March 3, 1959 G. J. GRETZ 2,875,990

CARBURETORS

Filed May 11, 1956 2 Sheets-Sheet 1

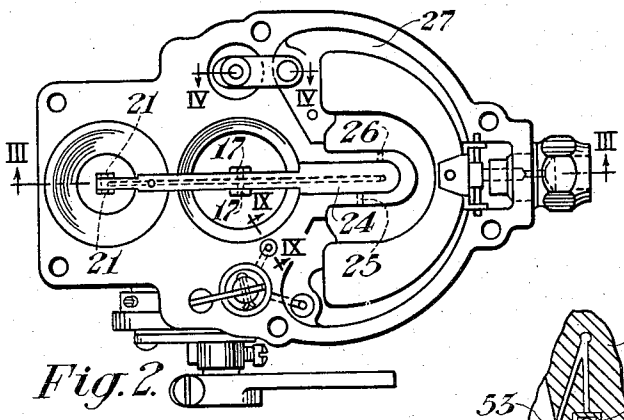


Fig. 2.

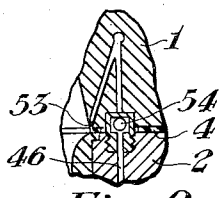


Fig. 9.

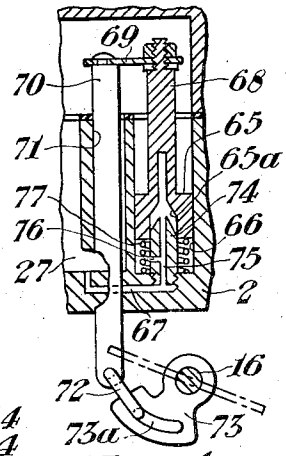


Fig. 4.

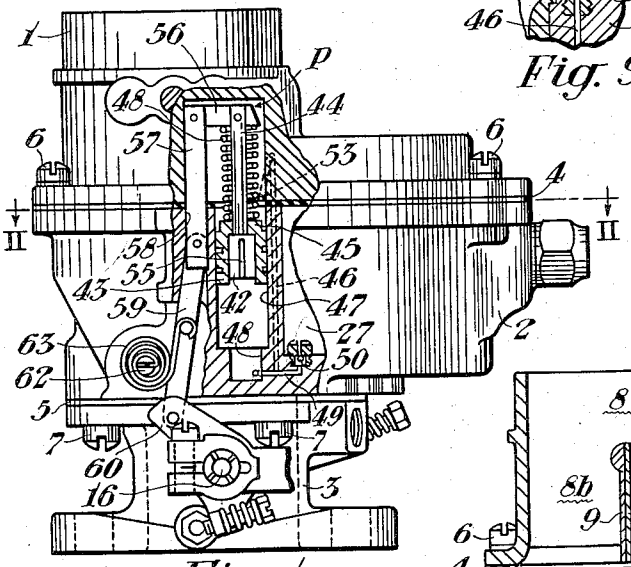


Fig. 1.

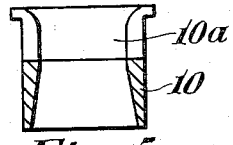


Fig. 5.



Fig. 6.

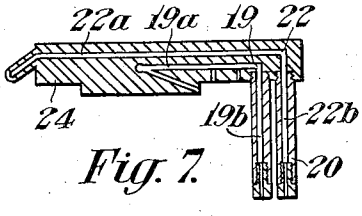


Fig. 7.

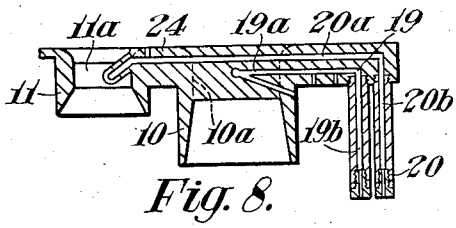


Fig. 8.

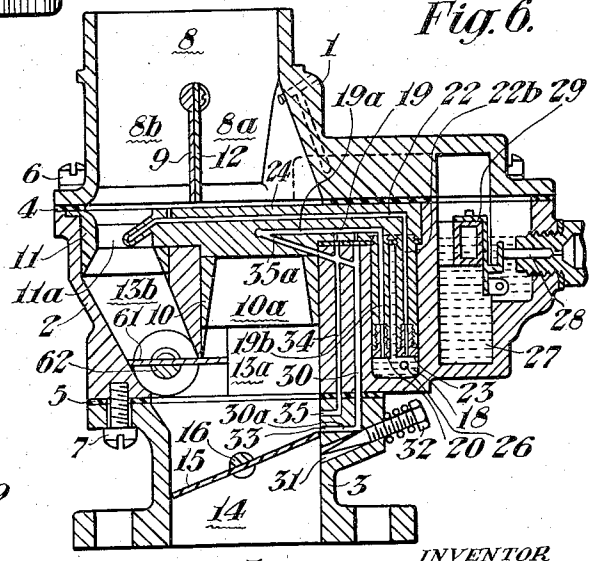


Fig. 3.

INVENTOR
George J. Gretz
BY W. L. Stout
HIS ATTORNEY

March 3, 1959 G. J. GRETZ 2,875,990

CARBURETORS

Filed May 11, 1956 2 Sheets-Sheet 2

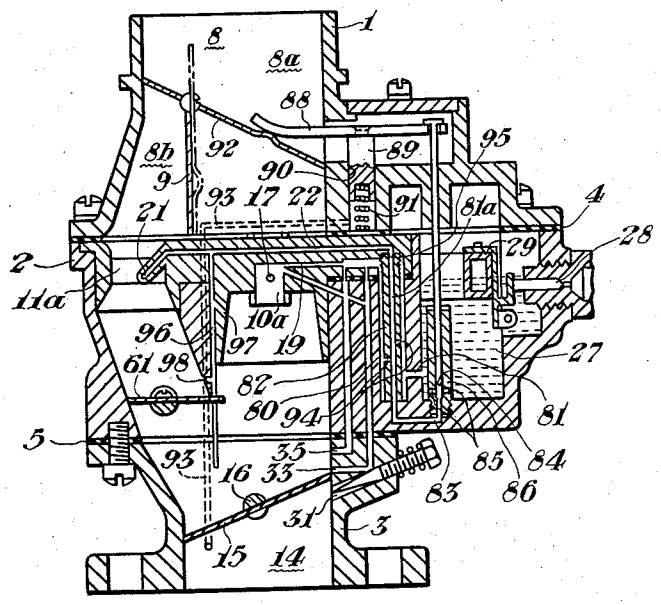


Fig. 10.

INVENTOR.
George J. Gretz
BY W. L. Stout.

HIS ATTORNEY

United States Patent Office

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2,875,990

CARBURETORS

George J. Gretz, Pittsburgh, Pa.

Application May 11, 1956, Serial No. 584,207

7 Claims. (Cl. 261—23)

My invention relates to carburetors, and particularly to down draft carburetors of the plain tube type.

It is well known that the present day plain tube types of down draft carburetors in common use provide a compromise between the best wide open throttle power at slow speeds and the highest speed under level road driving conditions, economy and maximum power being sacrificed for speed.

One object of my present invention is to provide an improved down draft carburetor of the plain tube type providing better performance at all speeds without sacrificing economy in fuel consumption.

Another object of my invention is to provide a down draft carburetor of the type described in which there is no after drip when the car on which it is installed is brought to a sudden stop or is stopped on a grade.

Another object of my invention is to provide an improved carburetor of the type described which will furnish a longer range of smoother off idle performance without any so-called flat spots.

Another object of my invention is to provide a carburetor of the type described having a constant and more uniform distribution of fuel at all engine speeds or throttle positions.

Another object of my invention is to provide a carburetor of the type described having two separate Venturi openings, one of which becomes effective to provide additional fuel mixture in response to high engine velocity when the throttle is open.

The present application is a continuation-in-part of my prior application, Serial No. 326,495, filed December 17, 1952, for Carburetors, now Patent No. 2,752,131, granted June 26, 1956.

According to my invention, main and auxiliary fuel channels are provided each having vertical portions, the lower ends of which receive fuel from the float chamber and the upper ends of which connect with horizontal portions leading to main and auxiliary discharge ports disposed respectively in main and auxiliary Venturi openings. The float chamber which is formed as part of the central body section is semi-circular and has its center located at substantially the vertical portions of the fuel channels. The fuel level is maintained no higher than the upper ends of the vertical portions of the fuel channels and as a result fuel will not run out or drip when the car is brought to a sudden stop or stopped on a grade.

The fuel mixture at idling speeds is supplied through a low speed circuit comprising a first vertical passageway which communicates at its upper end with the horizontal portion of the main fuel channel and at its lower end with a first discharge port containing the idling adjustment screw. A branch passageway connects this first vertical passageway with a second port which is so located with respect to the throttle that when the throttle is closed no fuel is discharged through this port, but as the throttle opens the second port is gradually opened to the air stream to cause it to discharge fuel into the air stream in parallel with the first port, this second port

being effective to provide the proper fuel mixture for speeds between idling speeds and a predetermined low speech such, for example, as 22 miles per hour. It should be noted that at closed throttle the main discharge port and the second port meter air into the low speed idling system.

The low speed idling system also includes a second vertical passageway communicating at its upper end with the horizontal portion of the main fuel channel and at its lower end with a third discharge port disposed above the second port. An air bleed passageway connects both vertical passageways between the point of connection with the horizontal portion of the main fuel channel directly with the main discharge port. As the throttle is gradually opened the second port is gradually transformed from an air bleed port to a fuel discharge port, and as the suction continues to increase, the third discharge port starts to discharge additional fuel into the air stream. This continues to a predetermined speed such, for example, as 45 miles per hour under level road driving conditions. As the throttle continues to open, the main discharge port is gradually transformed from an air bleed into a fuel discharge port.

The carburetor also includes a second Venturi opening in parallel with the main Venturi opening. This second opening is normally closed at its lower end by a butterfly valve biased to its closed position by a spiral spring connected to the accelerator pump operating link in such manner that as the throttle is opened the spring tension is gradually decreased. A portion of this butterfly valve extends into the main air stream so that as the velocity of the air suction increases, it will produce an increasing force tending to open this valve. Fuel is supplied to this second Venturi opening by an auxiliary discharge port connected to the horizontal portion of the auxiliary fuel channel. The parts are so proportioned that at the higher engine speeds, such, for example, as 60 or more miles per hour under level road driving conditions, if the throttle is open so that the tension on the spring biasing the butterfly valve to its closed position is reduced, this valve will open and will thus cause the auxiliary discharge port to discharge fuel into the second Venturi opening. This auxiliary Venturi opening enables the main Venturi opening to be reduced in size and thus obtain better fuel economy at the usual driving speeds and also better power at slow speed wide open throttle conditions, without sacrificing acceleration or power at the higher driving speeds.

In a modified form of my carburetor, the horizontal passageway leading to the auxiliary discharge port is connected intermediate its ends with a vertical auxiliary air bleed passageway which extends downwardly to a point just above the main butterfly valve. This auxiliary passageway communicates intermediate its ends through a first suction port with the main Venturi at or just below the throat of the Venturi, and also with the second Venturi opening just above the auxiliary butterfly valve. As the throttle is opened, suction develops in this auxiliary air bleed passageway which automatically begins to reduce back air bleed and starts enriching the mixture by reducing the flow of air. As suction further develops, this auxiliary air bleed passageway tends to bring fuel to the tip of the auxiliary discharge port so that when the secondary or auxiliary butterfly valve opens, fuel will be at or near the tip of the auxiliary discharge port. This arrangement assists in freer fuel discharge by lessening fuel surface friction at low speed but prevents leaning out of the mixture at extreme high speed. That is to say, the suction controlled auxiliary air bleed in the mixing chamber above the throttle and below the main discharge port gives a very uniform mixture for all speeds.

In this modified form of my carburetor, I also employ a somewhat different arrangement for supplying the fuel from the float chamber to the main and auxiliary discharge ports to provide an enriched mixture for the main Venturi opening on slow hard pulls and adequate fuel for the secondary barrel at extreme high speed level road driving conditions.

Other objects and characteristic features of my invention will become apparent as the description proceeds.

I shall describe one form of carburetor embodying my invention, and shall then point out the novel features thereof in claims.

In the accompanying drawings:

Fig. 1 is a side elevational view of a carburetor embodying my invention with a portion broken away and in section to show the accelerating pump.

Fig. 2 is a sectional view taken on the line II—II of Fig. 1.

Fig. 3 is a sectional view taken on the line III—III of Fig. 2.

Fig. 4 is a sectional view taken on the line IV—IV of Fig. 2.

Figs. 5 and 6 are detail vertical sectional views of the Venturi tubes **10** and **11** forming part of the carburetor shown in Figs. 1, 2 and 3.

Fig. 7 is a detail vertical sectional view of a member **24** which houses the main and auxiliary fuel channels for the carburetor shown in Figs. 1, 2 and 3.

Fig. 8 is a vertical sectional view of a modified arrangement of the Venturi tubes and member **24** for the carburetor shown in Figs. 1, 2 and 3.

Fig. 9 is a detail sectional view taken on the line IX—IX of Fig. 2.

Fig. 10 is a sectional view similar to Fig. 3 showing a modified form of a carburetor embodying my invention.

Similar reference characters refer to similar parts in each of the several views.

Referring now to the drawings, the carburetor in the form here shown comprises three sections **1**, **2** and **3** separated by suitable gaskets **4** and **5** and bolted together in the usual manner by bolts **6** and **7**. The various sections may be constructed in any suitable manner, but will usually consist of die castings as is customary.

The upper section **1** contains the air inlet **8** which is divided by a partition **9** into two separate passageways **8***a* and **8***b* leading into main and auxiliary Venturi openings **10***a* and **11***a* formed in Venturi sleeves **10** and **11** disposed in the main body portion **2** of the carburetor. The upper section **1** also houses a choke valve **12** so disposed that when it is moved to its closed position it will close or restrict the passageway **8***a*.

The Venturi openings **10***a* and **11***a* communicate through passageways **13***a* and **13***b* with the induction passage **14** of the carburetor. The induction passage **14** is located in the lower or throttle body **3** of the carburetor, and cooperates with a throttle valve **15** mounted on a throttle valve shaft **16** journaled in the throttle body **3**.

As will appear more fully hereinafter, fuel is at times discharged into the main Venturi opening **10***a* at the throat of the opening through main discharge ports **17** (see Fig. 2) which communicate with a fuel well **18** through a main fuel channel **19** and a main fuel metering jet **20**, while fuel is at times discharged into the auxiliary Venturi opening **11***a* at the throat of the opening through auxiliary discharge ports **21** which communicate with the fuel well **18** through an auxiliary fuel channel **22** and an auxiliary metering jet **23**. The fuel channels **19** and **22** are disposed in a transversely extending member **24** which fits with a snug fit into suitable openings formed in the upper part of the main body portion **2** in such manner that this member can be readily removed to enable the fuel metering jets to be cleaned, or removed and replaced with jets of different sizes to permit the carburetor to be readily adapted to different engines having different fuel requirements.

The Venturi sleeves **11** and **12** are also readily movable so that these sleeves can be changed to adapt the carburetor to different engine requirements, and these sleeves and the transverse member **24** may either be made in separate parts, as shown in Figs. 5, 6 and 7, or they may all be made in one piece as shown in Fig. 8, since each different size of Venturi opening will ordinarily require a different size jet.

The fuel well **18** communicates through passageways **25** and **26** with a fuel barrel or float chamber **27** provided with a fuel inlet valve **28** and a float mechanism **29** for controlling the flow of fuel into the float chamber **27**. The float chamber **27** is formed as part of the central body section **2** and has its center located as close as possible to the vertical portions **19***b* and **22***b* of the fuel channels **19** and **22**, that is, at the center of the fuel well **18**. The float mechanism is adjusted to maintain the fuel level no higher, and preferably slightly lower, than the upper ends of the vertical portions **19***b* and **22***b* of the fuel channels, and as a result since the center of the fuel in the fuel well is located substantially at the center of the fuel in the float chamber, fuel will not run out of the main and auxiliary fuel discharge ports when the engine is at rest regardless of the angle at which the carburetor is tilted. Likewise, fuel will not run out or drip when the car is brought to a sudden stop or is stopped on a grade.

The fuel mixture at idling and low speeds is supplied through a low speed circuit comprising a first vertical passageway **30** which communicates at its upper end with the horizontal portion **19***a* of the main fuel channel **19**, and at its lower end with a low speed discharge port **31** provided with an idling adjusting screw **32**. A branch passageway **30***a* connects this first vertical passageway **30** with a second discharge port **33** which is so located with respect to the throttle valve that when the throttle valve is closed no fuel will be discharged through this port, and this port will function as an air bleed because it is above the throttle valve. However, as the throttle valve is opened, this second port is gradually exposed to the air stream in parallel with the port **31**. It should be pointed out that when the throttle valve is closed, air is sucked in through the main discharge ports **17** into the horizontal portion **19***a* of the main fuel channel where it mixes with fuel sucked through the vertical portion **19***b* of the main fuel channel **19**. The emulsion thus formed is sucked down through the passageway **30** and discharged into the induction passage **14** through the low speed discharge port **31**. The idling adjusting screw is adjusted to give the desired idling speed of the engine. As the second port **33** becomes exposed to the air stream fuel is also discharged into the air stream through this port in parallel with the port **31**, this second port being effective to provide the proper fuel mixture for speeds between idling speed and a predetermined low speed such, for example, as 22 miles per hour.

The low speed idling system also includes a second vertical passageway **34** communicating at its upper end with the horizontal portion **19***a* of the main fuel channel **19** and at its lower end with a third discharge port **35** opening into the induction passage **14** above the second port **33**. An air bleed passageway **35***a* connects both vertical passageways **30** and **34** of the low speed system intermediate their ends directly with the main discharge ports **17**. As the throttle is opened wider the second port **33** is gradually transformed from an air bleed port to a fuel discharge port, and as the suction continues to increase the third port **35** starts to discharge additional fuel into the air stream. This action continues to a predetermined speed such, for example, as 45 miles per hour under level road driving conditions. At still higher speeds, the main discharge ports **17** are gradually transformed from an air bleed into fuel discharge ports.

The carburetor includes an accelerating pump P located at one side of the central body portion 2. The accelerating pump is connected to the shaft of the throttle valve in a manner which will be made clear presently, and is effective at each sudden opening of the throttle valve to discharge a jet of fuel into the main Venturi opening 10*a*.

The pump P is provided with two concentrically arranged plungers 42 and 43, respectively, mounted in a cylinder 47 formed in the main body portion 2. The cylinder 47 terminates at its lower end in a concentric cylinder 48, having a diameter which is just large enough to receive the main plunger 42, and the cylinder 48, in turn, is connected through a passageway 49 and a check valve 50 with the float chamber 27. It will be obvious that each time the plungers are moved to their upper positions, as shown, the cylinders 47 and 48 will both fill up with gasoline.

The main plunger 42 is secured to the lower end of a plunger rod 44, the upper end of which is secured to a cross member 56. The cross member 56, in turn, is secured to the upper end of a rod 57 mounted for vertical reciprocation within a guide member 58. The lower end of the rod 57 is connected by means of a link 59 to a segment 60 secured to the shaft 16 which actuates the throttle valve.

The auxiliary plunger 43 surrounds and slides on the main plunger 42, and is provided at its upper end with an inwardly extending annular flange 45 which fits the plunger rod 44 with a sliding fit. A coil spring 48 surrounds the plunger rod 44 between the plunger 43 and the cross member 56 and biases the auxiliary plunger to the position in which the flange 45 engages the top of the main plunger. This spring acts when the throttle valve is opened to maintain the two plungers 42 and 43 in the relative positions shown.

Upon up strokes of the pump caused by closing of the throttle, fuel flows into the cylinders 47 and 48 from the float chamber 27 through the check valve 50 and passageway 49, while upon each quick down stroke of the main plunger 42 which occurs each time the throttle valve is opened quickly, fuel is discharged by the main plunger through a duct or channel 46 to an outlet orifice or jet 53 disposed in the main Venturi opening 10*a*. The duct or channel 46 is provided with a non-return valve more or less diagrammatically shown at 54. The main plunger 42 is provided with a longitudinally extending groove 55 which is slightly longer than the cylinder 48. This groove has a two-fold purpose. When the throttle valve is opened slowly, the main plunger 42 will move down slowly and while some fuel will be expelled from jet 53, part of the fuel in the cylinder 49 will pass up through this groove 55 into cylinder 47 from which it will later be expelled by the supplemental plunger 43 through said groove and through jet 53 by way of duct or passage 46.

Upon a quick downward movement of the main plunger which occurs upon each quick opening of the throttle, a larger amount of fuel will be discharged through jet 53 by the main plunger than would be discharged on a slow opening of the throttle and the fuel trapped in cylinder 46 below piston 43 will be gradually expelled from this cylinder by way of groove 55 and duct 53. The supplemental piston acts as a follow-up piston and prolongs the period during which the accelerating discharge takes place.

It will be seen, therefore, that the accelerating pump operates in synchronism with the throttle valve and functions so as to provide a supply of accelerating fuel at the times and in the amounts needed.

The auxiliary Venturi opening 11*a* is provided for the purpose of providing a richer fuel mixture at the higher engine speeds to provide good high speed performance without sacrificing fuel economy at the lower engine speeds. The passageway 13*b* which connects the air inlet 8 with the induction passage 14 through the auxiliary Venturi opening 11*a* is normally closed at its lower end by a butterfly valve 61 mounted on a horizontal shaft 62 journaled in the main body portion 2 of the carburetor. The shaft 62 projects out through the sidewall of the main body portion 2, and is provided at its outer end with a spiral spring 63, one end of which is secured to the shaft 62 and the other end of which is secured to the link 59 which actuates the accelerator pump in such manner that the valve is biased to its closed position by a force which will decrease as the throttle valve is opened. The butterfly valve 61 is made somewhat wider than the lower end of the passageway 13*b* to provide a portion 61*a* which projects into the passageway 13*a* where it is subjected to the velocity of the air stream passing through the passageway 13*a*. The parts are so proportioned that at the lower engine speeds the biasing force exerted by the spring 63 will maintain the valve 61 closed. However, at the higher engine speeds, such for example, as 60 or more miles per hour under level road driving conditions, if the throttle is opened far enough so that the tension exerted by the spring 63 is reduced, the velocity of the air stream acting on the portion 61*a* of the valve will exert a force on the valve which is sufficient to open it, and the auxiliary discharge ports 21 then become effective to discharge additional fuel into the Venturi opening 11*a* and hence with the induction passage 14, thus providing a richer fuel mixture to give good engine performance at the higher engine speeds.

The carburetor further includes means for controlling the movement of the throttle to its fully closed position when the accelerator pedal is suddenly released to enable the car to be brought to a sudden stop without stalling the motor. As here shown, this means comprises a piston 65 slidably mounted in a bore 66 connected by a passageway 67 with the float chamber 27. The piston 65 is formed on the lower end of a piston rod 68, the upper end of which is connected by arm 69 to a vertical actuating rod 70 slidably supported in a guideway 71. The rod 70 is operatively connected at its lower end to the throttle valve shaft 16 by a lost motion connection including a U-shaped link 72 pivotally attached at one side to the lower end of the rod 70 and slidably mounted at the other side in an arcuate slot 73*a* formed in a segment 73 secured to the throttle valve shaft 16. The piston 65 is counterbored at 65*a* to slidably receive a plunger 74 secured at its lower end to the valve body 2. The plunger 74 is provided with a vertical passageway 75 which is connected at its lower end with the passageway 67 and which communicates at its upper end with the counterbore 65*a* when the parts are in their closed throttle positions as shown in Fig. 4. A branch passageway 76 also serves to constantly connect the passageway 75 with the bore 66. A coil spring 77 surrounds the plunger 74 and biases the piston 65 to a predetermined position with respect to the plunger 74.

As shown in Fig. 4, the ports are in their closed throttle positions. As the throttle is opened, the resulting movement of the segment 73 removes any downward force from the lower end of the rod 70 and hence from the piston rod 68, and as a result the spring 77 which is under compression in the closed throttle position forces the piston 65 upwardly and causes gasoline to be sucked into the bore 66 below the piston 65. The spring is so proportioned that if the throttle is opened far enough, it will force the piston 65 upwardly to a position in which the plunger 74 is completely withdrawn from the counterbore 65*a* permitting the bore 65*a* to become completely filled with gasoline. The slot 73*a* is so proportioned that when the throttle is fully opened, the piston 65 will be moved to the upper end of the cylinder by engagement of the link 72 with the right-hand end of the slot 73*a* as viewed in Fig. 4. When, however, the throttle is permitted to close, the slot 73*a* permits the throttle to close quickly until the throttle is approximately two-thirds

closed whereupon the link 72 will then engage the left-hand end of the slot 73*a*, as viewed in Fig. 4, and cause the piston 65 to move downwardly to a position in which the plunger 74 starts to enter the counterbore 65*a*. When this happens the gasoline which is then present in the bore 66 is expelled at a rate which depends upon the size of the opening 76 and this opening is made sufficiently small to regulate the rate of closing of the throttle in its last few degrees of movement toward its closed position to a value which will prevent stalling.

One advantage of the carburetor shown in Figs. 1 to 9 is that, since for each throttle opening or closing all air bleed ports serve also as fuel ports, there is no clogging of the ports by carbon, whereby one of the common troubles of present-day carburetors is eliminated.

Another advantage of the carburetor shown in Figs. 1 to 9 is that it is simple in construction and therefore economical to manufacture.

Another advantage of the carburetor shown in Figs. 1 to 9 is that it provides good performance under all operating conditions and at the same time provides good full economy.

Referring now to Fig. 10, in the modified form of my carburetor here shown, the main fuel channel 19 is supplied with fuel from a fuel well 80 connected to the main float chamber 27 through a metering orifice 81, while the auxiliary fuel channel 22 is supplied with fuel through a vertical passageway 81*a* formed in a tube 82 centrally located in the fuel well 80. The lower end of the tube 82 is connected with the float chamber 27 through a passageway 83, a needle valve 84, and a plurality of radially disposed passageways 85 formed in a vertically disposed tube 86. The needle valve 84 is connected to a slide bar 88, which slide bar, in turn, is connected to a piston 89 disposed in a cylinder 90 formed in the upper section 1 of the carburetor. A spring 91 is disposed in the cylinder 90 below the piston and cooperates with the piston to bias the needle valve to its upper or open position in which gasoline from the float chamber is free to enter the passageway 83 through the passageways 85. The slide bar 88 extends into the passageway 8*a* and cooperates with a thermally controlled automatic choke 92 of well-known construction in such manner that, when the slide valve is moved downwardly far enough to close the needle valve 84, it will just crack the choke, that is to say, it will open the choke a small amount. The slide bar is moved downwardly by suction formed on the lower side of the piston 89, through a passage 93 extending through the wall of the sections 1, 2 and 3 from the cylinder 90 to a point below the throttle valve 15.

Formed in the sides of the tube 82 are holes 94 for admitting air to the passageway 81*a* at low speeds and fuel at high speeds. Also formed in the tube 82 is an air bleed reducer 95.

The auxiliary fuel channel 22 leading to the auxiliary discharge port 21 is connected intermediate its ends with a vertical auxiliary air bleed passageway 96 which extends downwardly to a point just above the main butterfly valve 15. This auxiliary passageway 96 communicates intermediate its ends through a first suction port 97 with the main Venturi at or just below the throat of the Venturi, and also through suction port 98, with the second Venturi opening just above the auxiliary butterfly valve 61. As the throttle is opened, suction develops in this auxiliary air bleed passageway which automatically begins to reduce back air bleed and start enriching the mixture by reducing the flow of air. As suction further develops, this auxiliary air bleed passageway tends to bring fuel to the tip of the auxiliary discharge port so that when the secondary or auxiliary butterfly valve opens, fuel will be at or near the tip of the auxiliary discharge port. This arrangement assists in freer fuel discharge by lessening fuel surface friction at low speeds but prevents leaning out of the mixture at extreme high speeds. That is to say, the suction controlled auxiliary air bleed in the mixing chamber above the throttle and below the main discharge port gives a very uniform mixture for all speeds.

As shown in Fig. 10, all parts occupy the positions they normally occupy when the engine is stopped and is cool enough to cause the automatic choke 92 to be closed. If now the engine is started, the suction below the main butterfly valve 15 will act through the passageway 93 to move the piston 89 downwardly, and this movement, in turn, will act through the slide bar 88 to just crack the choke enough to make the engine idle smoothly. The ports 31, 33 and 35 will function under these conditions in the same manner as was previously described in connection with the form of my invention shown in Figs. 1 to 9. For low driving speeds the suction below the butterfly valve 15 will continue to hold the needle valve 84 closed, but on a sudden opening of the throttle or a gradual opening to the full open position the vacuum below the throttle 15 will decrease and permit the spring 91 to push the piston 89 upwardly, and hence open the needle valve 84. The opening of this needle valve permits additional fuel to enter the fuel well 80 through the passageways 85, 83, 81*a*, and the holes 94 to thereby increase the fuel supply to the main discharge port 17, and hence enrich the mixture supplied to the main Venturi opening 10*a*. This action will only occur for sudden throttle openings at low speeds. As the speed increases, the vacuum acting on the piston 89 will increase and cause the needle valve 84 to shut off the supply of fuel to the fuel well 80 so that under these conditions the only fuel supplied to the fuel well will be the fuel supplied through the metering orifice 81. This orifice is so proportioned that it will furnish the proper mixture for normal medium speed level road driving conditions. Morover, as the speed increases, the increase in suction in the passageway 96, due in part to the port 97, stops back air bleed into the main well 80 through the passageway 22 and causes fuel to be sucked into this passageway to a point near the auxiliary fuel discharge port 21. Consequently, if the speed is increased sufficiently to open the auxiliary butterfly valve 61, fuel will immediately be available at the auxiliary discharge port 21, thereby providing a smooth transition from the main Venturi 10*a* to both the main and auxiliary Venturi. At this particular point, the vacuum is lost on the piston 89 so that the spring 91 opens the needle valve 84, thus providing an adequate supply of fuel to the auxiliary discharge port 21. With both discharge ports in operation there is an adequate supply of fuel for high speed driving conditions.

One advantage of the arrangement shown in Fig. 10 is that none of the ports are exposed to atmosphere in a manner which would cause them to become clogged with carbon or other foreign matter.

Another advantage of the arrangement shown in Fig. 10 is that a smooth uniform fuel supply is provided for all driving speeds and driving conditions.

Although I have herein shown and described only one form of carburetor embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In a carburetor having main and auxiliary Venturi openings connected with a single induction passage provided with a throttle valve, main and auxiliary fuel discharge ports disposed in said main and auxiliary Venturi openings, means for preventing the flow of air through said auxiliary Venturi opening except at high speed open throttle conditions, a horizontal passageway leading to said auxiliary fuel discharge port from a fuel well having a fuel level below said passageway and serving at times as a fuel supply passageway and at other times as a back air bleed passageway, and an auxiliary passageway con-

necting said horizontal passageway with said induction passageway above said throttle valve and also with said main and auxiliary Venturi openings through suction ports to reduce back air bleed and start enriching the mixture as the throttle is opened and also to bring fuel to the tip of the auxiliary discharge port as suction develops.

2. In a carburetor having main and auxiliary Venturi openings connected with a single induction passage provided with a throttle valve, main and auxiliary fuel discharge ports disposed in said main and auxiliary Venturi openings, a fuel well connected with said main discharge port through a first horizontal passageway disposed above the level of the fuel in said fuel well, a float chamber surrounding said fuel well and connected with said fuel well through a metering orifice proportioned to furnish the proper mixture for normal medium speed level road driving conditions, a tube extending through said fuel well and connected with said auxiliary discharge port through a second horizontal passageway disposed above the level of the fluid in said fuel well and with said fuel well through holes for at times admitting additional fuel to the fuel well to enrich the mixture supplied the main Venturi opening and at other times serving as air bleeds, said tube also being connected with said float chamber through a needle valve, means operatively connected with said needle valve for causing said needle valve to close upon heavy suction in said induction passage, and normally closed means opened by a predetermined velocity of the air stream in said main Venturi opening for preventing the flow of air through said auxiliary Venturi opening except at high speed open throttle conditions.

3. In a carburetor having main and auxiliary Venturi openings connected with a single induction passage provided with a throttle valve, main and auxiliary fuel discharge ports disposed in said main and auxiliary Venturi openings, a fuel well connected with said main discharge port through a first horizontal passageway disposed above the level of the fuel in said fuel well, a float chamber surrounding said fuel well and connected with said fuel well through a metering orifice proportioned to furnish the proper mixture for normal medium speed level road driving conditions, a tube extending through said fuel well and connected with said auxiliary discharge port through a second horizontal passageway disposed above the level of the fluid in said fuel well and with said fuel well through holes for at times admitting additional fuel to the fuel well to enrich the mixture supplied the main Venturi opening and at other times serving as air bleeds, said tube also being connected with said float chamber through a needle valve, means connecting said horizontal passageway with said induction passage above said throttle valve and also with said main and auxiliary Venturi openings to reduce back air bleed and start enriching the mixture as the throttle is opened and also to bring fuel to the tip of the auxiliary port as suction develops, flow response means connected with said needle valve for causing it to close upon heavy suction in said induction passage, and means controlled in part by the flow of air in said main Venturi opening for preventing the flow of air through said auxiliary Venturi opening except at high speed open throttle conditions.

4. In a carburetor having a single air inlet connected through main and auxiliary Venturi openings with a single induction passage, main and auxiliary fuel discharge ports disposed in said main and auxiliary Venturi openings, respectively, a throttle valve disposed in said induction passage, a second valve biased to its closed position by a force which is responsive to the throttle valve position and which decreases as the throttle valve is opened, said second valve being positioned to prevent the flow of air through the auxiliary Venturi opening when closed and to permit the flow of air when opened, means associated with said second valve for opening it when the velocity of the air stream passing through said

main Venturi opening exceeds a predetermined velocity, horizontal passageways leading to said main and auxiliary fuel discharge ports and serving at times as fuel supply passageways and at other times as air bleeds, and a vertical auxiliary air bleed passageway connected at one end to the horizontal passageway leading to said auxiliary discharge port intermediate its ends and connected at the other end with said induction passage above the throttle valve, said auxiliary air bleed passageway also being connected intermediate its ends through a first suction port with said main Venturi opening at or just below the throat of the opening and through a second suction port with said auxiliary Venturi opening above said second valve, said auxiliary air bleed passageway serving to reduce back air bleed and start enriching the mixture as the throttle is opened by reducing the flow of air and as suction develops to bring fuel to the tip of the auxiliary discharge port.

5. In a carburetor having a single air inlet connected through main and auxiliary Venturi openings with a single induction passage, main and auxiliary fuel discharge ports disposed in said main and auxiliary Venturi openings, respectively, a throttle valve disposed in said induction passage, a second valve biased to its closed position by a force which is responsive to the throttle valve position and which decreases as the throttle valve is opened, said second valve being positioned to prevent the flow of air through the auxiliary Venturi opening when closed and to permit the flow of air when opened, means associated with said second valve for opening it when the velocity of the air stream passing through said main Venturi opening exceeds a predetermined velocity, horizontal passageways leading to said main and auxiliary fuel discharge ports and serving at times as fuel supply passageways and at other times as air bleeds, and means connecting said horizontal passageway leading to said auxiliary discharge port intermediate its ends with said induction passage above the throttle valve and also with said main and auxiliary Venturi openings to reduce back air bleed and start enriching the mixture as the throttle is opened and also to bring fuel to the top of the auxiliary discharge port as suction develops.

6. In a carburetor having a single air inlet connected through main and auxiliary Venturi openings with a single induction passage, main and auxiliary fuel discharge ports disposed in said main and auxiliary Venturi openings, respectively, a throttle valve disposed in said induction passage, a second valve biased to its closed position by a force which is responsive to the throttle valve position and which decreases as the throttle valve is opened, said second valve being positioned to prevent the flow of air through the auxiliary Venturi opening when closed and to permit the flow of air when opened, means associated with said second valve for opening it when the velocity of the air stream passing through said main Venturi opening exceeds a predetermined velocity, a fuel well connected with said main discharge port through a first horizontal passageway disposed above the level of the fuel in said fuel well, a float chamber surrounding said fuel well and connected with said fuel well through a metering orifice proportioned to furnish the proper mixture for normal medium speed level road driving conditions, a tube extending through said fuel well and connected with said auxiliary discharge port through a second horizontal passageway disposed above the level of the fluid in said fuel well and with said fuel well through holes for at times admitting additional fuel to the fuel well to enrich the mixture supplied the main Venturi opening and at other times serving as air bleeds, said tube also being connected with said float chamber through a needle valve, and suction responsive means connected with said needle valve for causing said needle valve to close upon heavy suction in said induction passage.

7. In a carburetor having a single air inlet connected

through main and auxiliary Venturi openings with a single induction passage, main and auxiliary fuel discharge ports disposed in said main and auxiliary Venturi openings, respectively, a throttle valve disposed in said induction passage, a second valve biased to its closed position by a force which is responsive to the throttle valve position and which decreases as the throttle valve is opened, said second valve being positioned to prevent the flow of air through the auxiliary Venturi opening when closed and to permit the flow of air when opened, means associated with said second valve for opening it when the velocity of the air stream passing through said main Venturi opening exceeds a predetermined velocity, a fuel well connected with said main discharge port through a first horizontal passageway disposed above the level of the fuel in said fuel well, a float chamber surrounding said fuel well and connected with said fuel well through a metering orifice proportioned to furnish the proper mixture for normal medium speed level road driving conditions, a tube extending through said fuel well and connected with said auxiliary discharge port through a second horizontal passageway disposed above the level

of the fluid in said fuel well and with said fuel well through holes for at times admitting additional fuel to the fuel well to enrich the mixture supplied the main Venturi opening and at other times serving as air bleeds, said tube also being connected with said float chamber through a needle valve, means connecting said horizontal passageway with said induction passage above said throttle valve and also with said main and auxiliary Venturi openings to reduce back air bleed and start enriching the mixture as the throttle is opened and also to bring fuel to the tip of the auxiliary port as suction develops, and suction responsive means connected with said needle valve for causing said needle valve to close upon heavy suction in said induction passage.

References Cited in the file of this patent

UNITED STATES PATENTS

2,621,911	Lindsteadt	Dec. 16, 1952
2,674,443	Bracke	Apr. 6, 1954
2,676,004	Bimberg	Apr. 20, 1954
2,703,229	Henning	Mar. 1, 1955
2,718,386	Henning	Sept. 20, 1955