Apr. 3, 1923.

1,450,762

C. E. SUMMERS

CARBURETOR

Filed Aug. 6, 1917

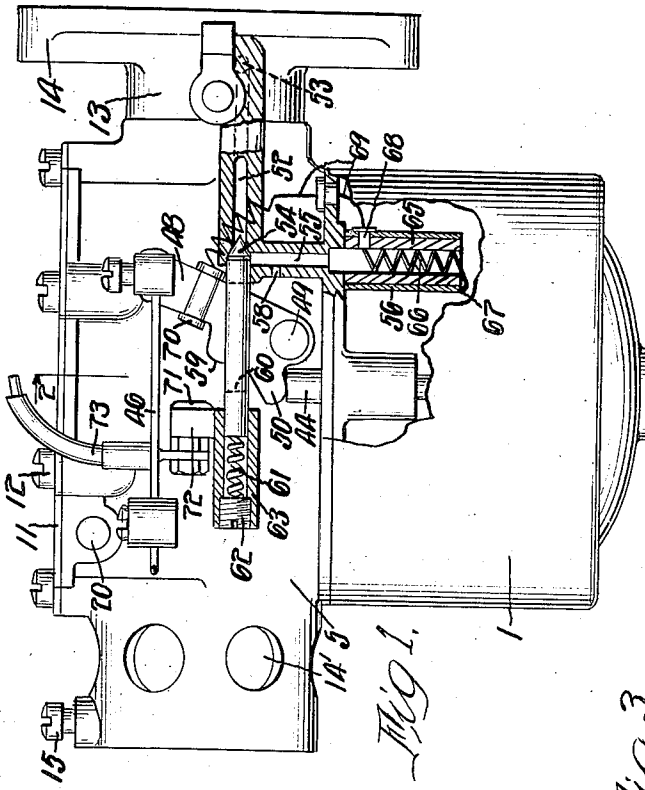


Fig. 1.

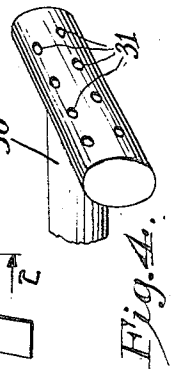


Fig. 4.

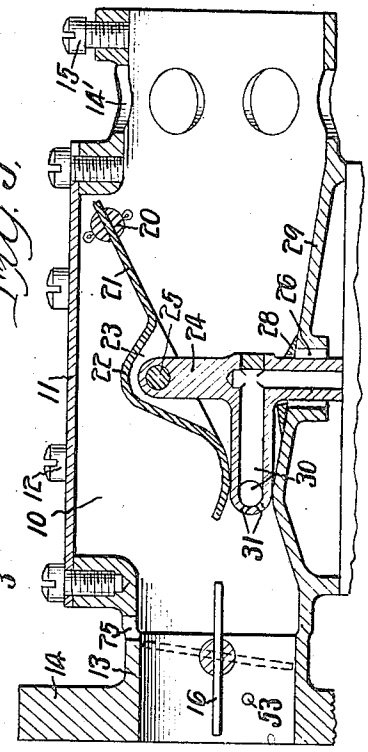


Fig. 3.

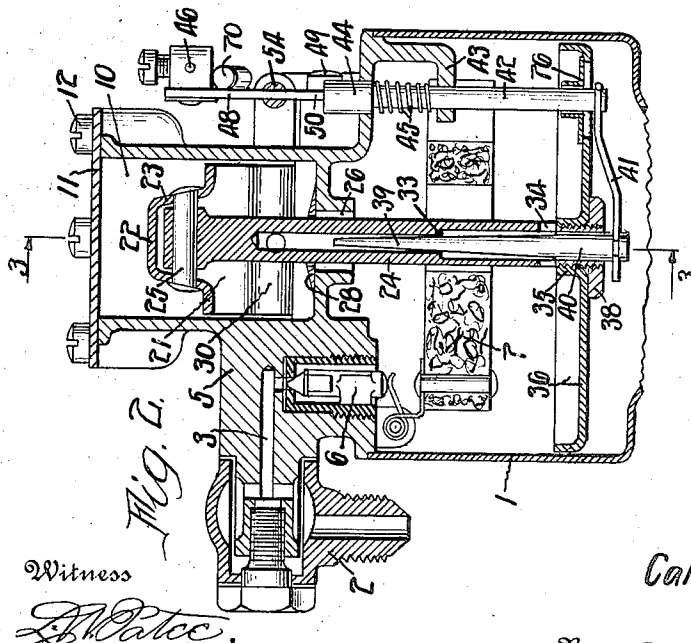


Fig. 2.

Witness

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UNITED STATES PATENT OFFICE.

CALEB E. SUMMERS, OF DETROIT, MICHIGAN, ASSIGNOR TO MASTER CARBURETER CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF DELAWARE.

CARBURETOR.

Application filed August 6, 1917. Serial No. 184,586.

To all whom it may concern:

Be it known that I, CALEB E. SUMMERS, a citizen of the United States, and residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Carburetor, of which the following is a specification.

The present invention relates to carburetors, its object being to provide a device of this nature which may be readily manufactured and which is capable of operating economically under a wide range of conditions.

Among its important features are a suction controlled air valve formed of a single pivoted member, and a movable jet actuated thereby in such manner that its fuel orifices are maintained substantially centrally in the air current whereby the air and fuel are intimately and uniformly commingled; a suction controlled air valve arranged to raise and lower a movable jet, together with a metering pin associated with the jet and a manually operated lever for operating the pin against the force of a spring to change the fuel mixture at will; a fuel jet arranged to be raised and lowered by a suction controlled air valve and having a diaphragm movable in the float chamber for retarding the movements of the jet and preventing fluttering of the air valve; an additional fuel supplying means arranged to be operable at will upon starting by the same means which lowers the metering pin; means for relieving the valve of the additional fuel supplying means of suction whereby leakage is prevented under normal running conditions; and means, controlled by the common lever of the metering pin and the starting jet controlling means, for heating the starting fuel. The invention further consists in the details of construction shown, described and claimed.

In the drawings, Fig. 1 is a side view, parts being broken away, showing a preferred embodiment of the invention. Fig. 2 is a section on the line 2—2 of Fig. 1. Fig. 3 is a section on the line 3—3 of Fig. 2. Fig. 4 is a perspective of the delivery end of the fuel nozzle.

1 indicates a cup-shaped float chamber to which fuel is supplied by means of the fitting 2, passage 3 in the float chamber top 5, valve 6, and pivoted float 7, as will be readily understood.

At a point above the float chamber, the top 5 is shaped to form a mixing chamber 10, substantially rectangular in cross-section for the most part and provided with a cover 11 which is held in place by screws 12 for affording ready access to the interior. The rectangular portion of the mixing chamber preferably merges at one end into the cylindrical neck 13 having a flange or ears 14 for attachment to the manifold; at its opposite or intake end the walls of the air passage may be perforated at 14′ and provided with a set screw 15 whereby a pipe (not shown) for supplying heated air may be fastened. A manually actuated butterfly throttle valve 16 in the neck 13 of the mixing chamber controls the flow of fuel mixture in the usual way.

Extending across the upper rear corner portion of the mixing chamber is a pivot 20 on which is mounted a suction controlled air valve 21 formed of a single piece of sheet metal having its central portion 22 struck upwardly to form a pocket between the end walls 23 of which a fuel pipe 24 is hung on a trunnion or pivot 25. It will be seen that the pipe passes downwardly into the float chamber through a hole 26 of somewhat greater diameter than the pipe, and that a washer 28, although allowing the necessary freedom of movement, seals the passage to prevent undesirable evaporation. The trunnion being above the plane of the valve rises almost vertically as the latter opens, thus avoiding any great amount of movement of the pipe longitudinally of the air passage. Over the float chamber, the cover 5 is also preferably inclined upwardly and forwardly in the direction of the flow of air as indicated at 29 to a point some distance beyond the pipe, and the latter has a T-shaped delivery nozzle 30 which extends forwardly to the apex of the incline and has its tubular head or cross bar provided with a number of orifices 31 distributed across the air passage from side to side. In the embodiment shown, the forward end of the air valve rests on the delivery end of the nozzle. Assuming that the distance from the pivot 20 to the pivot 25 is approximately the same as that from the

latter to the holes 31, it will be seen that as the valve is swung open by the suction of the engine the holes 31 will be maintained substantially in the middle of the current of air, and that the valve 21 and wall 29 will direct the air in a converging stream past the fuel orifices.

The lower end of the fuel pipe is bored out to form a valve seat 33, and opens laterally into the float chamber at 34. In order to prevent the valve from fluttering, the fuel pipe is threaded below the holes 34 to receive the threaded central portion 35 of the sheet metal diaphragm 36 which is held in position by a lock nut 38 and conforms loosely to the inner surface of the float chamber.

A metering pin having its upper end tapering at 39 and its lower end 40 cylindrical is guided in the fuel pipe and determines the free opening through the latter. At its lower end the pin 39—40 is fixed by an arm 41 to an actuating rod 42, and the latter passes upwardly through the diaphragm and a bracket 43 and has its head 44 projecting from the float chamber cover. A spring 45 suffices to hold the metering pin against the seat when the fuel pipe is in lowermost position. Therefore, as the fuel pipe rises and increases the head against which the fuel must be lifted, the free opening gradually increases in accordance with the taper of the metering pin, and fuel is supplied in quantities sufficient to meet the normal demands of the engine. Should it be desired, however, to increase the flow, it is only necessary to pull on the control rod or wire 46 which is fastened to the end of a lever 48, pivoted at 49 and having a projection or arm 50 bearing on the head 44, thereby depressing the metering pin in respect to its seat.

It is desirable to supply a rich mixture, over and beyond that due to the main fuel-pipe, for starting purposes, and a passage 52, opening into the mixture passage at a point 53 beyond the throttle valve, is therefore formed in the wall of the mixing chamber. This passage forms a seat for the valve 54 and communicates, when the latter is open, with the passage 55 and depending tube 56, the end of which dips into the liquid fuel. When suction is applied to the opening 53 (as occurs in starting), the valve 54 being open, a very rich mixture, due to the admission of air through an opening 58 into the passage 52, is supplied. Although the valve 54 might be operated independently of the lever 48, the construction is much simplified by slotting the former longitudinally to receive the latter and by providing the lever with a surface 59 that strikes the end wall 60 of the slot to draw the valve open as the lever approaches the limit of its movement in depressing the metering pin. A spring 61 interposed between the valve 54 and a plug 62 for the valve guiding boss 63 ordinarily holds the valve to its seat, and the opening 58 supplies sufficient air to satisfy the suction through the valve due to leakage, and thereby prevents leakage of fuel during the normal operation of the engine.

In order to heat the fuel for starting, it is preferred to line the tube 56 with a porcelain or similar sleeve 65 and to provide in the passageway a bare resistance coil 66 (which may be grounded to the tube 56 at 67) to which current is supplied through the plug 68, wire 69 and insulated contact 70 (carried by the lever 48) when the latter strikes the contact 71 at the end of its counter-clockwise movement (Fig. 1). The last mentioned contact may be conveniently carried on a lug 72 and is supplied with current through the wire 73.

It may be desirable for purposes of acceleration and economy, to in some instances slot the neck 13 longitudinally just back of the closed position of the throttle valve as indicated at 75, and to supply the fuel pipe with a larger free opening past the metering pin than would otherwise be used. Should the throttle valve in this case be suddenly opened, an overly rich mixture, suitable for acceleration, will be supplied—very little air then entering the slot, but on the other hand the throttle valve, when close to the slot 75, applies the suction effectively to the latter to draw in an amount of air which increases during the early part of the movement of the valve, and which is sufficient to render the resulting mixture lean enough for economy.

Were no means provided to prevent it the diaphragm might cause the fuel pipe to settle too slowly when the throttle valve is suddenly moved toward closed position to direct the diminishing air current effectively about the orifices 31;—in other words, the velocity of the air might under such circumstances become too low to produce the suction necessary to draw a proper supply of fuel. The engine might consequently stall. This is readily overcome by making the opening in the diaphragm of considerable size and by surrounding the rod 42 with a loose sheet metal valve 76 whereby the opening is in effect closed against the rising movement of the diaphragm and the latter is allowed to settle quite freely.

Review of operation.

Upon starting, the lever 48 is drawn over to the limit of its movement, thus depressing the metering pin and opening a free passage through the fuel pipe and at the same time striking the end wall 60 of the slot in the valve 54 and opening the passage

52—53—55—56 through which raw fuel, mixed with air from the opening 58, is delivered. When the coil 66 is present this mixture is of course heated. As soon as the engine is started, the spring 61 is allowed to throw the valve 54 to its seat and the opening 58 thereupon prevents leakage as heretofore explained. The lever 48 is then properly adjusted and the air valve 21, acting on the fuel pipe, varies the free opening about the metering pin to suit the demands of the engine. Because of the size of the openings 31 and their distribution across the mixing chamber, together with their arrangement at all times substantially midway in the depth of the air current, a much more uniform mixture is secured than can be obtained from a single nozzle located centrally in the current.

The device comprises few parts and is compact and readily constructed. In accordance with the patent statutes, I have described what I regard as the most desirable embodiment of the invention, but I am aware that the details may be changed within considerable limits. I do not, therefore, wish to be limited except as indicated by the subjoined claims.

I claim:—

1. A carburetor comprising a mixing chamber, a fuel chamber, a suction controlled air valve in the mixing chamber, said air valve having a rear end and a forward end and being pivoted near its rear end, and a fuel pipe connected to the air valve to be moved thereby and having a nozzle extending laterally therefrom toward the forward end of the air valve, said nozzle being constructed and arranged to deliver fuel from the fuel chamber substantially midway in the air current between the forward end of the air valve and the adjacent wall of the mixing chamber at all positions of the air valve.

2. A carburetor comprising an air passage, a suction controlled air valve therein, said valve being pivoted near its rear end, a fuel pipe operably connected to the valve near the mid-point in the length of the latter and having a nozzle portion extending into proximity to the free end of the valve, whereby the fuel delivery end of the nozzle is maintained substantially half way from the free end of the air valve to the adjacent wall.

3. A carburetor including an air passage, a fuel pipe entering the passage through the wall thereof, a suction controlled air valve to which said pipe is connected and whereby it is caused to rise and fall as the air valve responds to a varying suction in the air passage, said fuel pipe having a T-shaped nozzle portion, the head of the T being arranged to deliver fuel to the air passage at intervals substantially entirely across the width thereof.

4. A carburetor comprising a mixing chamber, a fuel chamber, a suction-controlled air valve in the mixing chamber, said air valve having a rear end and a forward end and being pivoted near its rear end, and a fuel pipe connected to the air valve to be moved thereby and having a nozzle, said nozzle extending from the said fuel pipe to the forward end of the air valve and from side to side of the mixing chamber, whereby the fuel delivering end of the nozzle is maintained midway in the air current between the forward end of the air valve and the adjacent wall of the mixing chamber.

5. A carburetor comprising a fuel chamber, an air passage, a suction controlled air valve therein, said valve being pivoted to swing about a substantially horizontal pivot near one end thereof, and a fuel pipe hung from the air valve at a point half-way between the pivot and the free end of the valve and having a nozzle provided with a discharge orifice at the free end of the valve.

6. A carburetor comprising a float chamber, an air passage, a suction controlled air valve therein, a fuel pipe carried by the air valve and depending into the float chamber, a diaphragm secured to the fuel pipe below the level of the fuel, a metering pin associated with the fuel pipe, and means entering the float chamber above the level of the fuel and passing through the diaphragm for manipulating the pin to vary the opening through the fuel pipe at will.

7. In a carburetor, an air passage, a suction control air valve therein pivoted to swing about a horizontal axis near its rear end, an intermediate portion of the valve being pressed upwardly to form a pocket, and a fuel pipe hung from the walls of said pocket.

8. In a carburetor, the combination of a fuel chamber and a mixing chamber above the fuel chamber, a throttle valve controlling the passage of air through the mixing chamber, a fuel pipe extending from the fuel chamber to the mixing chamber, an independent passage extending from the fuel chamber to the discharge end of the mixing chamber, a heating coil in said passage submerged in the fuel, a fuel valve to close said passage, electric connections for said coil, and means to operate the fuel valve and to close the circuit to said coil to cause additional heated fuel to flow to the discharge end of the mixing chamber when desired.

9. A carburetor having a float chamber and an air passage, a fuel pipe extending from the float chamber into the air passage, a metering pin entering the fuel pipe from below to control the flow of fuel, a substantially vertically movable member depending into the float chamber for actuating the

pin, said member having a head projecting from the chamber, a spring tending to project the head from the chamber, and a manually operated lever coacting with the head to lower the metering pin.

10. A carburetor comprising a suction controlled fuel pipe, a metering pin therefor, manually operable means for moving the pin, a normally closed starter valve, and means controlled by the manually operable means as it approaches the limit of its movement in one direction for opening the starter valve.

11. A carburetor comprising a main fuel pipe, regulating means for the pipe, said means including a manually operable lever, a starter passage, a valve for controlling the starter passage, said valve being operable by said lever as the latter approaches the limit of its movement in one direction, a coil for heating the liquid supplied to the starter passage, and means for completing the circuit through the coil as the lever approaches the limit of its movement in the direction stated.

12. In a carburetor, the combination of a fuel chamber and a mixing chamber above the fuel chamber, a throttle valve controlling the passage of air through the mixing chamber, a fuel pipe extending from the fuel chamber to the mixing chamber, an independent passage extending from the fuel chamber to the discharge end of the mixing chamber, a heating coil in said passage submerged in the fuel, a fuel valve to close said passage, electric connections for said coil, and means to operate the fuel valve and to close the circuit to said coil to cause additional heated fuel to flow to the discharge end of the mixing chamber when desired, said independent passage having an air inlet above the fuel level to limit the flow of fuel through the passage.

CALEB E. SUMMERS.