March 20, 1962 A. T. TRAMMELL ETAL 3,026,095

CARBURETOR CONSTRUCTION

Filed Nov. 27, 1959 2 Sheets-Sheet 1

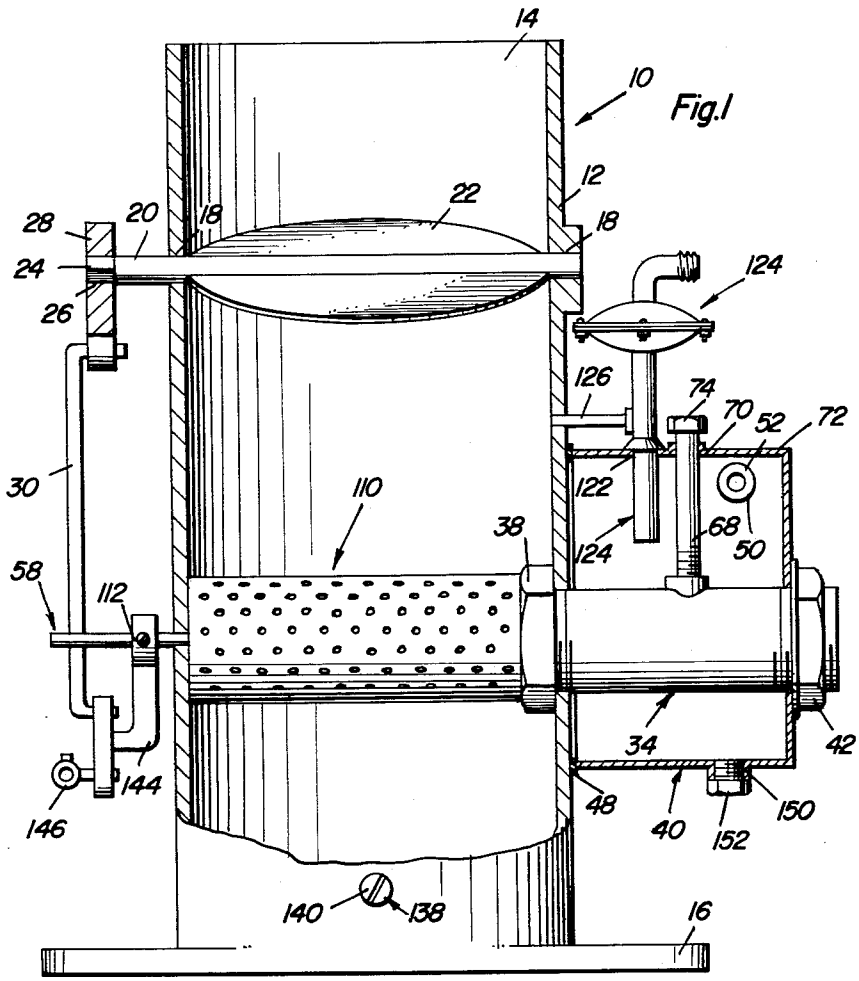


Fig.1

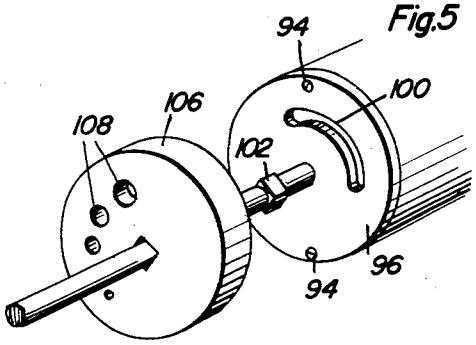


Fig.5

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Fig.2

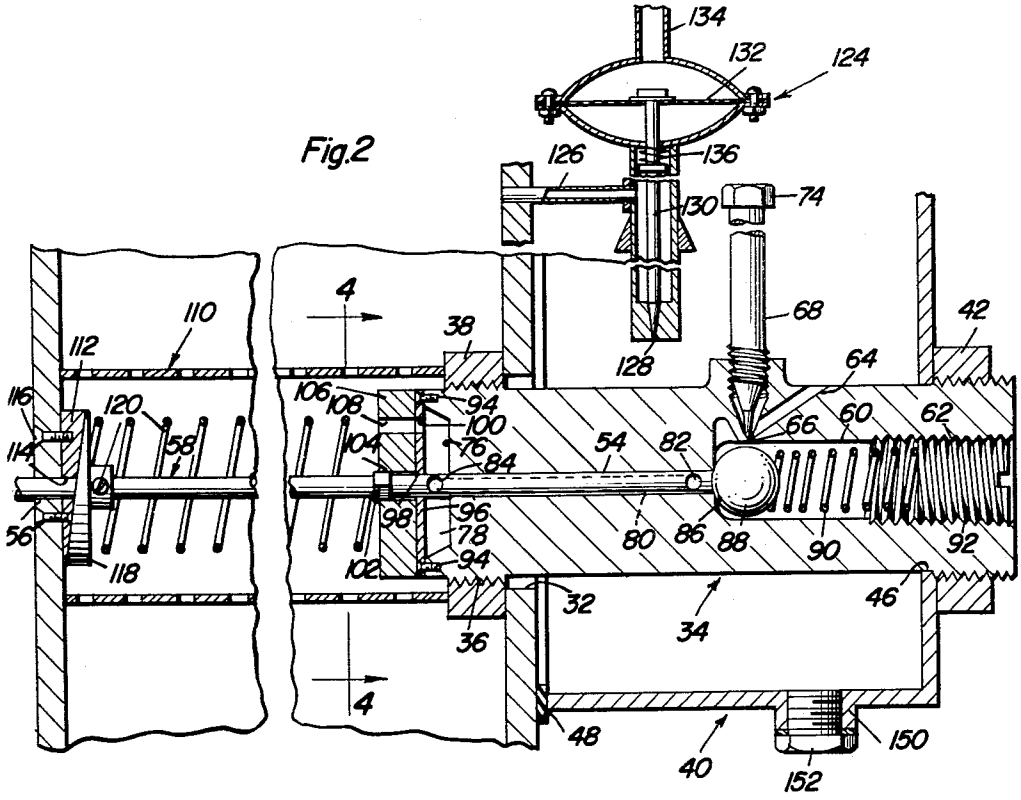


Fig.3

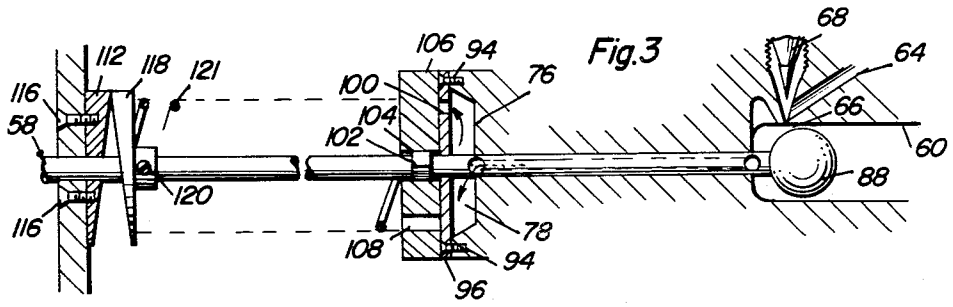
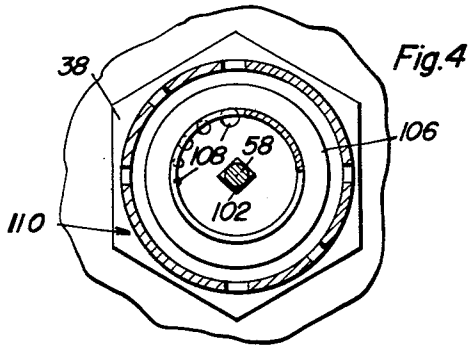


Fig.4



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CARBURETOR CONSTRUCTION

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This invention relates to a novel and useful carburetor construction and more particularly to a carburetor construction incorporating the use of a pair of disk jets disposed in side-by-side surface-to-surface contacting relation having registrable apertures formed therein for metering the amount of fuel delivered to a foraminated fuel dispensing sleeve which is disposed in the main air passage of the carburetor. The carburetor does not use the conventional form of float and float valve but instead utilizes a pressure fuel supply system to eject a stream of fuel directly into the foraminated fuel dispensing means upon the registering of apertures formed in the two disk jets.

The reticulated fuel dispensing means comprises a horizontally disposed foraminated cylindrical member disposed in the main air passage of the carburetor. The pair of apertured jet disks are disposed in one end portion of the cylindrical foraminated member and the rotation of one of the disks with respect to the other is effected upon rotation of a control shaft to which the one disk is secured for rotation therewith upon operation of a conventional form of throttle shaft having an air valve mounted thereon which is disposed in the air passage, the throttle shaft being operatively connected to the control shaft. The two jet disks comprise a closure for a fuel reserve chamber to which fuel is supplied from a supply chamber, there being means provided for metering the maximum fuel flow from the supply chamber to the reserve chamber and also means for adjustably metering the fuel flow from the supply chamber to the reserve chamber in response to movement of the control shaft.

Of course, the usual idle air passage having a metering valve therefor is provided as well as an idle fuel passage communicating with the main air passage. The idle fuel passage has disposed therein a vacuum controlled metering valve which meters the passage of fuel through the idle fuel passage in response to vacuum in the main air passage.

The main object of this invention is to provide a carburetor construction which will more effectively and completely atomize the fuel being dispensed into the air passing through the main air passage under all throttle settings by means of a foraminated fuel dispensing member.

A further object of this invention is to greatly increase the accuracy of metering the desired quantity of fuel into the main air passage.

Still another object of this invention is to provide a carburetor not having the conventional float chamber and float valve assembly or any other moving parts which could be effected by the forces of gravity thereby enabling the carburetor to function efficiently while in any position.

A final object to be specifically enumerated herein is to provide a carburetor that will conform to conventional forms of manufacture, be of simplified construction, and relatively trouble free so as to provide a device that will be economically feasible, relatively simple to work on and dependable.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a side elevational view of the carburetor construction with parts thereof being broken away and shown in section to illustrate some of the structural details thereof;

FIGURE 2 is an enlarged vertical sectional view taken substantially upon a plane passing through the center of the carburetor, parts thereof being broken away and the various metering valves shown in closed positions;

FIGURE 3 is a sectional view similar to that of FIGURE 2 but showing the delivery valve including the jet disks and the fuel flow metering valves in open positions;

FIGURE 4 is a transverse vertical sectional view taken substantially upon the plane indicated by the section line 4—4 of FIGURE 2; and

FIGURE 5 is an enlarged exploded perspective view of the control shaft and the two jet disks disposed thereon.

Referring now more specifically to the drawings, the numeral 10 generally designates the carburetor of the instant invention which includes a body portion 12 having a main air passage 14 formed therethrough and a suitably apertured mounting flange 16 disposed on the discharge end of the body portion 12.

The body portion 12 is provided with a pair of diametrically opposed aligned apertures 18 which receive therethrough and rotatably journal a throttle shaft 20 having a butterfly valve 22 secured thereto which is adapted to meter the flow of air through the air passage 14 upon rotation of the shaft 20. One end of the shaft 20 is provided with a non-circular end portion 24 which is received in a non-circular aperture 26 formed in a bell crank 28 which has one end of a connecting link 30 pivotally secured thereto.

An enlarged opening 32 formed in the body portion 12 and communicating with the air passage 14 has one end of a mounting sleeve generally designated by the reference numeral 34 received therethrough. The end of the mounting sleeve 34 received through the opening 32 is externally threaded as at 36 and has a retaining nut 38 threadedly engaged therewith. A fuel supply chamber generally designated by the reference numeral 40 is secured about the opening 32 by means of retaining nut 42 which is threadedly engaged with the other end of the mounting sleeve 34, there being an opening 46 formed in the outer wall of the supply chamber through which the other end of the mounting sleeve 34 projects. The supply chamber 40 is secured to the body portion 12 in sealing engagement therewith by means of a gasket 48 which is disposed between the confronting surfaces of the body portion 12 and the supply chamber 40. The supply chamber 40 is provided with an inlet opening 50 having an inlet fitting 52 secured therein which is adapted to be secured to a pressurized fuel supply line (not shown).

The mounting sleeve 34 is provided with a longitudinally extending bore 54 which is in alignment with a bore 56 disposed in the opposite wall of the body portion 12. A control shaft generally designated by the numeral 58 is rotatably and slidably received through bores 54 and 56. The bore 54 is provided with a counterbore 60 which is internally threaded as at 62 at its outer end.

A smooth bore 64 communicates the interior of the fuel supply chamber 40 with the interior of the counterbore 60 by means of port 66 whose effective diameter may be adjusted by means of needle valve 68 which extends upwardly from the sleeve 34 and projects through an aperture 70 formed in the upper wall 72 of the fuel supply chamber 40 to terminate in a non-circular head portion 74. Thus, the effective diameter of the port 66 may be adjusted from the exterior of the carburetor 10.

The inner end of the sleeve 34 is provided with a centrally disposed recess 76 defining a fuel reserve chamber 78 which is in communication with counterbore 60 by means of a longitudinally extending bore 80 formed

in the control shaft 54 which terminates a spaced distance from the end of the control shaft 54 adjacent the counterbore 60 in a transverse bore 82 and in a transverse bore 84 at its other end which communicates the bore 80 with the reserve fuel chamber 78.

It is to be understood that the end of the bore 54 communicating with the counterbore 60 comprises a valve seat as at 86 which is engageable by a ball check valve 88 disposed in the counterbore 60 and resiliently urged towards seating engagement with seat 86 by means of compression spring 90 which is disposed between the ball check valve 88 and a threaded plug 92 which is threadedly engaged in the threaded portion 62 of the counterbore 60 and may be adjusted to adjust the tension of the compression spring 90.

A delivery valve secured over the open end of the fuel reserve chamber by means of suitable fasteners 94 and comprising a closure for chamber 78 includes a first jet disk 96 having a centrally disposed aperture 98 therein slidably and rotatably receiving the control shaft 58. The first jet disk 96 is provided with an arcuate slot 100 which communicates the reserve chamber 78 with the fuel passage 14. The control shaft 58 is provided with a non-circular portion 102 which is complementary with the centrally disposed non-circular opening 104 formed in the second jet disk 106. The second jet disk 106, see FIGURES 2 and 5, is provided with a plurality of apertures 108 which are registrable with slot 100 in the first disk 96. Thus, it will be seen that upon rotation of the control shaft 58 that either one of or a plurality of apertures 108 may be registered with the slot 100 to permit the passage of fuel from the reserve chamber 78 into the main air passage 14. However, disposed about the end of the sleeve 34 adjacent the disks 96 and 106 is a foraminated fuel dispensing sleeve 110 which extends towards the opposite wall of the body 12 and encircles the operating shaft 58. A first wedge disk 112, which is provided with a centrally disposed aperture 114 receiving therethrough the control shaft 58, is secured to the inner surface of the air passage 14 remote from the sleeve 34 by means of suitable fasteners 116 and a second wedge cam disk 118 is secured to the control shaft 58 by means of a setscrew 120. It will be apparent that upon rotation of the control shaft 58 that the cam disks 112 and 118 will also effect longitudinal movement of the shaft 58. A compression spring 120 is disposed between and has its opposite ends in frictional engagement with the confronting surfaces of the cam disk 118 and the jet disks 106. With particular attention directed to FIGURE 2 of the drawings, it will be noted, therefore, that compression spring 120 not only serves to urge the cam disk 118 into surface-to-surface engagement with the cam disk 112 but also serves to urge the jet disk 106 into surface-to-surface contacting relation with the jet disk 96.

Secured through aperture 122 formed in the top wall 72 of the fuel supply chamber 40 by any convenient means is the lower portion of an idle metering valve assembly generally designated by the reference numeral 124 which communicates the interior of the fuel supply chamber 40 with an idle fuel passage 126. The valve assembly 124 includes a port 128 whose effective diameter is adjusted by means of needle valve 130 which is connected to a diaphragm 132 at its upper end whose remote side is sealed from the ambient atmosphere and in communication with the air passage 14 by means of conduit 134 thereby enabling the opening of the valve assembly 124 against the tension of compression spring 136 by means of vacuum in the air passage 14. Therefore, should the carburetor 10 be connected to the intake manifold of an internal combustion engine, sufficient fuel to enable idling of the internal combustion engine would be delivered into the air passage 14 by means of fuel passage 126 upon the unseating of needle valve 130 from port 128 by diaphragm 132 upon an increase of vacuum in the air passage 14. Further, an idle air metering valve 138 is provided in the body adjacent the mounting flange 16 communicating the main air passage with the ambient atmosphere and having an adjustable metering valve 140 disposed therein.

The control shaft 58 has secured to its outer end, by means of setscrew 142, an operating arm 144 to which the end of the connecting link 30 remote from the bell crank 28 is pivotally secured. As is desired, any form of throttle linkage 146 may be secured to the operating arm 144 in order to effect rotation of shafts 20 and 58.

In operation, the main metering valve 68 is adjusted for the fuel to be used by the carburetor 10. It is to be understood that the fuel supply chamber 40 is maintained full of fuel at all times and that the fuel contained therein is under normal operating pressures. With the throttle shaft 20 and the control shaft 58 rotated towards closed positions, the butterfly valve 22 restricts the passage of air through the main air passage 14 and the shaft 58 positions the second jet disk 106 so that none of the apertures 108 formed therein register with the slot 100 formed in the first jet disk 96. Also, the cam disks 112 and 118 are positioned with respect to each other as is shown in FIGURE 2 so that the ball check valve 88 is disposed in seating engagement with seat 86. Therefore, the ball check valve 88 restricts the flow of fuel through the bore 80 in the control shaft 58 from the fuel supply chamber 40 into the fuel reserve chamber 78 and the misalignment of the slot 100 with any of the apertures 108 restricts the flow of fuel from within the fuel reserve chamber 78 into the reticulated fuel dispensing sleeve 110.

Upon operation of the throttle linkage 146 to move both the throttle shaft 20 and control shaft 58 towards an open position, the rotation of the control shaft 58 effects longitudinal movement of the same to unseat the ball check valve 88 and also rotates the second jet disk 106 to align one or more of the apertures 108 therein with the slot 100 formed in the first jet disk 96. It is to be understood that the apertures 108 are of relatively small diameter and that the pressure of the fuel in the carburetor 10 will effect a stream of fuel being ejected from the apertures 108 upon their registry with the slot 100 so that air passing through the main air passage 14 and the foraminated fuel dispensing sleeve will atomize the fuel to a great degree.

It is to be understood further that the fine stream or streams of fuel being ejected from the delivery valve will tend to transverse the entire length of the foraminated member with the large streams having a greater force to accomplish this than the smaller streams. However, the velocity of the air passing through the reticulated member 110 will tend to deflect these streams and atomize the fuel throughout the entire length of the foraminated member. Also, since the larger streams of fuel will be ejected upon increased opening of the throttle valve and since this will necessarily also admit more air into the main air passage 14, the increased pressure of the larger streams will be automatically compensated for by the increased flow of air thereby not allowing the streams of fuel to traverse the length of the foraminated member 110 without being substantially completely atomized before any fuel strikes the opposite wall of the air passage 14. Still further, since the foraminated member surrounds the delivery valve and the streams of fuel ejected by the delivery valve are ejected directly toward the opposite wall of the main air passage 14, the effect of the air passing through the air passage 14 will always tend to deflect and atomize the stream of fuel regardless of the position of the carburetor 10. Also, although the supply chamber 40 has been shown formed as a separate part and attached to the body 12 with a gasket therebetween, it is to be noted that the body 12 and the supply chamber 40 could be integrally constructed.

With particular attention directed now to FIGURES

1 and 2 it will be noted that there is provided a drain opening **150** in the bottom of the supply chamber **40** which is internally threaded and has removably secured therein a threaded drain plug **152** which may be removed to drain from the supply chamber **40** any foreign material which may have collected therein.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A carburetor comprising a body portion with a main air passage formed therethrough and having a fuel supply chamber, a throttle shaft journaled in said body portion and having an air throttle valve secured thereto for regulating the flow of air through said air passage, a hollow elongated fuel dispensing sieve-like sleeve disposed transversely in said air passage, a fuel reserve chamber enclosed by one end of said fuel dispensing sleeve, means communicating said supply and reserve chambers, a delivery valve communicating said reserve chamber with the interior of said dispensing sleeve operable between a closed position and varying degrees of open positions to direct a jet discharge of fuel therefrom longitudinally of the interior of said sleeve, a control shaft operatively connected to said delivery valve, and means operatively connecting said throttle shaft with said control shaft for simultaneous movement therewith to move said delivery valve towards the open positions upon movement of said throttle valve towards an open position.

2. The combination of claim 1 including means for metering the maximum fuel flow from said supply chamber to said reserve chamber, and means for adjustably metering the fuel flow from said supply chamber to said reserve chamber in response to movement of said control shaft.

3. The combination of claim 1 including an idle fuel passage communicating said supply chamber and said air passage, a vacuum controlled metering valve disposed in said idle fuel passage metering fuel passing therethrough in response to vacuum in said air passage.

4. A carburetor comprising a body portion with a main air passage formed therethrough and having a fuel supply chamber, a throttle shaft journaled in said body portion and having an air throttle valve secured thereto for regulating the flow of air through said air passage, hollow foraminated fuel dispensing means disposed transversely in said air passage, a fuel reserve chamber enclosed by said fuel dispensing means, means communicating said supply and reserve chambers, a delivery valve communicating said reserve chamber with the interior of said dispensing means operable between a closed position and varying degrees of open positions, a control shaft operatively connected to said delivery valve, and means operatively connecting said throttle shaft with said control shaft for simultaneous movement therewith to move said delivery valve towards the open positions upon movement of said throttle valve toward an open position, said foraminated fuel dispensing means comprising a cylindrical member disposed transversely in said air passage a spaced distance from the side of said throttle valve remote from the intake of said air passage and extending substantially across the latter, said control shaft extends longitudinally through said cylindrical member, a straight bore communicating said supply and reserve chambers, one end of said control shaft being slidably and rotatably received in said bore, said first communicating mentioned means comprising a longitudinal bore formed in said control shaft terminating at one end in a radial bore communicating with said supply chamber and at the other end in a radial bore communicating with said reserve chamber, the end of said longitudinal bore adjacent said supply chamber comprising a valve seat, a ball check valve, means resiliently urging said check valve into seating engagement with said seat, said delivery valve comprising a first disk jet having a centrally disposed aperture formed therein snugly, rotatably and slidably receiving said control shaft and enclosing said reserve chamber secured to said body, said first disk having an arcuate slot formed therein with the center of its radii lying upon the longitudinal axis of said control shaft, a second disk jet slidably secured to said control shaft and engageable with said first disk jet in surface-to-surface side-by-side relation, a plurality of apertures formed in said second disk successively registrable with said slot upon rotation of said control shaft, and cam means on said control shaft effecting longitudinal movement of the latter to unseat said check valve from said seat upon movement of said throttle shaft towards an open position.

5. A carburetor comprising a body portion with a main air passage formed therethrough and having a fuel supply chamber, a throttle shaft journaled in said body portion and having an air throttle valve secured thereto for regulating the flow of air through said air passage, hollow foraminated fuel dispensing means disposed transversely in said air passage, a fuel reserve chamber enclosed by said fuel dispensing means, means communicating said supply and reserve chambers, a delivery valve communicating said reserve chamber with the interior of said dispensing means operable between a closed position and varying degrees of open positions, a control shaft operatively connected to said delivery valve, and means operatively connecting said throttle shaft with said control shaft for simultaneous movement therewith to move said delivery valve towards the open positions upon movement of said throttle valve toward an open position, said foraminated fuel dispensing means comprising a cylindrical member disposed transversely in said air passage a spaced distance from the side of said throttle valve remote from the intake of said air passage and extending substantially across the latter, said control shaft extending longitudinally through said cylindrical member, a straight bore communicating said supply and reserve chambers, one end of said control shaft being slidably and rotatably received in said bore, said first mentioned means comprising a longitudinal bore formed in said control shaft terminating at one end in a radial bore communicating with said supply chamber and at the other end in a radial bore communicating with said reserve chamber, the end of said longitudinal bore adjacent said supply chamber comprising a valve seat, a ball check valve, means resiliently urging said check valve into seating engagement with said seat, and cam means on said control shaft effecting longitudinal movement of the latter to unseat said check valve from said seat upon movement of said throttle shaft towards an open position.

6. The combination of claim 3, including an idle air metering valve assembly communicating said main air passage with the ambient atmosphere having an adjustable metering valve therein.

7. A carburetor comprising a body portion with a main air passage formed therethrough, a hollow cylindrical sieve-like fuel dispensing sleeve disposed in said air passage and extending thereacross, a fuel reserve chamber opening into one end of said fuel dispensing sleeve adapted to be communicated with a pressurized fuel supply, a delivery valve communicating said fuel reserve means with said dispensing sleeve, said delivery valve being operable from a closed position to selected open positions ejecting at least one stream of fuel into said one end of said dispensing sleeve towards the other end thereof, and an air throttle valve for metering the flow of air through said main air passage, and means interconnecting said

throttle valve and said delivery valve for simultaneous operation.

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