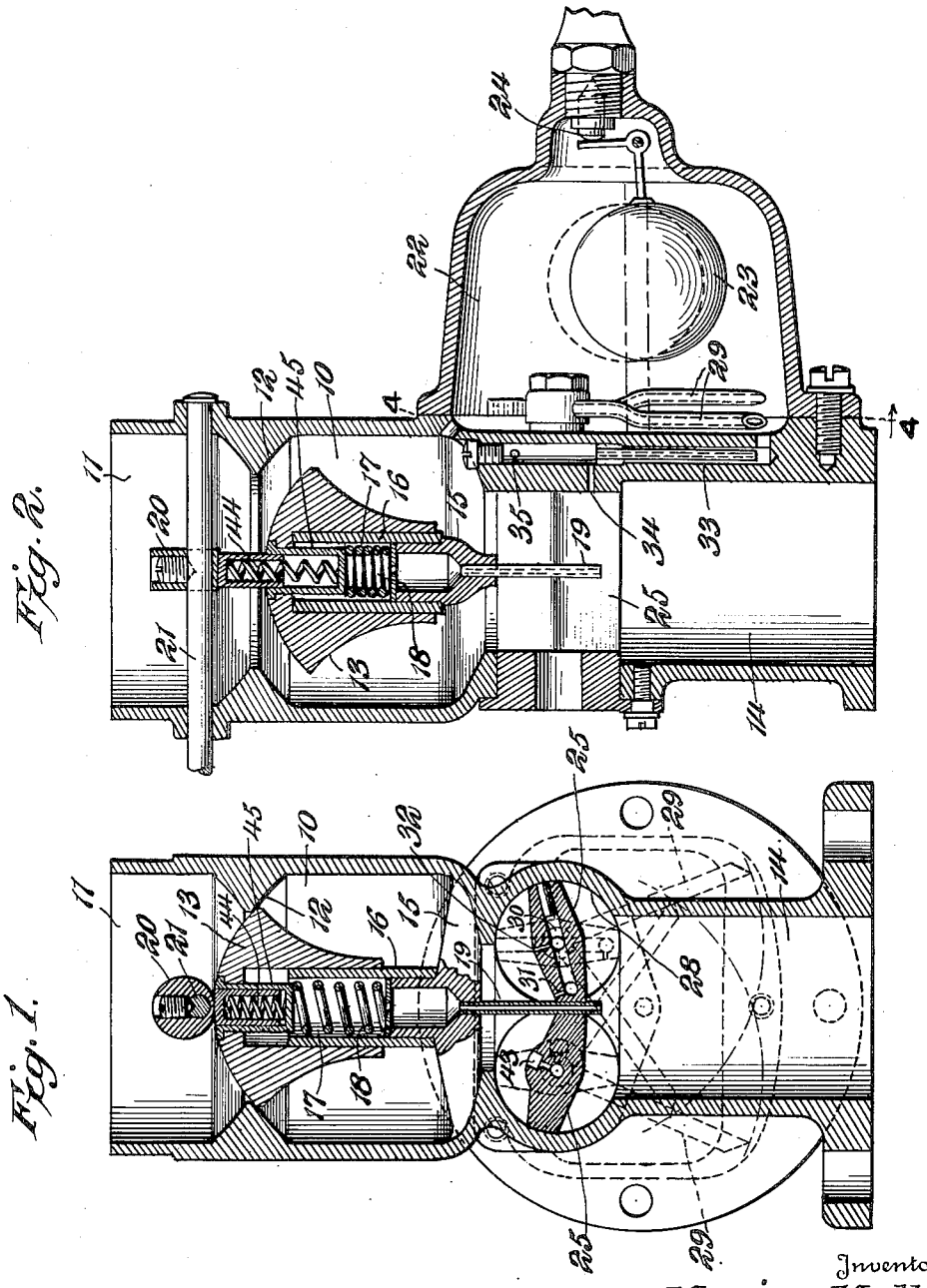
April 30, 1935. M. MALLORY 1,999,334

CARBURETOR

Filed April 28, 1934 2 Sheets-Sheet 1



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CARBURETOR

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Fig. 4.

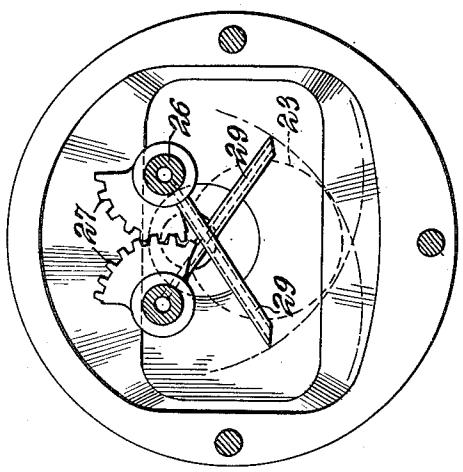


Fig. 6.

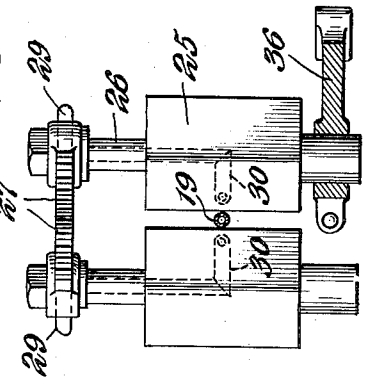


Fig. 3.

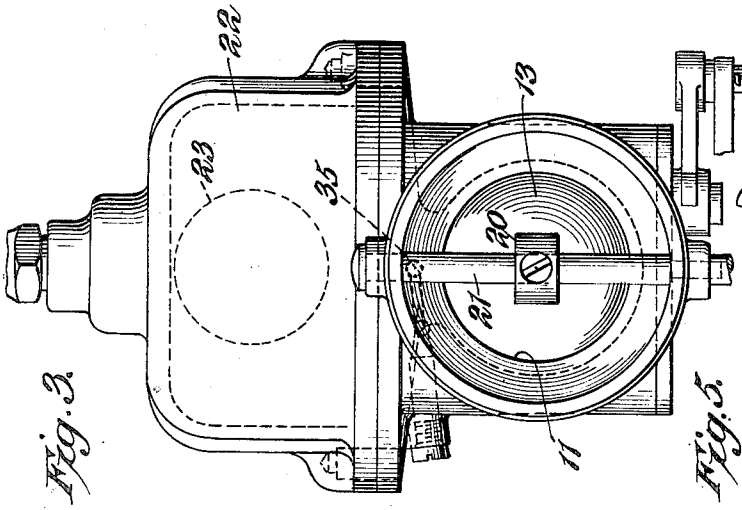
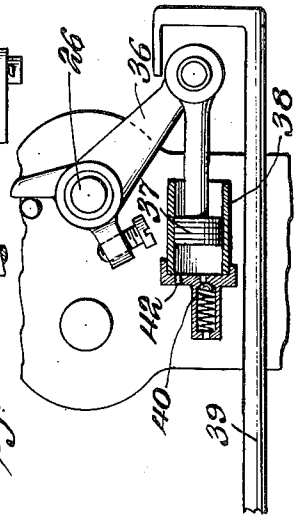


Fig. 5.



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CARBURETOR

Marion Mallory, Detroit, Mich., assignor to The Mallory Research Company, Toledo, Ohio, a corporation of Delaware

Application April 28, 1934, Serial No. 722,977

10 Claims. (Cl. 261—34)

This invention relates to a carburetor, provided with a choke valve, and is in the nature of an improvement over the disclosure in my earlier application, Serial No. 702,051, filed December 12, 1933. The opening of the choke valve is controlled in part by suction from the intake manifold and in part by the velocity of the air passing through the carburetor.

The primary object of the invention is to effect a more complete atomization of the fuel which passes into the cylinders. The air which is drawn into the cylinders passes the main fuel nozzle at high velocity, thereby drawing fuel into the main stream and completely atomizing it. The throttle itself is a part of the venturi and, in the present form, comprises two oppositely opening valves with fuel nozzles therein, so that the fuel is always discharged toward the center line of the intake passage. The greatest restriction of air flow and consequently the highest velocity is directly across the fuel nozzles. The fuel is therefore atomized as it is drawn through the venturi or throttle. After leaving the nozzles, the atomized fuel does not subsequently strike any wall, as is the case with other carburetors, but passes directly into the center of a region of comparatively high vacuum, which tends to perfect the atomization.

The preferred form of the invention will now be described more in detail in connection with the accompanying drawings, in which,—

Figure 1 is a vertical section taken centrally of the intake passageway, with the choke valve closed.

Figure 2 is a central vertical section taken at right angles to the plane of Figure 1, showing the choke valve open.

Figure 3 is a plan view of the carburetor.

Figure 4 is a section taken on the line 4—4 of Figure 2.

Figure 5 is a detail view of the throttle control.

Figure 6 is a plan view of the throttle valves and connections.

The invention is herein shown as applied to a down draft carburetor having a chamber 10 with an air inlet 11, within which is an annular seat 12 for the choke valve 13. The valve 13 is adapted to be opened by suction from the intake manifold, to which the lower end of the intake passageway 14 is adapted to be connected. For this purpose, the chamber 10 is formed with a web 15 from which a hollow stem 16 extends upwardly and constitutes a bearing on which the valve 13 is reciprocably mounted. The valve 13 is formed internally with a suction chamber 17 and a light spring 18 within the chamber 17 urges the valve toward its seat 12. A tube 19 connects the chamber 17 with the intake pasageway 14. A cam or eccentric 20 is secured to a spindle 21 extending horizontally across the air intake 11 and the spindle 21 is adapted to be rocked by any known means, either manual or automatic, to hold the choke valve 13 positively open or partly open whenever the motor is warm enough to take a leaner mixture.

At one side of the intake passageway 14, there is a bowl 22, within which the liquid gasolene is maintained at a substantially constant level by the usual float 23 and needle valve 24 controlling the inlet to the bowl.

The throttle comprises two valves 25 mounted on parallel horizontal spindles 26, which are connected to each other at one end by intermeshing gear segments 27, so that they rock in opposite directions in their opening and closing movements. The valves 25 are balanced so that the vacuum on one side does not tend to hold them open. The walls of the intake passageway conform to the paths described by the outer edges of the valves 25, as shown at 28, so that all of the fuel which is drawn into the manifold passes between the valves along the center line of the passageway.

As the air is drawn through the chamber 10 and the passageway 14, gasolene is drawn into the air stream from the bowl 22. For this purpose, each spindle 26 has a depending tubular fuel inlet nozzle or dipper 29 extending below the liquid level in the bowl 22. The fuel passes from the nozzles or dippers 29 longitudinally of the respective spindles 26, which are also tubular, and through bores 30 in the valves 25, whence it is discharged into the air stream which passes downwardly through the chamber 10 when the throttle is open.

One of the valves 25 has a jet orifice 31 near its tip and another orifice 32 at its center. The orifice 32 acts as an air bleed to the jet orifice 31 when the throttle is opened to a small extent, thus causing more fuel to be discharged, but as the throttle is opened wider, the increased air flow is more directly across the orifice 32 and the latter ceases to be an air bleed. If the throttle is opened still wider, fuel is discharged from the orifice 32, as well as from the orifice 31. The orifices 31 and 32 are so restricted that the mixture will be sufficiently lean during the first stages of throttle opening. The other valve 25 has a larger opening 43 at its center which comes into operation only when the throttle is fully open or nearly

so, because it is pointed upward and there will be no vacuum created in it until it is turned into the air stream substantially at a right angle thereto. The orifice **43**, therefore, plays the role of a power jet.

An idling well **33** is formed in the wall of the passageway **14** and has an outlet **34** and bleed **35**.

In the present construction, the throttle valve itself constitutes a venturi. In other words, with the choke valve **13** open, the opening between the valves **25** is the most restricted part of the intake passageway and consequently the air flow at this point attains its highest velocity. This not only draws gasolene from the bowl but completely atomizes it. The atomized fuel mixture then passes downwardly along the central line of the passageway directly into a region of high vacuum without striking any cold or hard surface, which would tend to condense it again.

In fuel feeding devices, as heretofore used, the volume of the fuel charge is usually controlled by a throttle valve having a single vane which deflects the fuel mixture against the side of the passageway. Thus the fuel, if it has become atomized in the mixing chamber, tends to condense in drops, to be again atomized at it enters the region of high vacuum in the intake manifold. In the present construction, however, the initial atomization, which is more complete than in the usual carburetor, is retained in full and is further promoted by the projection of the stream directly into the center of the high vacuum in the intake manifold.

It will be noted that in the present construction, as the throttle is opened, the jet orifices are swung downwardly, so that there is an increased flow of gasolene from the bowl **22** in proper proportion to the increased flow of air. Thus the fuel mixture is regulated by the throttle without the use of metering valves.

When the choke valve **13** is used, if the engine is operating at low speed and is suddenly accelerated, the pressure within the lower end of the passageway **14** will rise, permitting the choke valve to move toward closed position. This maintains a degree of vacuum in the manifold, which will not only suck out more gasolene from the bowl but will at the same time promote its atomization.

I have found, however, that if the spring **18** alone is used in controlling the valve **13** and is made strong enough to choke the engine sufficiently for starting, it will be too stiff when the engine is running normally; that is, when the engine is accelerated and the vacuum decreases, the valve will close up too much and over-choke the engine. I have therefore provided a weaker auxiliary spring **44** mounted in a cup **45** at the top of the valve **13**. This spring **44** opposes the spring **18**, when the cam **20** is moved to partially or wholly open the choke, thus preventing the valve **13** from over-choking the engine on acceleration. When the cam **20** is moved to choke the engine, however, the spring **44** is released.

In connection with this carburetor, I prefer to use the throttle control device shown in Figure 5. In this device, the throttle lever **36** is secured to one of the spindles **26** and is connected to a piston **37** which operates in a dash pot **38**. In closing the throttle, the manually operated rod **39** engages the lever **36** and a check valve **40** in the end of the dash pot allows the piston to move freely therein, but in moving the rod **39** to open the throttle, it merely releases the lever **36**. The throttle is then slowly opened by the air passing therethrough. This opening will be facilitated if the valves **25** are unbalanced, with the greater area at the inner side of the axis. During this gradual opening movement of the throttle, the piston **37** gradually travels toward the open end of the dash pot, while air bleeds into the dash pot through the bleed hole **42**. Thus it is impossible to stall the engine by opening the throttle too suddenly.

From the foregoing description, it will be seen that I have provided a fuel supply device in which the throttle itself constitutes a venturi and the gasolene is fed from the bowl through the throttle directly into the venturi, so that the highest air velocity is directly across the fuel jet nozzles, thereby insuring the best possible atomization. There is no throttle between the venturi and the intake manifold for the atomized fuel to strike against and to become again condensed, as is the case with the usual carburetors. All of the air, as well as the fuel, is directed by the throttle toward the center line of the passageway and immediately into the region of highest vacuum.

While I have illustrated and described the specific form of the invention which at present seems most desirable, it is apparent that many of the details thereof may be considerably modified without departing from the scope of the appended claims.

I claim:

1. In a carburetor, a fuel passageway, a throttle therein constituting a venturi, and means for discharging fuel in intersecting jets along the center line of said venturi, the angle between the jets being adjustable in synchronism with the adjustment of the throttle opening.

2. In a carburetor, a fuel bowl, an intake passageway, a throttle valve pivotally mounted in said passageway, a fuel jet nozzle in the throttle valve and connected with the bowl and discharging into said passageway at a point higher than the normal level of liquid in the bowl, the nozzle outlet being on the side of the valve axis which moves downwardly as the valve opens.

3. In a carburetor, a passageway having a variable venturi, a fuel inlet nozzle opening into the narrowest part of the venturi and means for lowering the fuel inlet nozzle as the capacity of the venturi is increased.

4. The combination with a fuel mixture passageway, of interconnected throttle valves therefor adapted to open said passageway, a lever connected to the axis of one of said valves, a rod movable in one direction to engage the lever and close the valves and movable in the opposite direction to release the lever, the opening movement of the valves being completed by the velocity of the mixture stream passing therethrough.

5. The combination with a fuel mixture passageway, of interconnected throttle valves therefor adapted to open said passageway, a lever connected to the axis of one of said valves, a rod movable in one direction to engage the lever and close the valves and movable in the opposite direction to release the lever, the opening movement of the valves being completed by the velocity of the mixture stream passing between them, and a dash pot, with a bleed, connected to said lever.

6. The combination with a fuel mixture passageway, of throttle valves therein adapted to open at the center of the passageway, one of said valves having a fuel duct with small orifices at

the inner edge and at the axis of the valve respectively, the other valve having a fuel duct with a single larger orifice located at the axis of the valve.

7. The combination with a fuel mixture passageway having an air inlet formed with an annular valve seat, of a reciprocable choke valve cooperating with said seat and adapted to be opened by suction through said passageway, a spring opposing the opening of said valve, a second spring, and means for setting said second spring to oppose the first mentioned spring when a full choke is not desired.

8. The combination with a fuel mixture passageway having an air inlet formed with an annular valve seat, of a reciprocable choke valve cooperating with said seat and adapted to be opened by suction through said passageway, a spring opposing the opening of said valve, a second spring normally idle when full choke is desired, and manually operable means to set said second spring to exert different degrees of opposition to the first mentioned spring as circumstances require.

9. The combination with a fuel mixture passageway having an air inlet formed with an annular valve seat, of a reciprocable choke valve cooperating with said seat and adapted to be opened by suction through said passageway, a spring opposing the opening of said valve, a second spring normally idle when full choke is desired, and a manually operable cam directly engageable with said valve to positively open it when choking is not desired.

10. In a carburetor, an intake passageway having an air inlet, two throttle valve members within the passageway with a variable opening between them, and fuel jets discharging in converging lines toward the center of the air stream directly between said valves.

MARION MALLORY.