Nov. 29, 1938. R. F. BRACKE 2,138,591

CARBURETOR

Filed Feb. 14, 1935 3 Sheets-Sheet 1

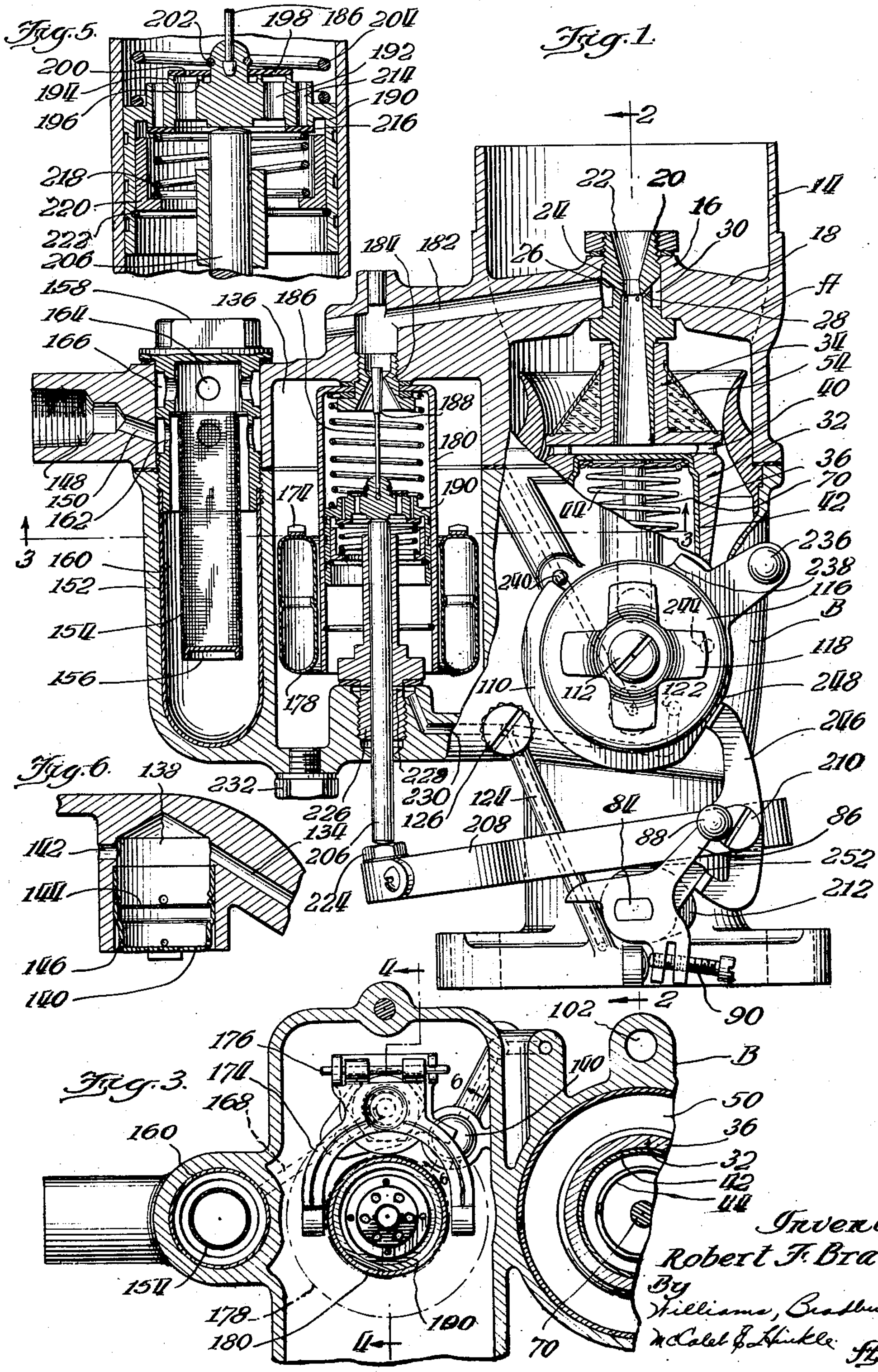

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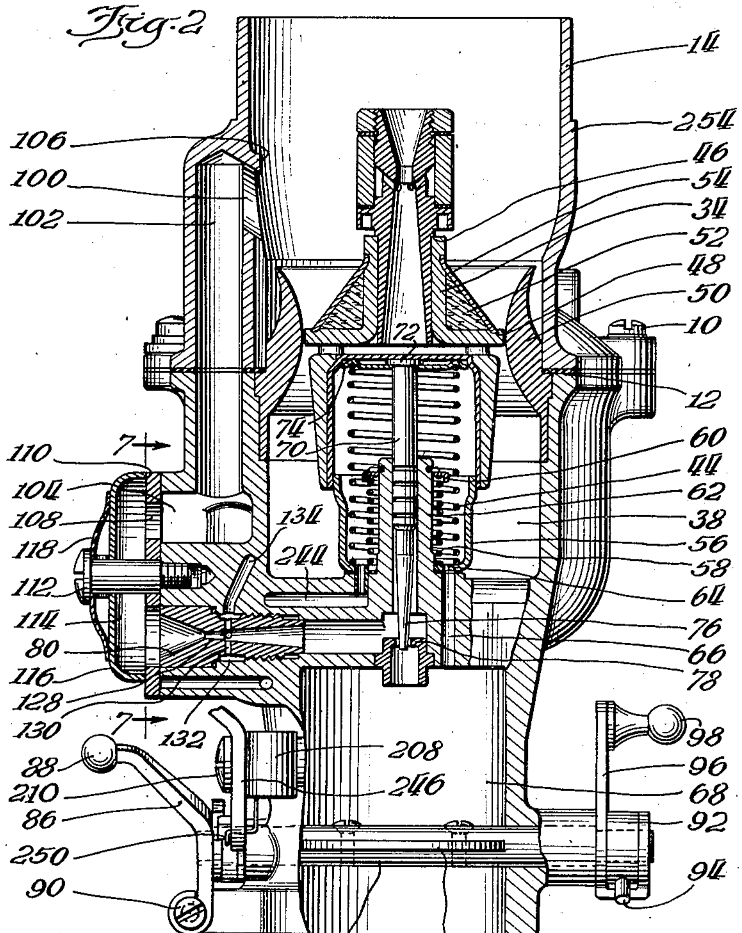
Fig. 2



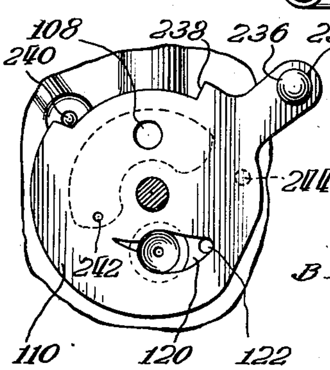


Fig. 7

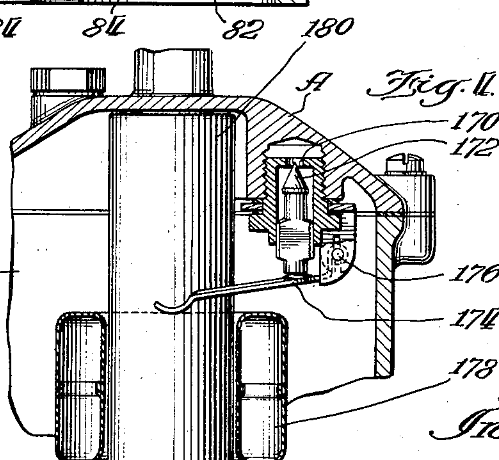


Fig. 4.

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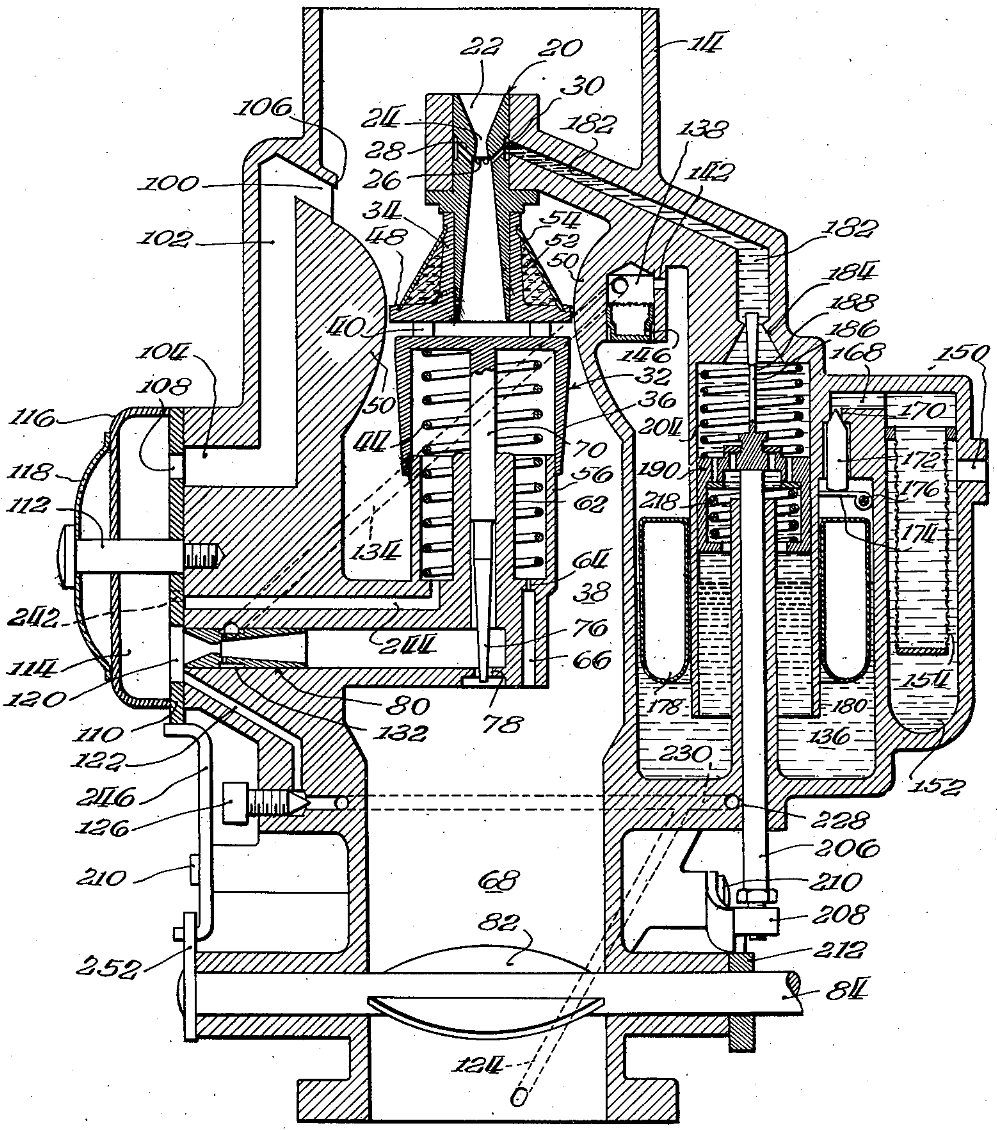
Fig. 8.



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Patented Nov. 29, 1938 2,138,591

UNITED STATES PATENT OFFICE

2,138,591

CARBURETOR

Robert F. Bracke, Chicago, Ill.

Application February 14, 1935, Serial No. 6,421

13 Claims. (Cl. 261—34)

My invention pertains to carburetors and is particularly concerned with the provision of a fuel lift carburetor for internal combustion engines which gives better engine operation and which is economical to manufacture and reliable in operation.

Another object is to provide a carburetor having an improved float and guiding means therefor.

Another object is to provide a carburetor having provided as an integral part thereof an improved filter for the fuel supplied to the carburetor.

Another object is to provide a carburetor affording better control of the quantities of fuel supplied to the engine under different operating conditions.

Another object is to provide a carburetor having improved means for cracking the throttle when the choke is in use.

Another object is to provide a carburetor having an improved secondary air valve which is not subject to fluttering and which opens more quickly to afford better acceleration.

Another object is to provide improved means for limiting opening of the secondary air valve while the choke is in use.

Another object is to provide a carburetor of the fuel lift type having improved means for reducing the degree of suction in the fuel chamber while the choke is being used.

Another object is to provide a carburetor of the fuel lift type having an improved booster Venturi tube.

Other objects and advantages will become apparent as the description proceeds.

In the drawings,

Figure 1 is an elevational view, partly in section, showing one embodiment of my invention;

Figure 2 is a sectional elevation taken on the line 2—2 of Figure 1;

Figure 3 is a horizontal section taken on the line 3—3 of Figure 1;

Figure 4 is a partial vertical section taken on the line 4—4 of Figure 3;

Figure 5 is an enlarged view of the accelerator pump mechanism;

Figure 6 is an enlarged partial vertical section taken on the line 6—6 of Figure 3;

Figure 7 is a vertical section taken on the line 7—7 of Figure 2; and

Figure 8 is a diagrammatic representation of my improved carburetor.

In the drawings, I have shown a downdraft type of fuel lift carburetor wherein the upper casting A and the lower casting B are secured together by any suitable means and together composed the main body of the carburetor. The particular means for securing the castings A and B together are illustrated as bolts 10, and a suitable washer or gasket 12 is shown as clamped between the castings A and B to form an airtight seal therebetween.

The upper casting A has an air horn 14 which is shown as communicating directly with atmosphere but which may be connected to a suitable air filter and silencer of the type now commonly used in connection with internal combustion engines, particularly where such engines are used in automotive vehicles. In the air horn 14 is a hub 16 supported by spokes 18. The hub 16 has a vertical opening therethrough in which a Venturi tube or nozzle 20 is suitably affixed. The nozzle 20 has a primary air inlet 22 converging toward a throat 24 terminating at a step 26, which in the carburetor shown has a width of approximately fifteen thousandths of an inch on a side so that the diameter of the throat 24 is thirty thousandths of an inch less than the diameter of the nozzle 20 immediately below the step 26. The width of this step 26 will vary with different sizes of carburetors but will never be less than approximately ten thousandths of an inch on a side.

Immediately beneath the step 26 are the inner ends of diagonal fuel feed passages 28 which establish communication between the interior of the nozzle and an annular chamber 30 surrounding the adjacent portion of the nozzle. The manner in which fuel is supplied to the annular chamber 30 is an important part of my invention and will be hereinafter described.

The fuel entering through the diagonal passages 28 mixes with the primary air and decreases the temperature of the incompletely vaporized mixture formed thereby. Surrounding the lower end of the nozzle 20 is a secondary air valve 32 comprising a casting having an upper portion or sleeve 34 which telescopes with the lower end of the nozzle 20 and a lower portion 36 which extends down into a mixing chamber 38. The upper portion 34 and lower portion 38 are connected by four pins 40. A sheet metal cup 42 is pressed into the lower portion 36 and a spring 44 urges the air valve toward the position shown, in which position the extreme upper end of the air valve abuts a shoulder 46 provided by the nozzle 20.

When the air valve is in its uppermost position, as shown in the drawings, the intermediate portion 48 closes the restricted passageway formed by a throat member 50 so that no secondary air can enter the mixing chamber 38. The upper part of the air valve 34 is surrounded by a layer of cork 52 or other suitable insulating material which is held in place by a sheet metal cover 54. The mixture of fuel and air passing downwardly through the nozzle 20 is at a temperature considerably lower than that of atmosphere. The lower end of the nozzle 20 directs this mixture against the upper end of cup 42 which causes this mixture to be directed radially in the space provided between the upper and lower portions of the air valve so that the entire upper portion of the air valve is subjected to the low temperature of this mixture. The cork insulation 52 is provided for the purpose of preventing this cool mixture from absorbing heat from the cover 54. If the cover 54 is materially colder than atmosphere, the secondary air which flows around the air valve when the latter is in a lower position would deposit moisture on this cover 54, and under certain conditions of atmospheric temperature this moisture might freeze and render the air valve inoperative.

The lower portion of the air valve is telescopically related to a cup-shaped guide 56 which is secured in place by a spring 58 confined between the inturned flange of the guide 56 and a washer 60 secured to the upstanding sleeve 62. The inturned flange of the guide 56 is provided with a small orifice 64 registering with a passage 66 leading to the throttle bore 68. By means of passage 66 and orifice 64, the suction existing in the upper part of throttle bore 68 is communicated to the interior of the air valve 32 and draws this valve downwardly against the resistance of the spring 44 an amount proportional to the degree of suction existing in the upper part of the throttle bore.

A pin 70 is slidably guided in the sleeve 62 and has an enlarged head 72 confined between the base of cup 42 and a plate 74 which rests upon the upper end of the spring 44. The lower end of the pin 70 is tapered, as indicated at 76, and lies within a metered opening 78 controlling communication between the upper end of the throttle bore 68 and the discharge end of a booster Venturi tube 80 which draws fuel from a main fuel tank, not shown. The position of the tapered end 76 of the pin 70 varies with the degree of suction existing in the upper end of the throttle bore 68, with the result that a substantially constant degree of suction is maintained in the discharge end of the booster 80.

In the throttle bore 68 is the usual throttle valve 82 supported on a rotatable shaft 84 attached at one end to a lever 86 adapted to be connected by way of a knob 88 with the usual accelerator pedal or other suitable control means. The lever 86 is provided with the usual adjustable stop 90. The other end of shaft 84 is provided with a collar 92 held in place by a pin 94 which projects from the collar and establishes a one-way connection with the U-shaped end of a second lever 96 having a knob 98 whereby this lever can be connected to the usual manual hand control of an automobile.

Part of the air entering the horn 14 enters an opening 100 at one side of the horn and from thence passes into a vertical passage 102 communicating with a horizontal passage 104. The opening 100 is slightly inclined in a reverse direction relative to the direction of the air in the horn 14, and this opening 100 is located beneath an overhanging shelf 106. This construction prevents the formation of a Pitot tube action at this point and also prevents dirt and moisture from entering the passage 102.

The horizontal passage 104 communicates with a metered orifice 108 in a plate 110 oscillably mounted on a bolt 112. The orifice 108 restricts the amount of air admitted to the chamber 114 formed by a sheet-metal cup 116 clamped against plate 110 by star-shaped spring 118. The plate 110 is provided with a second opening 120 having the peculiar conformation shown in Figure 7. This opening 120 normally establishes free communication between the chamber 114 and the inlet end of the booster 80.

Opening 120 also normally establishes communication between the chamber 114 and a passage 122 and a second passage 124 which opens into the throttle bore 68 at a point below the throttle valve 82 so that the suction on the engine side of the throttle valve is communicated to chamber 114 by way of passages 122 and 124 and opening 120. A needle valve 126 is located at the juncture of passages 124 and 122 and constitutes the idling adjustment for the carburetor. The manner in which this idling adjustment controls the operation of the carburetor is fully described in my prior application, Serial No. 4,479, filed February 1, 1935. The carburetor disclosed and claimed in this present application is an improvement on that disclosed and claimed in this earlier application.

The booster Venturi tube 80 has a throat 128 terminating at a shallow step of from two to four thousandths of an inch on a side. Just to the right of this step are passages 130 leading to an annular chamber 132 communicating with a passage 134 leading to the upper end of the fuel chamber or float chamber 136.

The booster Venturi tubes heretofore used have been provided with a smooth throat which did not include any step. These prior art boosters were extremely difficult to manufacture on a commercial scale because extremely slight variations in the drilling of the throat would produce wide variations in the degree of suction which such boosters would produce for any given flow of air through them. By providing a slight step of the order indicated, the narrowest part of the throat is definitely located with respect to the radial passages 130, and this step is made just large enough to compensate for the usual variations in the drilling operation. Furthermore, the provision of this step renders the booster less susceptible to disturbances resulting from the deposit of small particles of dirt in the throat of the booster. The step is so narrow that it does not appreciably detract from the efficiency of the booster.

As best shown in Figure 6, the upper end of passage 134 does not communicate directly with fuel chamber 136 but instead communicates with a space 138 located above the fuel chamber 136 and separated therefrom by a sheet metal cup 140. The air and vapor withdrawn from the fuel chamber 136 by booster 80 first passes through a port 142 into space 138 where any liquid falls down onto strainer 144 and passes therethrough and into the bottom of the cup 140 from whence it is returned to the fuel chamber through openings 146 adjacent the bottom of the cup 140. The purpose of this structure is to prevent liquid from being sucked or splashed into the upper end of passage 134.

The suction created in the fuel chamber 136 by the booster 80 draws fuel into the carburetor by way of conduit 148 formed in a threaded boss which is adapted to be connected to the main fuel tank by means of piping. Conduit 148 communicates with downwardly-inclined duct 150 leading into a filter chamber 152 provided by the castings A and B. A tubular wire screen 154, having its bottom closed by a sheet metal cap 156, is supported in the chamber 152 by a head 158 threaded into the upper end of the chamber. The head 158 also supports a shell 160 which encloses the lower end of the screen 154 and is spaced therefrom. Fuel entering through conduit 148 and duct 150 flows through openings 162 into the space between the shell 160 and the screen 154. Any water which may be in the fuel collects in the bottom of the shell, whereas the fuel being lighter, passes through the screen 154 and flows out through openings 164 into the annular space 166.

After the carburetor has been in use for an appreciable length of time, the head 158, screen 154 and shell 160 can be removed as a unit. The shell 160 can then be separated from the head 158 with which it has a frictional engagement, and any water collected in the shell 160 can then be disposed of. At the same time the screen 154 can be cleaned of dirt and other obstructing material. The unit is then reassembled and replaced in the chamber 152.

Annular space 166 connects with one end of a passage 168 (Figure 3) leading to a port 170 (Figure 4) controlled by a valve 172. The lower end of the valve rests on a bifurcated lever 174 pivoted on a pin 176 and having separated ends resting on a float 178 and disposed on opposite sides of a cylinder 180 located in the fuel chamber of the carburetor. The float 178 is annular and surrounds the cylinder 180 which forms a guide for it. The float 178 controls the valve 172 in the usual manner.

The diagonal passages 28 in the nozzle 20 are supplied with fuel from the fuel chamber 136 by way of the interior of cylinder 180 and bore 182. Between cylinder 180 and bore 182 is a knife-edged orifice 184 in which is located an economizer pin 186. The extreme upper end of the economizer pin is cylindrical for a space of approximately three thirty-seconds of an inch. Below this the upper end of the economizer pin is tapered to the shoulder 188 which connects the tapered portion of the pin with a cylindrical stem of smaller diameter. The pin 186 is carried by a piston 190 of an accelerator pump which I shall now describe.

As best shown in Figure 5, the piston 190 has a circular inner series of ports 192 leading to the annular space provided by upstanding ribs 194 and 196. A disk valve 198 is supported on these ribs and is provided with a small orifice 200 which provides for the passage of sufficient fuel for the engine when it is idling. When the engine is operating at part and full throttle, disk 198 is lifted away from the ribs 194 and 196 and moved into engagement with the spring clip 202 so that additional fuel can pass through the ports 192 and around the edge of the disk 198 to provide for the increased fuel consumption of the engine. The piston 190 is urged downwardly by a spring 204 and is moved upwardly against the tension of this spring by piston rod 206 which rests on one end of a lever 208 pivoted at 210. An intermediate portion of the lever 208 rests on a cam 212 on one end of the throttle valve shaft so that as the throttle valve is opened the piston 190 is moved upwardly in its cylinder 180. This upward movement of the piston 190 results in the closing of the ports 192 by the disk 198 and pumps a charge of fuel to the nozzle 20.

When the throttle is suddenly opened through its full movement, this pumping action of the piston 190 would force too much fuel to the nozzle 20, and to avoid this I have provided relief means comprising an outer series of ports 214 in the piston 190. These ports are normally closed by a valve 216 held against the lower end of these ports by a spring 218 resting on the inturned flange provided by a sleeve 220 held in place by a clip 222.

As the throttle valve is shifted to different positions, the piston 190 is similarly shifted and this piston in turn changes the position of that part of the pin 186 in the knife-edged orifice 184. The relationship between the pin 186 and the throttle valve can be varied by adjusting the nut 224 which engages the lower end of the piston rod 206. The short cylindrical upper end of the pin 186 provides the proper idling position of the pin 186 for all positions of the adjusting nut 224. Similarly, when the throttle is wide open, the reduced cylindrical stem portion of the pin 186 is always within the knife-edged orifice 184.

Piston rod 206 is guided by a member 226 which is threadedly secured in the lower casting B. The upper end of member 226 extends above the normal level of the fuel in the fuel chamber 136 so that there is no tendency for the fuel to leak out around the piston rod 206. It is equally important that no air leak into this fuel chamber along the piston rod, and to prevent this I provide member 206 with radial ducts 228 communicating with a passage 230 leading to the passage 124 which empties into the throttle bore 68 on the engine side of the throttle 82 so that any air which may tend to leak in along the piston rod 206 is disposed of before it can reach the fuel chamber 136. The fuel chamber 136 is provided with a drain plug 232.

In Figure 7 the choke plate 110 is shown in the position which this plate assumes when the choke is not in use and the engine is operating under normal conditions. This plate 110 is provided with an arm 234 having a ball connection 236 whereby this plate can be attached to the usual manual choke control. As the choke is applied by rotating the plate 110 counterclockwise, as viewed in Figure 7, the large part of opening 120 moves away from the entrance to the booster Venturi tube 80, thereby restricting the amount of air supplied to this booster and reducing the suction effect which it creates in the fuel chamber 136. The degree to which the admission of air to the booster 80 is restricted varies with the extent to which the choke is applied. When the choke is fully applied so that shoulder 238 of the choke plate abuts the stop pin 240, the opening 120 is moved entirely away from the entrance to the booster 80, and the very small orifice 242 registers with the booster and forms the sole source of air therefor.

In the full choke position of plate 110, the right-hand end of opening 120 overlies the end of a duct 244 leading into the interior of secondary air valve 32. It is to be noted that duct 244 is considerably larger than orifice 64 which connects the interior of the air valve with the throttle bore 68 so that when the choke is fully applied, opening 120 in the choke plate and duct 244 admit air to the interior of the secondary air valve faster than this air can be sucked out through the restricted orifice 64, with the result that the secondary air valve remains substantially in the closed position shown in the drawings when the engine is being started with full choke.

When the choke is in the off position, as shown in Figures 1 and 7 of the drawings, one end of a finger 246, pivoted on pin 210, is held in engagement with the flat edge portion 248 of choke plate 110 by a spring 250. The other end of the lever 246 abuts an arm 252 secured to throttle shaft 84. When plate 110 is moved to produce a choking effect, the cam-shaped edge of this plate swings lever 246 about its pivot and cracks or slightly opens throttle valve 82 so that the engine will not stall so easily when operating under part or full choke.

The air horn 14 is shown as being provided with a shoulder 254 whereby an air cleaner and silencer of the usual type may readily be applied to the carburetor. The operation of the carburetor is the same, whether or not it be used with such an air cleaner and silencer.

In the operation of my invention, the air passing into the horn 14 through opening 100, passages 102 and 104, and chamber 114, flows through the booster Venturi tube 80 and discharges into the manifold bore 68. As this air passes through the throat of the booster 80, it creates a suction in passage 134 which communicates with the upper end of fuel chamber 136 so that a vacuum is created in this fuel chamber which sucks fuel from the main supply tank through the filter and into the fuel chamber. As the fuel chamber 136 fills up with fuel, the float 178 rises, and when the fuel level has reached the proper height, this float closes the admission valve 172.

The primary air enters the horn 14 and flows down through the nozzle Venturi tube 20, creating a suction in the throat thereof and drawing fuel upwardly through cylinder 180, piston 190 and passage 182, to the annular space surrounding the throat of nozzle 20. From this space the fuel flows through diagonal passages 28 into the primary air stream passing through the nozzle 20. The mixture of air and fuel delivered by the nozzle 20 strikes the upper end of the cup 42 of the secondary air valve and has its direction changed from an axial to a radial flow.

In the normal part throttle and full throttle operation of the engine, the suction created in the interior of the secondary air valve 32 moves this air valve downwardly from the position shown so that secondary air can enter around this valve. The mixture of air and fuel delivered by the nozzle 20 forms a combustible mixture with the secondary air admitted around the air valve 48, and this combustible mixture passes into the throttle bore 68 and from thence through the manifold to the engine cylinders.

It is to be noted that as the secondary air valve 32 moves downwardly, its upper end forms in effect a continuation of the discharge end of the nozzle 20. The air valve and throat member 50 are so designed that they constitute in effect a large Venturi tube for all positions of the air valve, this Venturi tube automatically varying in capacity in accordance with the volume of secondary air drawn in around the air valve. The particular structure of the secondary air valve and throat 50 is designed to provide quick opening of the air valve and to prevent fluttering thereof, particularly at low engine speeds when such fluttering is most likely to occur in the air valves of the prior art.

When the throttle 82 is partly or fully open, an increased suction is produced in the upper end of the throttle bore 68. In these positions of the throttle 82 the secondary air valve 32 is lowered in proportion to the increase in vacuum in the throttle bore. The air valve in turn controls the position of the tapered end 76 of the pin 70 so that the suction obtaining at the discharge end of booster 80 is maintained constant.

When the throttle is opened suddenly, the piston 190 forces an additional charge of fluid to the nozzle 20 to provide for rapid acceleration. However, where the throttle is suddenly opened over a wide range of throttle movement, the valve 216 in the piston 190 opens to prevent the piston 190 from supplying an excess of fuel to the nozzle 20. In idling position and in all intermediate throttle positions, the enlarged upper end of pin 186 is located in the knife-edged orifice 184 and correctly apportions the amount of fuel supplied to the nozzle 20, whereas in full throttle position the reduced stem of pin 186 is located in the knife-edged orifice 184 and free flow of fuel to the nozzle 20 is then permitted.

When the choke is applied the choke plate 110 is so moved that the supply of air to the booster 80 is restricted to a degree corresponding to the degree of choking desired. This correspondingly reduces the suction created in the fuel chamber by this booster and provides a greater difference in pressure between the throttle of the nozzle 20 and the fuel chamber so that the nozzle 20 supplies a correspondingly richer mixture to the engine. Application of the choke also opens or cracks the throttle valve 82 slightly. The choke is seldom used except when the engine is cold, and when an engine is operating below its normal operating temperature it stalls easily. By thus cracking the throttle, this tendency to stall is offset.

While I have disclosed only one embodiment of my invention, it is to be understood that my invention is capable of assuming various forms and that the scope of my invention is to be limited solely by the following claims.

I claim:

1. In a carburetor of the class described the combination of a cast portion providing a fuel chamber, a nozzle supplied therefrom, a cylinder separate from said cast portion and located in said fuel chamber for establishing communication between said nozzle and the lower end of said fuel chamber, said cylinder having smooth internal and external surfaces, an accelerator pump piston reciprocable in said cylinder, a float in said fuel chamber closely fitting said cylinder and guided thereby, and valve means operated by said float, said valve means permitting straight line movement of said float lengthwise of said cylinder.

2. In a fuel lift carburetor of the class described, a nozzle, a fuel chamber, means connecting said nozzle with said chamber, a booster Venturi tube for maintaining the interior of said fuel chamber below atmospheric pressure, said booster Venturi tube being adapted to discharge into the intake manifold of an engine, valve means for reducing the suction produced by the booster Venturi tube, a throttle valve, and means operated by said first-named valve means to partially open said throttle valve when said first-named valve means is in position to reduce the suction produced by the booster Venturi tube.

3. In a carburetor of the class described, the combination of a nozzle having a tubular dis-

charge end, an air valve having a portion telescoping with said discharge end, a layer of insulation surrounding said portion, and means for opening and closing said air valve to provide controlled admission of air therepast.

4. In a fuel lift carburetor of the class described, the combination of a nozzle Venturi tube providing a rich mixture of fuel and air, an air valve for admitting additional air for reducing the richness of said mixture, a fuel chamber from which said nozzle Venturi tube is supplied with fuel, a booster Venturi tube for creating a suction in said fuel chamber, said booster Venturi tube discharging through a metered orifice lying in a plane normal to the movement of said air valve, said metered orifice being in alignment with said air valve, and a pin movable directly with said air valve and having a tapered portion extending into said metered orifice to regulate flow through said booster.

5. In a fuel lift carburetor of the class described, the combination of a nozzle, a fuel chamber from which said nozzle is supplied, a booster for creating a suction in said fuel chamber, a compartment provided in the top wall of said fuel chamber, a port connecting one side of said compartment with the upper part of said fuel chamber, a passage connecting the other side of said compartment with said booster, and a sheet metal cup closing the bottom of said compartment to prevent fuel from splashing thereinto, said cup having drain passages whereby liquid drawn into said compartment may return to said fuel chamber.

6. In a fuel lift carburetor of the class described, the combination of a nozzle, a fuel chamber from which said nozzle is supplied, a booster for creating a suction in said fuel chamber, a compartment provided in the top wall of said fuel chamber, a port connecting one side of said compartment with the upper part of said fuel chamber, a passage connecting the other side of said compartment with said booster, a sheet metal cup closing the bottom of said compartment to prevent fuel from splashing thereinto, said cup having drain passages whereby liquid drawn into said compartment may return to said fuel chamber, and a strainer carried by said cup.

7. In a carburetor of the class described, the combination of a fuel feeding nozzle, a pump for supplying fuel thereto, said pump comprising a vertical cylinder, a piston reciprocable therein, said piston including a body having two series of ports therethrough, a disk above said piston urged by gravity to close one of said series of ports except for a small idling orifice through said disk, an annulus below said piston, a spring urging said annulus against said piston to close said second series of ports, a throttle valve for said nozzle, common means for opening said throttle valve and raising said piston, and a spring for returning said piston.

8. In a fuel lift carburetor of the class described, the combination of a nozzle Venturi tube, a fuel chamber from which said nozzle is supplied, a booster Venturi tube for creating a suction in said fuel chamber, a chamber in communication with the inlet to said booster, means for admitting a restricted volume of air to said chamber, an accelerator pump for supplying fuel from said fuel chamber to said nozzle, an operating rod for said pump extending through a wall of said fuel chamber, a guide for said rod, said guide having radial passages communicating with said rod intermediate the ends of said guide, a throttle valve for said nozzle, and a duct connecting the engine side of said throttle valve with said radial passages and the chamber communicating with the inlet to said booster.

9. In a fuel lift carburetor of the class described, the combination of a nozzle, a fuel chamber from which said nozzle is supplied, a booster Venturi tube for creating a suction in said fuel chamber, a plate having a port controlling the inlet to said booster, a sheet metal cup forming an inlet chamber for said booster, a second port in said plate forming a restricted air inlet for said last-named chamber, and means for shifting said plate to vary the amount of air admitted to said booster.

10. In a self-feeding carburetor of the class described, the combination of a fuel-feeding nozzle, a mixing chamber into which said nozzle discharges, a fuel supply chamber, a booster nozzle for creating a sub-atmospheric pressure in said chamber, said booster nozzle discharging into said mixing chamber, an automatic air valve for maintaining minimum depression in said fuel supply chamber and in said mixing chamber, a throttle valve on the engine side of said air valve, a conduit connecting said fuel-feeding nozzle with said fuel supply chamber, said conduit including a fixed cylinder and a perforate piston through which all fuel supplied to said fuel-feeding nozzle must pass, said piston being reciprocable in said cylinder, a rod for moving said piston in one direction, an interconnection between said rod and said throttle whereby upon opening said throttle said piston advances in a direction tending to supply an accelerating charge to said fuel-feeding nozzle, and a valve coacting with said piston to regulate return flow of fuel therethrough whereby the accelerating charge is prevented from becoming excessive.

11. In a self-feeding carburetor of the class described, the combination of a mixing chamber, a fuel supply chamber, means for creating a sub-atmospheric pressure in said fuel supply chamber, an automatic air valve for maintaining minimum depression in said fuel chamber and in said mixing chamber, a fuel-feeding nozzle discharging into said mixing chamber and supplying the normal operating requirements of an engine to which said carburetor is attached, a throttle valve on the engine side of said air valve, an accelerating pump interposed between said nozzle and said fuel chamber whereby all fuel supplied to said nozzle passes through said pump, said pump comprising a cylinder, a perforate piston therein, means for advancing said piston upon opening of said throttle valve, said piston being in communication with said fuel chamber whereby fuel from said chamber is admitted through said piston to said cylinder, a member for regulating return flow of fuel through said piston to prevent oversupply of fuel to said nozzle during acceleration, and a fuel discharge passage leading from said cylinder to said nozzle.

12. In a carburetor of the class described, the combination of a fuel-feeding nozzle supplying the normal operating requirements of an engine to which said carburetor is attached, an accelerator pump for supplying fuel thereto, said pump comprising a cylinder, a perforate piston through which fuel is normally supplied to said nozzle, a conduit connecting said cylinder with said nozzle, means for advancing said piston to supply an accelerating charge of fuel to said nozzle, and a valve-controlled opening permitting back flow of

fuel through said piston to prevent oversupply of fuel to said nozzle during acceleration.

13. In a fuel lift carburetor of the class described, a nozzle, a fuel chamber, means connecting said nozzle with said chamber, a booster Venturi tube for maintaining the interior of said fuel chamber below atmospheric pressure, said booster Venturi tube being adapted to discharge into the intake manifold of an engine, a choke plate movable to restrict the inlet of the booster Venturi tube for reducing the suction produced by said booster Venturi tube, a throttle valve, and means comprising a cam on said choke plate and a lever operated thereby to partially open said throttle valve when said choke plate is in position to restrict the inlet of said booster Venturi tube.

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