March 19, 1935. D. COLE 1,994,944

CARBURETOR

Original Filed July 5, 1928 3 Sheets-Sheet 1

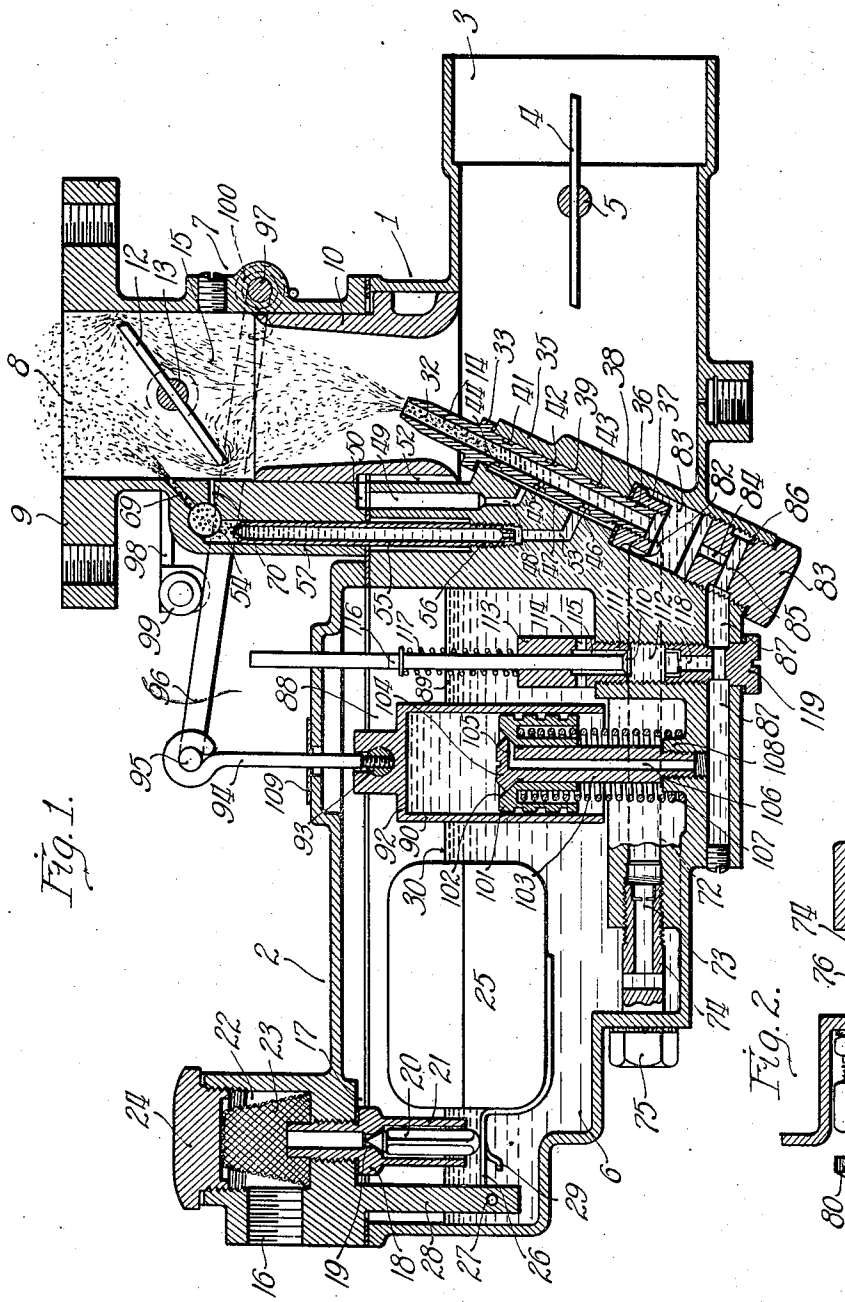


Fig. 1.

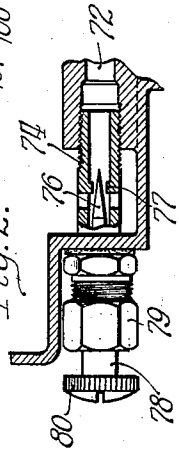


Fig. 2.

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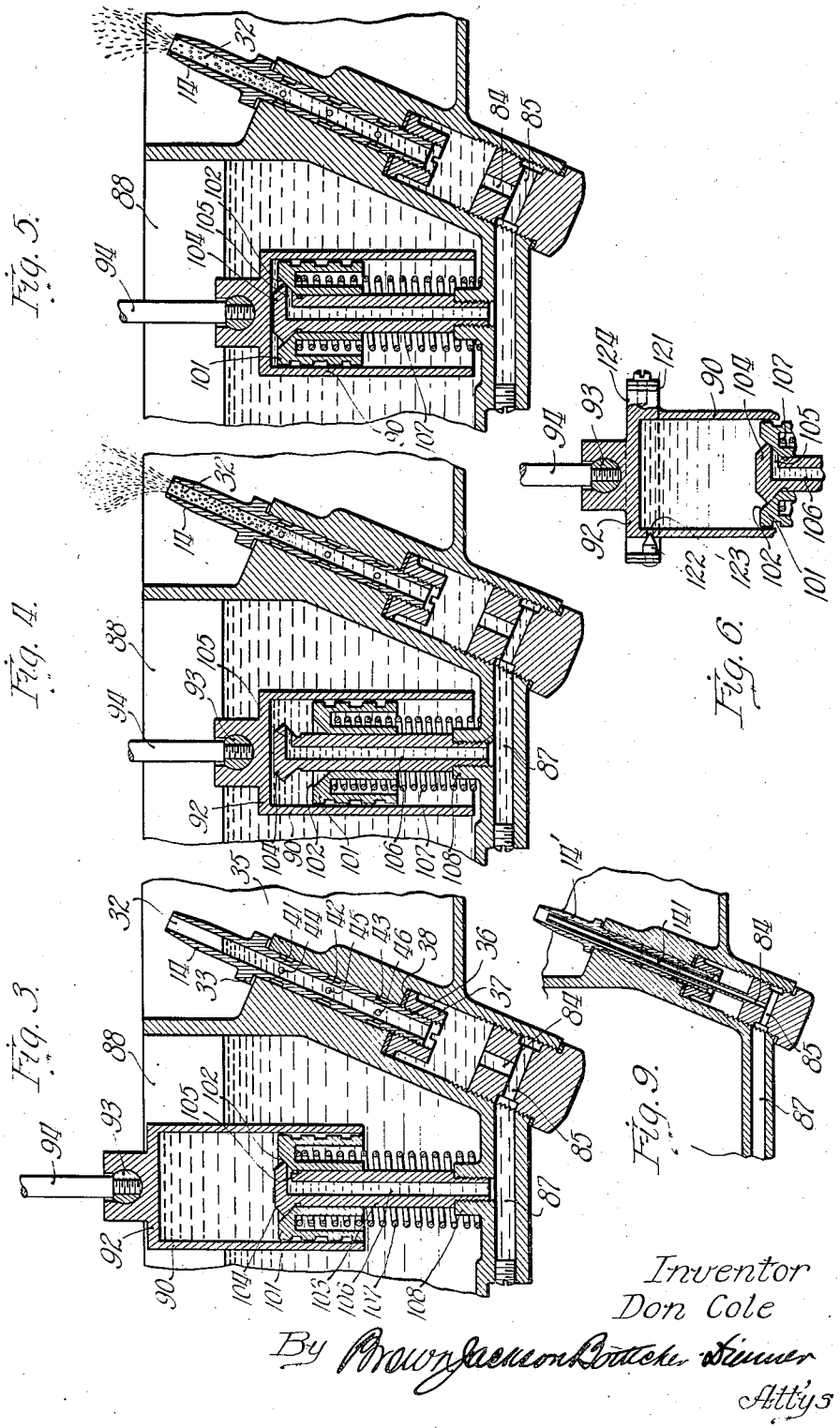


Fig. 5.

Fig. 4.

Fig. 6.

Fig. 3.

Fig. 9.

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CARBURETOR

Original Filed July 5, 1928 3 Sheets-Sheet 3

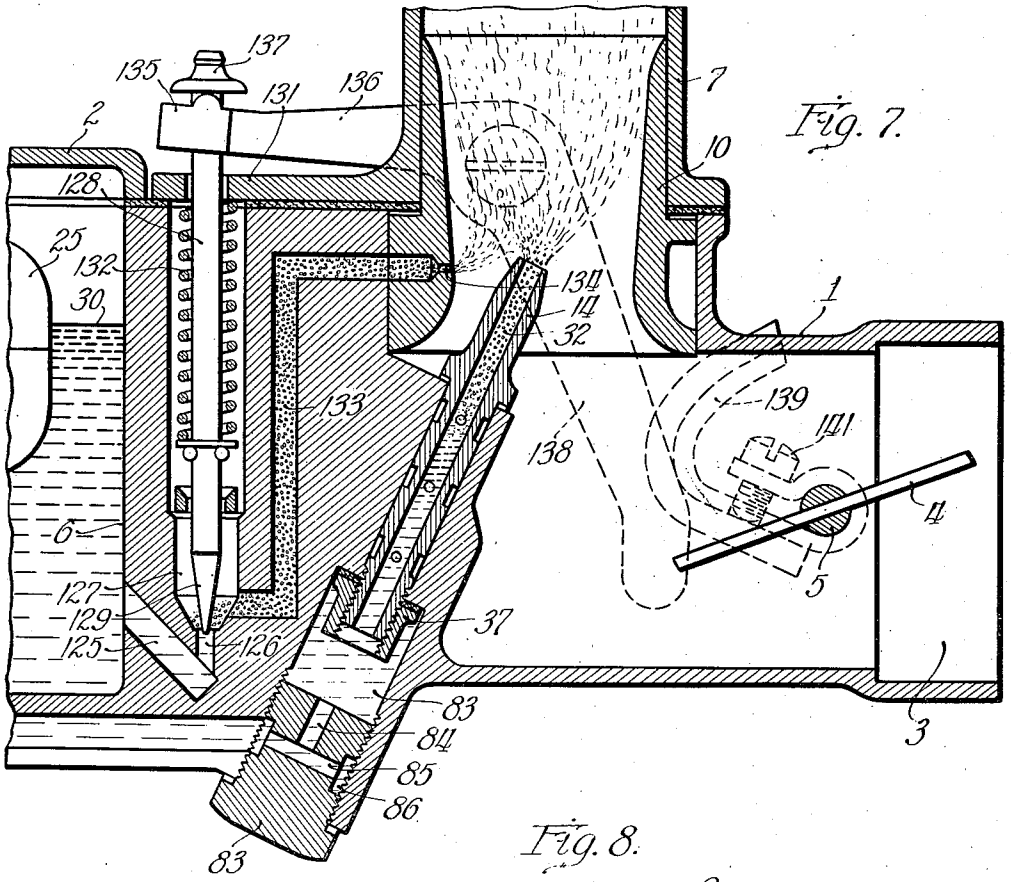


Fig. 7.

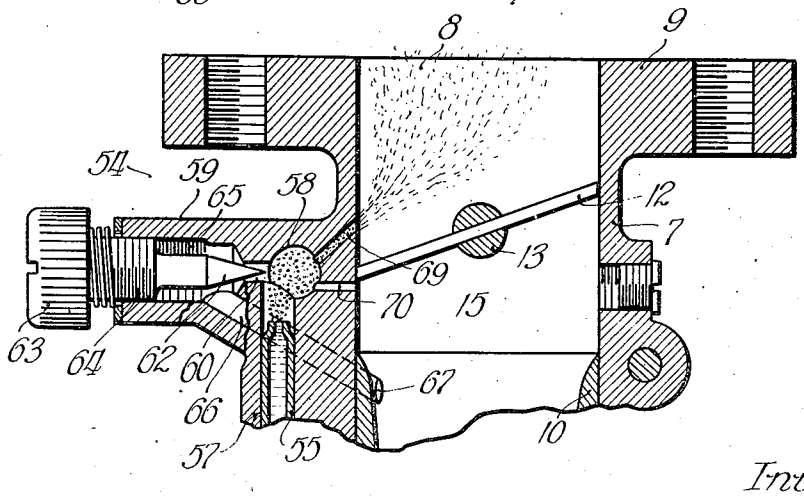


Fig. 8.

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1,994,944

UNITED STATES PATENT OFFICE

1,994,944

CARBURETOR

Don Cole, Evanston, Ill.

Application July 5, 1928, Serial No. 290,393
Renewed December 3, 1934

20 Claims. (Cl. 261—34)

My invention relates to carburetors and is more particularly concerned with the provision of improved means for supplying fuel for acceleration of the engine and certain other features of construction.

The present invention is an improvement upon the device disclosed and claimed in my copending applications, Serial No. 189,983, filed May 9th, 1927, and Serial No. 629,555, filed August 19, 1934.

The accelerating device, commonly termed a pump or syringe, of the present invention involves the graded volumetric discharge and the protracted period of discharge disclosed in my earlier application, and also includes the cut-off valve for disconnecting the discharge passageway of the syringe from the fuel nozzle of the carburetor. According to the present invention, however, the cut-off valve and outlet port are disposed at the upper end of the discharge stem. This construction facilitates manufacture and provides improved operating characteristics, one feature of which is the automatic thermostatic control of the syringe or accelerating device. Also by collapsing the accelerating device over the stem the overall length of the device is decreased, and assembly and disassembly are facilitated.

Another feature of the present invention is an improved form of well and main nozzle construction which both facilitates manufacture and improves the operating characteristics by rendering the accelerating well less subject to surface tension. Where an accelerating device of the pump or syringe type is employed, an accelerating well as such is not strictly essential. Air bleeding of the main jet is, however, desirable, and such air bleeding is best accomplished by an atmospheric or air passageway which partakes of the characteristic of an open well. To render the air bleed highly sensitive it is desirable to diminish as much as possible the effect of the surface tension of the liquid. I provide, according to the present invention, a form of air bleed which accomplishes this purpose and which is peculiarly advantageous in connection with an accelerating device of the pump or syringe type.

There are certain other features of construction which will be more apparent from the following detailed description and drawings of a device embodying my invention.

Now in order to acquaint those skilled in the art with the manner of constructing and operating a device embodying my invention, I shall describe in connection with the accompanying drawings a specific form of carburetor in which the invention appears.

In the drawings

Fig. 1 is a diagrammatic section through a carburetor embodying my invention.

Fig. 2 is a fragmentary sectional view showing a modified form of high speed adjustable needle which is the equivalent of the metering orifice shown in Fig. 1.

Fig. 3 is a fragmentary sectional view showing the accelerating device in the position it occupies when the engine is running at low speed.

Fig. 4 is a similar view showing the accelerating device just after opening the throttle valve of the carburetor.

Fig. 5 is a view similar to Figs. 3 and 4, showing the accelerating device with the throttle open and the engine running at high speed.

Fig. 6 is a fragmentary view of a modified form of accelerating device employing a thermostatic control needle.

Fig. 7 is a diagrammatic sectional view showing the connections between the choke and the auxiliary needle valve employed during the warming up period of the engine the priming device controlled by the throttle being omitted for the sake of clearness.

Fig. 8 is an enlarged view of the idling device during idling action; and

Fig. 9 is a fragmentary sectional view of a modification.

In the actual construction of the carburetor the main body of the carburetor is constructed of two die cast parts, although obviously this may be varied, these parts having suitable passageways formed therein and provided with fittings to complete the construction. When so formed the carburetor consists of a main body portion 1, a cover portion 2 and a barrel portion 7. The main body portion 1 provides the air inlet 3 or air horn, in which there is disposed the butterfly choke valve 4 mounted on a transverse shaft 5. The body portion 1 also contains a suitable cavity 6 defining the float chamber or fuel supply chamber. The vertical barrel 7 provides the outlet 8 surrounded by the bolting or attaching flange 9 of well known construction. A Venturi member 10 is disposed partly in the body member 1 and extends up into the barrel 7.

The outlet is controlled by butterfly throttle valve 12 mounted on a transverse stem or shaft 13. The space between the throttle valve 12 and the nozzle 14 is commonly termed the mixing chamber 15. The nozzle 14 is disposed at an angle to facilitate construction and to shorten the

passageways and it terminates slightly above the most restricted part of the venturi 10 according to known practice. This may be varied. In larger sizes the carburetor preferably employs a double Venturi system.

The cover member 2 has a threaded fuel inlet connection 16 for supplying fuel to the chamber 6 under the control of a float valve 17. The float valve 17 comprises a body 18 having a passageway therethrough, and a valve port 19 controlled by a needle valve 20 slidable in the barrel or sleeve 21 which extends downwardly from the cover member 2. The valve body 18 is threaded into an opening in the wall of the cover member 2 which leads into the chamber 22 containing the screen or strainer 23. The chamber 22 is provided with a removable cover in the shape of a threaded plug 24 through which access may be had to the thimble-shaped strainer 23. The body 18 extends for a short distance above the bottom wall of the chamber 22 to prevent sediment and impurities which might escape the strainer 23 from being washed directly into the passageway through the valve body 18.

A float 25 is provided with a lever 26 hinged at 27 to a depending stem 28 preferably formed integral with the cover member 2. The arm or lever 26 has a suitable stop 29 adapted to engage the lower end of the stem 28 to prevent the float 25 from resting against the bottom wall of the float chamber 6, thereby to avoid injury to the same. Under the control of the float valve 17 the level of fuel is maintained substantially as indicated at line 30, and the same level tends to prevail throughout all connected passageways and chambers including the nozzle 14.

The level of liquid is preferably maintained slightly below the outlet end of the bore 32 of the nozzle 14. The nozzle 14 has an integral polygonal collar or shoulder 33 which is adapted to seat against the upper surface of the boss 35, a suitable gasket being interposed to provide a tight joint. The nozzle 14 comprises a sleeve-like member threaded as at 36 at its lower end to receive a clamping nut 37 which also bears against a shoulder as at 38 through the intermediary of a gasket to maintain a tight joint. The boss 35 has a cylindrical bore 39 in which the sleeve-like body of the nozzle 14 fits relatively closely. The body of the nozzle within the bore 39 has a series of grooves such as 41, 42 and 43 communicating with the bore 32 through corresponding orifices 44, 45 and 46. The bore 39, in which the sleeve-like body of the nozzle 14 lies, has a crescent-shaped groove 47 which through the circular or annular grooves 41, 42 and 43 communicates with the bore 32 through the orifices 44, 45 and 46. This groove 47 is preferably cored in the bore 39 at one side thereof, and the core being drawn out of the castings downwardly and to the left, leaves a longitudinal groove 47 of relatively small capacity so far as its ability to contain liquid fuel is concerned, but of sufficient cross section to permit the necessary flow of air without serious interference from the surface tension of the liquid. If the passageway 47 were an annular passageway about the stem of the nozzle 14, the radial dimension of the same would have to be kept very small to avoid undesirable capacity or gasoline content, and by the present construction I have avoided such narrow passageway in which surface tension might have a very considerable effect.

The passageway 47 communicates with a restricted atmospheric passageway 48 that leads through an enlargement 49 to a recess 50 in the barrel member and a downwardly extending passageway 52 in the Venturi member 10, thereby leading to atmosphere through the air horn 3. The groove 47 also communicates through a passageway 53 for supplying liquid fuel to the idling device 54, which idling device is located at the throttle valve 12. A connecting tube or idling tube 55 is threaded at 56 into the body of the casting 1 in communication with the passageway 53, and extends above the parting plane or line of the body member 1 and the barrel member 7. The upper end of the idling tube 55 telescopes in the passageway 57 leading to the idling device 54. The idling device, which is shown more in detail in Fig. 8, comprises a chamber 58 formed in the boss 59. This chamber 58 communicates with the idling tube 55, the idling tube 55 supplying liquid fuel to the chamber 58 when sufficient suction is imposed upon the chamber 58 to raise gasoline to that level. The upper and lower ends of the idling tube 55 are constricted to control the rate of flow to the idling device. The chamber 58, in addition to its communication with the idling tube 55, has an air inlet pasageway 60 controlled by the needle valve 62, which needle valve has a suitable adjusting head 63 and a stem 64 threaded into the boss 59. The air passageway 60 communicates with the valve chamber 65 and the chamber 65 in turn communicates with the main bore of the carburetor through a passageway 66 extending through the upper end of the venturi 10 and terminating in a port 67, which, when the throttle valve 12 is closed or substantially closed, receives air at substantially atmospheric pressure by way of the air horn 3.

The chamber 58 has two passageways 69 and 70 leading to the main bore of the mixture passageway in the barrel member 7, the passageway 69 extending above the throttle 12 when in closed position, and the passageway 70 extending to a point below the throttle valve 12 when it is in closed position.

As shown in Fig. 8, when the engine is running at low speed with the throttle valve 12 closed, a relatively high suction prevails in the main passageway above the throttle 12, subjecting the passageway 69 to such high suction. In response to this suction or depression, liquid flows from the idling tube 55 which is suitably connected to the main liquid fuel supply chamber, as will be explained later, and air flows in through the passageway 70 into the chamber 58 and air under regulation also flows in through the port 67, passageway 65 and air port 60 past the needle valve 62.

As the throttle valve 12 is moved towards open position the first result thereof is to obstruct the passageway 70, diminishing the flow of air into the chamber 58, and consequently increasing the liquid flow through the passageway 69. Since some air is admitted around the throttle when it is thus moved towards open position, the additional fuel flowing through the passageway 69 mixes with the air moving past the edges of the throttle and thereby supplies a larger quantum of mixture for operating the engine.

When the throttle 12 is moved still further towards open position, as shown in Fig. 1, suction is imposed upon the passageway 70, and it also discharges fuel, thereby still further increasing the fuel feed to mix with the air flowing past the throttle.

Increase of air flow about the edges of the throttle valve 12 is accompanied by drop of pres-

sure upon the port 67 and also is accompanied by a lower degree of suction upon the ports 69 and 70, but such increase of air flow draws fuel from the main supply nozzle 14. Thus as the idling device becomes insufficient or tapers off its function, the main jet comes into effect and supplies the requirements of the engine.

Fuel is supplied from chamber 6 to the main nozzle and to the idling tube 55 through a passageway 72 indicated in dotted lines in Fig. 1. This passageway is controlled by a metering orifice 73 mounted in a removable plug 74 having an external polygonal head 75 inserted at its inner end into the metal of the body member 1. The orifice 73 is formed preferably as a fixed opening in a thin metal plate which is cup-shaped to be suitably disposed in the end of the hollow plug 74.

In lieu of the orifice plate, a metering restriction may be formed by a needle valve 76 cooperating with a valve port 77, as shown in the modification of Fig. 2. Needle valve 76 has a stem 78 extending through a packing device 79 to prevent leakage, and having a head 80 at its outer end by which the position of the needle 76 may be adjusted with respect to the port 77.

The main passageway 72 terminates in an opening 82 in the chamber 81, which is formed as an enlargement of the bore in the boss 35. The lower end of the bore is closed by a drilled screw plug 83. The screw plug 83 has a central passageway 84 communicating with a diametrical passageway 85, which at its ends communicates with a groove 86. The groove 86 in turn communicates with a passageway 87 extending along the bottom of the carburetor body 1 and having two connections, one with the accelerating device 88 and the other with the economizer 89.

Fuel from either the accelerating device 88 or the economizer 89 is thus delivered through the passageway 87, groove 86, bores 85 and 84 to the chamber 83 below the nozzle 14 and in direct communication with the bore 32 thereof.

The accelerating device 88 comprises a movable cylinder or sleeve 90 closed at its upper end by the head 92, which head has a ball and socket connection 93 with an operating rod 94, this rod being hinged or pivoted at 95 upon the lever 96. The lever 96 at its other end is hinged for swinging movement at 97 in a boss formed in the barrel portion 7 of the carburetor.

An operating arm 98 bears at its outer end a roller 99 and is fastened at its inner end to the throttle shaft 13. The lever 98 is termed the throttle syringe lever, and the lever 96 is termed the syringe lever. It will be observed that for motion of the throttle shaft in opening the throttle valve 12 the roller 99 bearing down upon the lever 96 forces the same downwardly and thereby causes the cylinder or sleeve member 90 to be depressed. However, for upward motion of the throttle syringe lever 98 the arm 96 need not follow upwardly since there is no positive connection for upward motion of the two parts. The syringe lever is provided with a spring 100 disposed about the pivotal point 97 tending at all times to raise the lever and the cylinder 90 with it. The spring 100 raises the lever 96 and brings it against the roller 99 tending thereby to close the throttle valve 12.

The cylinder 90 is provided with a movable piston 101 which plays with a relatively loose fit therein. The piston 101 is provided with a series of grooves to facilitate the desired action of preventing rapid flow of liquid thereby and to provide lodgment for particles which might otherwise tend to bind the two parts together.

The piston 101 is provided with a conical valve face 102 at its upper end and a central bore, which central bore is guided on a stem 103. The stem 103 has a conical head 104 at its upper end containing a radial passageway 105 communicating with the axial passageway 106 extending longitudinally of the stem and opening at the lower end of the stem into the passageway 87. A compression spring 107 is disposed between the bottom wall of the float chamber 6 and the piston 101, the piston being recessed annularly to receive the upper end of the spring. The lower end of the stem 103 is threaded in a boss 108, which boss guides the lower end of the spring 107.

It can now be seen that if the cylinder 90 is depressed any liquid which is contained within the cylinder will transmit pressure to the upper end of the piston 101 and force the same downwardly against the spring 107, thereby opening the valve port 105 and permitting the discharge of liquid therethrough and through the passageway 106 into the passageway 87 and from thence to the passageway 32 of the nozzle 14.

If the piston is held down, the spring 107 by its recoil drives the piston 101 upwardly, expelling liquid until the valve face 102 closes the port 105 and thereby both limits the upward travel of the piston 101 and closes off communication between the interior of the cylinder 90 and the nozzle 14. In effect the piston forms an overrunning valve for the port 105.

Upon upward motion of the throttle 12 towards closed position the spring 100 tending to raise the syringe lever 96 creates a drop of pressure inside the cylinder 90 and liquid flows into the same through the clearance between the piston and the cylinder.

It will be observed that the upper end of the cylinder 90 extends above the liquid level 30, and the cylinder in operation becomes filled with liquid which may be held at a level above the normal level 30. It will be appreciated that the discharge port 105 comes very close to the cylinder head 92 when the cylinder 90 is fully depressed, and the cylinder 90 is thereby evacuated of any air which might tend to be trapped in the same. It is to be observed that the cylinder 90 forms an inverted cup or bell which provides a relatively important function in providing an automatic thermostatic control which will be described later.

The stem 94 passes loosely through a hole in the cover member 2, which hole is covered by a sheet metal washer 109 embracing the stem 94 with sufficient freedom to permit the stem to play freely up and down, the washer 109 playing sidewise.

The carburetor constructed as aforesaid tends to give a mixture which becomes too lean at wide open throttle, and I have provided, therefore, an economizer 89 which operates to open an auxiliary restricted passageway for fuel between the float chamber 6 and the bore of the nozzle 14 when the throttle valve is moved towards wide open position. This economizer comprises a valve member 110 seating against a valve seat 111 which is formed on the lower end of a plug threaded into the threaded passageway 112. The plug 113 contains transverse openings 114 leading to a central passageway 115 controlled by the valve 110 and its seat 111. The upper end

of the plug 113 serves to guide the stem 116 of the valve 110, this stem extending up through a hole in the cover and lying in the path of the syringe lever 96 so that when the syringe lever is depressed by wide opening of the throttle the economizer valve 110 will be opened. A spring 117 about the stem 116 tends at all times to close the valve 110.

The rate of fuel flow through the economizer passageway 112 is controlled by a metering orifice 118 formed in a thin plate, this plate having flanges to seat the same in the upper end of a removable plug 119. The plug 119, like the plug 74, may be removed for the purpose of substituting a plate of a larger or smaller metering orifice. By the means of this economizer the tendency of the fuel mixture to grow too lean at wide open throttle is counteracted. By constructing the economizer separate from the accelerating device each may have its own proper adjustment without interfering with the function of the other. The rate of fuel discharged from the accelerating device or syringe 88 is controlled by the spring 107 and by the size of the valve port 105. Preferably these features are so arranged as to give a protracted discharge as distinguished from a sudden injection of a relatively large mass of fuel into the air stream.

In Figs. 3, 4 and 5 I have illustrated diagrammatically the operation of the accelerating device or syringe. In Fig. 3 cylinder 90 is fully raised and is filled with liquid fuel. The throttle is closed and there is not sufficient suction on the nozzle 14 to cause fuel to flow therefrom. In Fig. 4 the throttle has been opened, fully depressing the cylinder 90, causing suction to be imposed upon the nozzle 14 by the opening of the throttle and fuel to be discharged through the port 105, passageway 106, from the accelerating device. Such downward motion of the cylinder 90 forces the piston 101 downwardly since the liquid is not appreciably compressible, and while a part of the liquid escapes through the clearance between the piston and cylinder, the major part thereof is driven through the discharge passageway to the nozzle 14. The pressure on the liquid in the cylinder 90 forces the piston 101 down against the spring 107 opening the discharge port 105.

As the throttle is held open and the cylinder 90 is held in its lowermost position, as indicated in Fig. 5, the recoil of the spring 107 moves the piston 101 upwardly, protracting the discharge of fuel from the accelerating device to the main nozzle 14 until the piston arrives at its upward limit of motion where it cuts off the discharge port 105 to prevent suction on the nozzle 14 from drawing fuel through the accelerating device or pump 88.

Now I wish to call attention to an important function which this structure inherently provides, namely, thermostatic control of the quantity of liquid fuel discharged by the accelerating device. It has been found that when the engine is fully warmed up and atmospheric temperature is relatively high, the amount of fuel required for proper acceleration should be reduced in proportion generally to the temperature rise. The device of my invention automatically graduates the quantum discharge per given displacement of the cylinder 90 in accordance with temperature rise for the reason that vapor is evolved from the gasoline and fills the upper part of the cylinder 90 when the temperature rises to a point where the amount of fuel should be decreased. It is to be observed that the cylinder 90 when fully extended has its upper end lying above the gasoline level in the float chamber, and this facilitates the automatic graduation of the quantum of fuel discharged by the accelerating device with rise in temperature. However, such arrangement is not essential since on the upward stroke of the piston 90 the suction which is created in the chamber tends to cause the evolution of vapor, which, after it is once evolved, does not readily condense even under considerable drop of temperature.

The inverted bell shape of the movable cylinder member 90 traps the vapors or gases so evolved and holds them against escape since the cylinder 90 is liquid sealed at its lower end. When gas or vapor is thus formed within the cylinder 90, depression of the cylinder corresponding to opening of the throttle drives out this liquid, with the result that the discharge of the accelerating device is graduated in accordance with temperature.

If desired, a separate thermostatic element such as the thermostatic spring 121, bearing a valve member 122 controlling the port 123 in the upper part of the cylinder member 90, may be provided. Such thermostatic spring 121 may be made of a piece of bi-metallic thermostatic metal, one end being anchored to a boss 124 and the other end being free and bearing the valve member 122. However, I find that the structure shown in Figs. 1, 3, 4 and 5 automatically compensate for temperature changes to meet the requirements of the engine to a highly satisfactory degree.

In Fig. 7 I have illustrated the warming up control which is preferably employed with the carburetor shown in Fig. 1, this warming up control having been omitted from Fig. 1 for the sake of clearness.

A passageway 125 including the needle valve port 126 communicates with a well 127 formed in the body portion 1, said well extending upwardly above the level 30 of fuel in the chamber 6. The well 127 contains stem 128 of the needle valve 129, which controls the port 126. The stem 128 is guided in a suitable guide 130 in the well 127 adjacent the lower end thereof, and is suitably guided in an extending flange 131 of the barrel member 7.

The needle valve 129 is urged downwardly by a compression spring 132, tending at all times to close the port 126. A discharge passageway 133 communicates with the bottom of the well 127 at its lower end, and at its upper end communicates with a discharge port 134 formed in the constricted part of the Venturi member 10. The stem 128 has a head 134 at its upper end, which head rests upon the end 135 of a bell crank lever 136 pivoted on the side of the barrel member 7. The other arm of the bell crank lever 136 is indicated in dotted lines at 138, and this arm lies in the path of a cam member 139 which is attached to the shaft of the choke valve 4.

The cam member 139 is channel-shaped so that the flanges thereof lie on opposite sides of the edge of the lever arm 138. The bell crank lever 136 is preferably formed of sheet metal, and it has its end 135 formed in the shape of a hook or bend encircling the stem 128. The web of the channel of which the cam member 139 is formed is extended and wrapped around the choker valve shaft 5 to form a split clamp held by means of the screw 141 in adjustable position on said shaft. The shaft 5 is preferably controlled by a manual operating member such as a Bowden cable and a lever attached to the shaft 5. The cam mem-

ber 139 is so shaped as to start to lift the needle valve 129 upon a slight change of position of the choker valve 4, thus opening up the auxiliary needle valve 129 without greatly obstructing the air flow. In this manner additional fuel may be thrown into the air stream at a point where it will be effectively mixed with the inflowing air in the venturi 10. At the same time the choker valve 4 can be closed if desired. The upper part of the cam member 139 is substantially concentric with the shaft 5, so that after the valve 129 has once been completely opened further motion thereof is not required.

By this means additional fuel can be effectively supplied without cutting off the air supplied to the carburetor, and yet if it is desired to put the carburetor under suction, the choker valve 4 can be closed.

While the metering restriction for the accelerating device 88 is provided in radial port 105, I may, in order to facilitate change of such orifices, insert a removable plug bearing an orifice plate, through the bottom wall of passage 87 as is done in the main metering orifice 73.

The injection of the accelerating fuel through passageway 84 into chamber 81 directly in line with the bore 32 of main nozzle 14 facilitates the prompt response of the carburetor to the action of the accelerating device. In a large size of carburetor I have extended a small pipe 141 integral with plug 83 and forming a continuation of passageway 84, up inside the nozzle 14 to a point a short distance below its outlet, as shown in Fig. 9. By this arrangement the discharge of the accelerating device 88 is delivered directly into the air stream with minimum impedance and with practically no back flow through the main passageway 72 and main orifice 73 and no dissipation into the passages or spaces communicating with the main nozzle. In other words, the syringe action then becomes more pronounced. The economizer valve 110 may open into the same passageway 87 as shown in Fig. 1, when the additional nozzle tube 141 is employed, as shown in Fig. 9, or it may open into the main passageway 72 as desired.

It is believed that the operation of the device herein disclosed and illustrated will be apparent from the foregoing description. The air bleed to the main nozzle 14 occurs through the passageways 52, 50, 48 and the groove 47 to the successive openings 44, 45 and 46 as the suction upon the nozzle 14 increases.

While in the preferred form of my invention the accelerating device fills through the clearance between the piston and cylinder and thereby secures a delay in filling so that successive rapid operations of the throttle valve will not continue to discharge fuel, it will be apparent to those skilled in the art that this detail may be varied without departing from the scope of the invention.

I do not intend to be limited to the details shown and described except as they are recited in the appended claims.

I claim:

1. In a throttle controlled carburetor, an accelerating device comprising a collapsible chamber having a movable wall actuated upon operation of the throttle, a hollow stationary discharge stem having a sliding fit with said wall of the chamber, said chamber wall and stem having cooperating valve parts for shutting off communication between said chamber and the hollow stem.

2. In a throttle controlled carburetor, an accelerating device comprising a collapsible chamber having walls movable relative to each other, a discharge stem having a discharge passageway for fuel, said stem and one of said walls having relatively movable valve parts controlling the communication of said stem with the chamber, means actuated upon operation of the throttle for moving another wall of said chamber, and a spring abutment for said one wall of the chamber tending to move said one wall towards the other wall of the chamber and to close the valve parts.

3. In a carburetor, the combination of a movable cylinder, a piston for the same, a stem on which the piston is guided, the stem being hollow to provide a discharge passageway, said stem having a conical head, said head having a port communicating with the discharge passageway, a spring abutment for the piston tending to move the piston into position to obstruct said port, and means for moving the cylinder.

4. In a throttle controlled carburetor, a fuel supply chamber, an accelerating device disposed in said chamber, said device comprising a movable cylinder and a movable piston, a stationary stem upon which the piston is guided, said stem having a discharge passageway terminating in a port at the upper end of the stem, a spring abutment for the piston tending to move the piston to close said port, a lever connected to the piston, and means actuated by operation of the throttle for actuating said lever.

5. In a throttle controlled carburetor, a fuel supply chamber, an accelerating device disposed in said chamber, said device comprising a movable cylinder and a movable piston, a stationary stem upon which the piston is guided, said stem having a discharge passageway terminating in a port at the upper end of the stem, a spring abutment for the piston tending to move the piston to close said port, a lever connected to the piston, means actuated by operation of the throttle for actuating said lever, an economizer passageway communicating with the fuel supply chamber and having a restriction, and a valve normally closing said economizer passageway, said valve having a stem adapted to be moved by said lever to operate the economizer valve when the throttle is in substantially wide open position.

6. In a throttle controlled carburetor, an accelerating device comprising a vertical stem having a passageway, a piston guided on the stem, said stem and piston having cooperating valve parts, a spring for the piston tending to move it to a position to close said valve parts, and an inverted closed end cylinder embracing the piston and vertically movable in conjunction with the operation of the throttle, the lower end of said inverted cylinder being at all times sealed by liquid fuel.

7. In combination in a throttle controlled carburetor, a vertical stem having a central passageway and having a head at its upper end, a radial passageway opening into the central passageway, a piston embracing said stem and having its upper end adapted to cooperate with said head to obstruct said radial passageway, a spring tending to move the piston on the stem to cause it to close said radial passageway, a movable cylinder embracing the piston, the lower end of the cylinder being open and the upper end thereof closed, and means for actuating the cylinder upon opening of the throttle.

8. In a throttle controlled carburetor, the combination of a fuel supply chamber, an accelerat-

ing device having a movable closed end cylinder disposed in said fuel supply chamber, a stationary stem containing a discharge passageway terminating in a port, a piston for the cylinder guided on said stem and adapted at one end of its travel to close said port, a spring for the piston tending to move it to the end of its travel, spring means tending to raise the cylinder and a lost motion connection between the throttle and the piston, said lost motion being taken up by the last mentioned spring.

9. In a throttle controlled carburetor, an accelerating device comprising a collapsible chamber, one wall thereof movable by movement of the throttle, a second wall of the chamber movable relative to said one wall, a stationary hollow stem comprising a valve port, said latter wall having a sleeve movable on said stem, and a spring abutment for said latter wall tending to cause the sleeve to close the valve port when the latter wall is moved by the spring abutment to the limit of its movement.

10. In a throttle controlled carburetor having a fuel supply chamber, a venturi, a fuel supply passageway leading from the chamber into the venturi, said passageway including a metering orifice, an air bleed passageway opening into the said fuel supply passageway at a point adjacent its outlet in the venturi and on the outlet side of the metering orifice, an accelerating syringe for drawing fuel from the supply chamber and discharging the same into the fuel supply passageway upon opening of the throttle, said syringe having a fuel discharge passage opening into the fuel supply passageway between the metering orifice and the connection of the air bleed passageway, and a valve closing off the syringe discharge passageway, after operation of the syringe.

11. In a throttle controlled carburetor having a constant level fuel supply chamber the combination of an accelerating device operated upon opening of the throttle for discharging accelerating fuel, said device comprising a movable pumping chamber having an imperforate closed top extending above the fuel level in said fuel supply chamber when the throttle is in closed position, adapted to be filled with liquid to a variable degree depending upon the temperature of the fuel in said supply chamber and having an outlet valve opened by pressure of the fuel thereon.

12. The combination of a throttle controlled carburetor having a substantially constant level fuel supply chamber and an accelerating pump communicating with said chamber, said pump being actuated upon opening of the throttle to discharge fuel for acceleration purposes, said pump comprising a movable member carrying a thermostatic element for controlling the discharge of acceleration fuel.

13. The combination of a throttle controlled carburetor having a substantially constant level fuel supply chamber and an acceleration pump communicating with said fuel supply chamber, said pump being actuated upon opening of the throttle to discharge fuel for acceleration purposes, said pump comprising a movable cylinder member, said member having a bypass port and a thermostatically controlled valve for said port carried by said cylinder.

14. The combination of a throttle controlled carburetor having a substantially constant level fuel supply chamber and an acceleration pump communicating with said fuel supply chamber, said pump being actuated upon opening of the throttle to discharge fuel for acceleration purposes, said pump comprising a cylinder having a bypass, a valve controlling said bypass and a thermostatic element responsive to the temperature of the fuel in the fuel supply chamber for controlling said valve.

15. In a carburetor, a constant level fuel supply chamber, an accelerating device comprising means forming a fuel pumping chamber having an imperforate gas-tight upper portion extending above the fuel level in said fuel supply chamber for containing a gas or vapor, means responsive to throttle operation for reducing the effective volume of the chamber, and a pressure responsive outlet valve permitting flow of fuel from the chamber only when the pressure reaches a predetermined value.

16. In a throttle-controlled carburetor having a fuel supply chamber, a venturi, a fuel supply passage leading from the chamber to the venturi, said passage including a metering orifice, an air bleed passage opening into the fuel supply passage on the outlet side of the metering orifice, an accelerating pump for drawing fuel from the fuel supply chamber and discharging the same into the fuel supply passage upon opening of the throttle, said pump having a fuel discharge passage opening into the fuel supply passage on the outlet side of the metering orifice, and a pressure-responsive valve closing off said fuel discharge passage after operation of the pump.

17. In a carburetor having a fuel nozzle, a fuel supply chamber, an accelerating device comprising means forming a fuel chamber having a vapor tight upper portion for containing a gas or vapor, said portion being movable under certain conditions of operation to a position where it extends a substantial distance above the fuel level in said fuel supply chamber, means responsive to throttle operation to reduce the effective volume of the chamber, a discharge passage communicating with said chamber and with said fuel nozzle, and a pressure-actuated valve controlling said passage permitting flow of fuel from the chamber to the nozzle and preventing flow of fuel from the nozzle to the chamber.

18. In a carburetor including a fuel reservoir and having an induction passage, a normal fuel system for feeding fuel from said fuel reservoir to said induction passage, an acceleration system including a pump having a stationary outlet port and a discharge passage leading therefrom to said induction passage, said discharge passage being subject to the suction in the induction passage, said pump comprising a pumping member movable upon opening movement of the throttle to exert pressure upon the fuel in said pump, a plunger associated with said pumping member and carrying a valve element controlling said outlet port, said plunger being yieldingly urged toward a position where said element closes said outlet port but movable by the pressure produced by said pumping element upon the fuel in the pump to a position where the valve element is in open position.

19. In a carburetor having a fuel mixture passage including a throttle, a main fuel system for supplying fuel to said fuel mixture passage, a fuel reservoir, means for temporarily feeding a charge of fuel into said fuel mixture passage including a pump having a stationary outlet port and a passageway leading from the outlet port and communicating with said fuel mixture passage at an elevation above that of the fuel level

in said reservoir, said passageway being subject to the suction in the fuel mixture passage, said pump comprising a hollow reciprocable pumping member actuated in accordance with throttle movements to exert pressure on the fuel being pumped, and a plunger slidable within said pumping member and carrying a valve member adapted to close said outlet port, said plunger being yieldingly urged to a position where the valve member closes said outlet port but movable by the pressure produced by the pumping member in the fuel being pumped to a position where the valve member is in open position.

20. In a carburetor having a fuel mixture passage, a throttle, a fuel reservoir, a main fuel system for supplying fuel from said reservoir to said fuel mixture passage, and an acceleration system including a pump and an outlet from the pump to the fuel mixture passage, said pump comprising a reciprocable pumping member having an internal bore and actuated in accordance with opening movements of the throttle to exert pressure on the fuel being pumped, and a plunger slidable within said bore and carrying a valve member adapted to close said outlet, said plunger being yieldingly urged to a position where the valve member closes said outlet but movable by the pressure produced by the pumping member to a position where the valve member is in open position.

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