

Sept. 2, 1941.

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2,254,850

CARBURETOR

Filed Dec. 30, 1939

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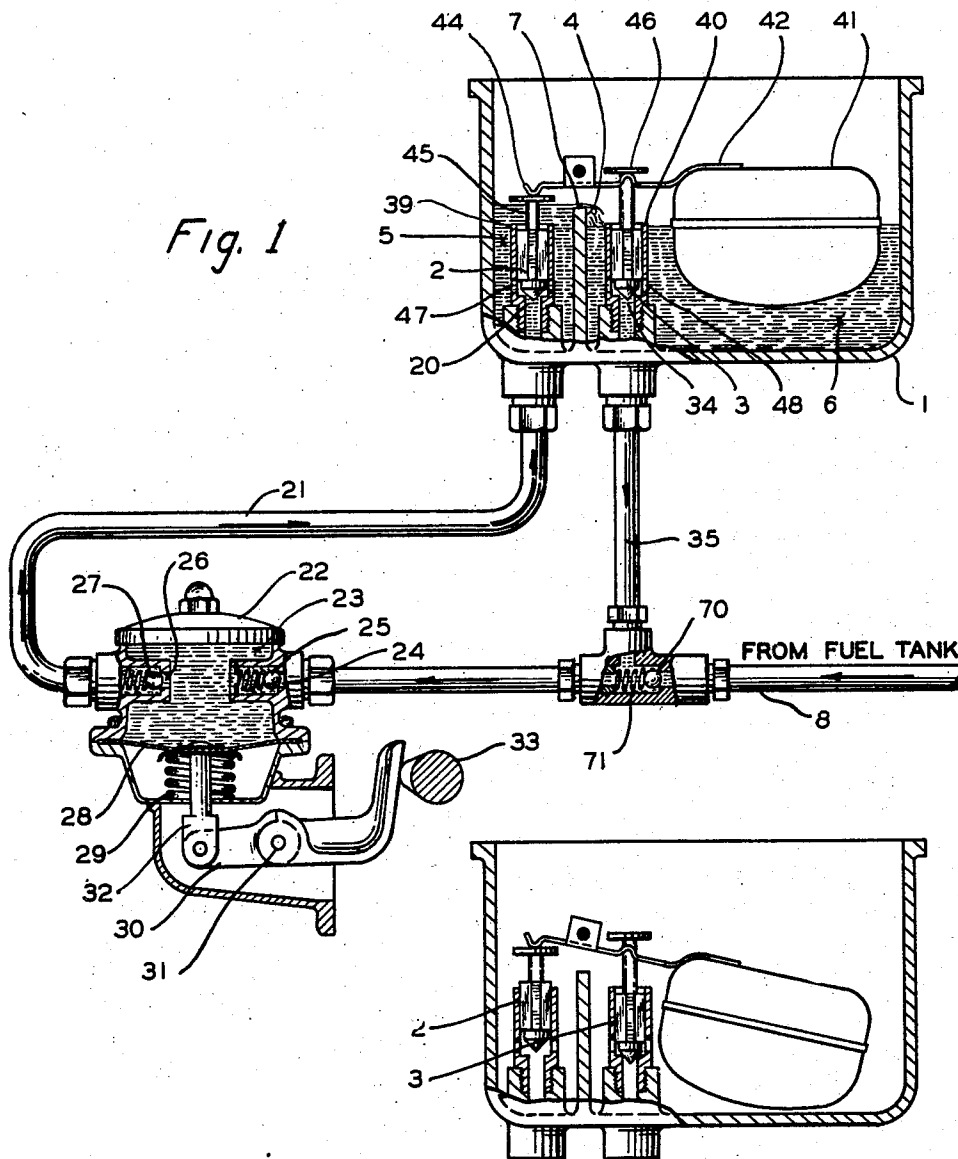


Fig. 2

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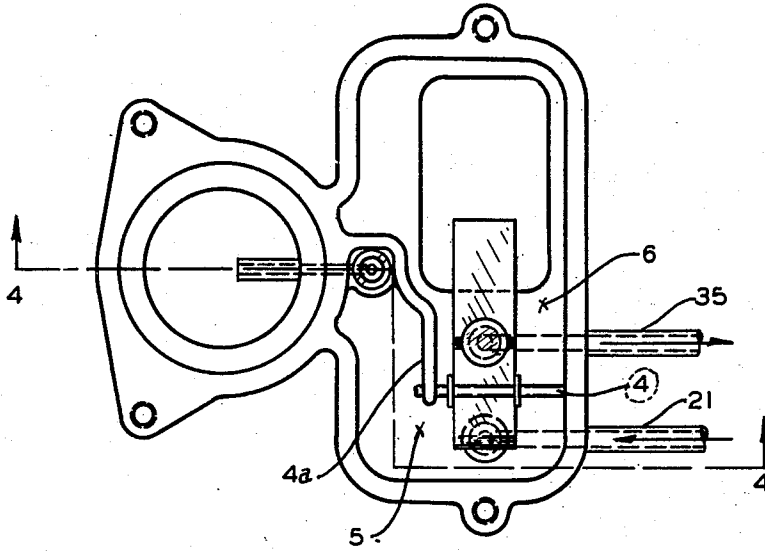


Fig. 3

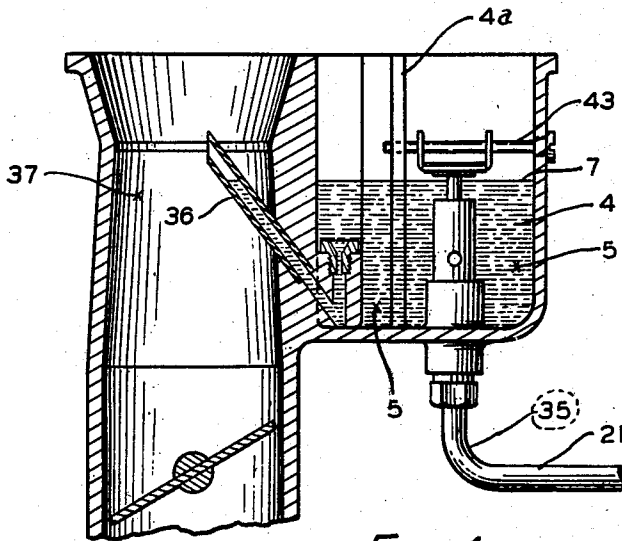


Fig. 4

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Fig. 5

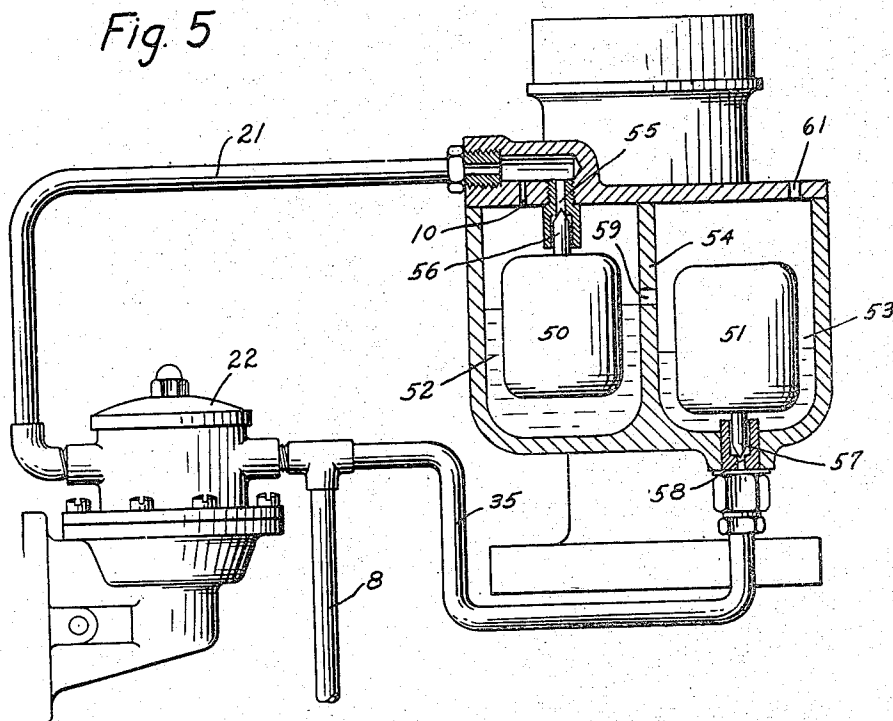
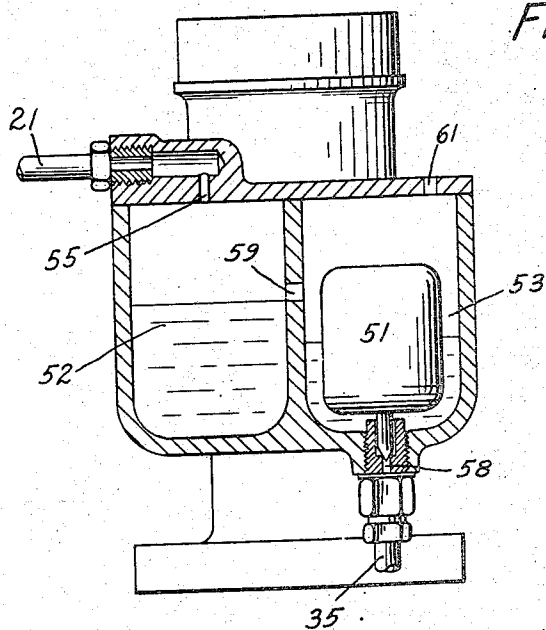


Fig. 6



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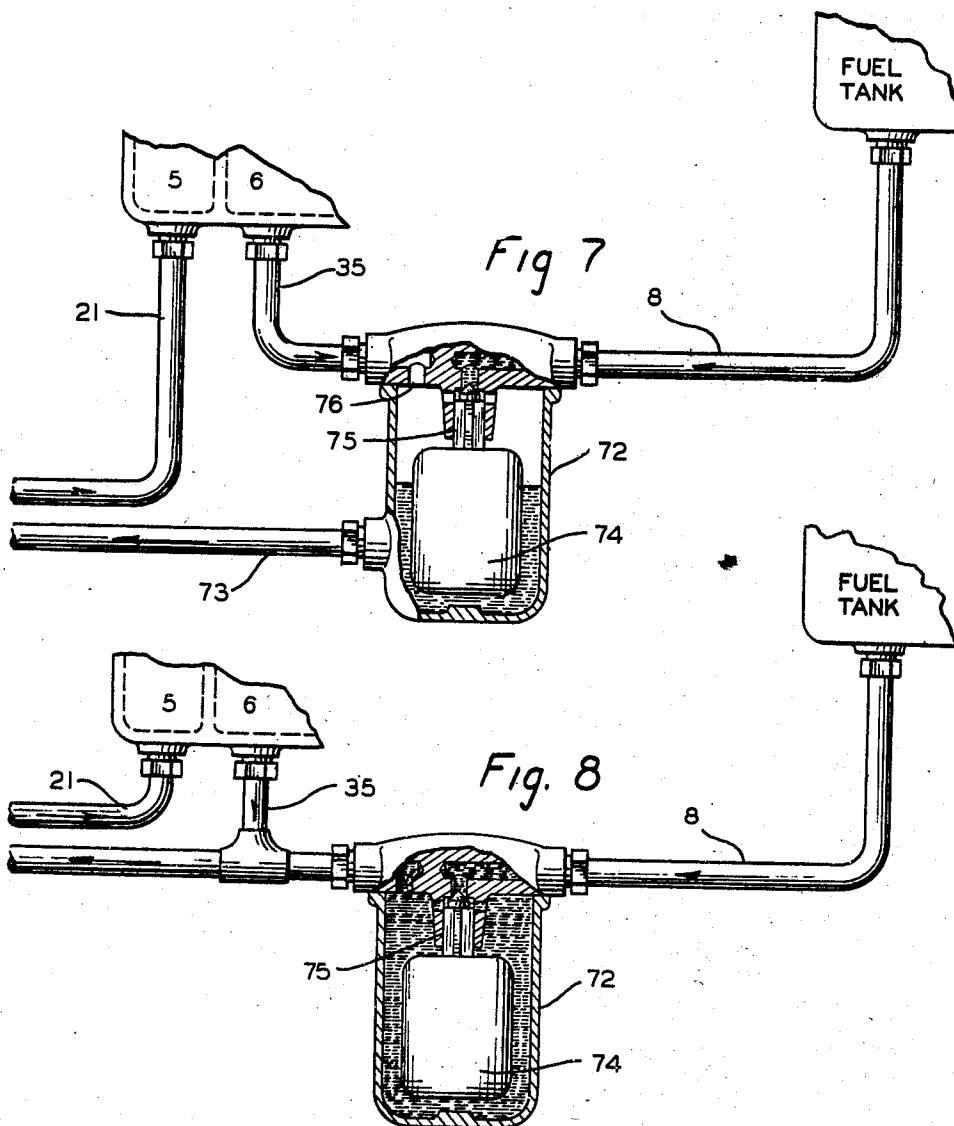
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4 Sheets-Sheet 4



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CARBURETOR

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Application December 30, 1939, Serial No. 311,770

6 Claims. (Cl. 158—36.4)

This invention relates to carburetors. The principal objects are to eliminate flooding of carburetors caused by worn needle seats, gum and dirt getting under the needle seats, and to eliminate boiling of the gasoline, known as percolation, which is due mainly to hot spot manifolds and underhood temperatures.

With the present downdraft carburetors, great difficulties are encountered in restarting the engine, especially in hot weather, because a downdraft carburetor is located directly on a hot spot manifold, and in most cases above the engine at a point where it absorbs all of the heat, because heat travels upwardly. When the engine has been running and is stopped, this heat is so terrific that it boils the gasoline in the carburetor bowl, causing it to raise above the nozzle and flow into the manifold. Naturally, the float will lower as the gasoline passes out of the carburetor into the manifold, and, as the float lowers, it opens the needle seat. There is always gasoline stored in the pump and pipe or conduit between the pump and the carburetor. Naturally, this gasoline is under the pump pressure because the pump check valve is closed. The gasoline in the pump is forced out into the carburetor by the pressure of the pump spring and by the underhood temperatures heating the pump and line between the pump and the carburetor. This surplus amount of gasoline passes over into the intake manifold and makes starting of the engine in many cases impossible.

Often times all of the gasoline is forced out of the pump and carburetor bowl into the intake manifold and engine. The engine will not start because the fuel mixture is too rich. Even though consistent cranking of the engine by the starter does clean out the rich mixture, starting is often still difficult because the pump and the line between the carburetor and the pump are so hot due to underhood temperatures that the gasoline will not flow from the gasoline tank into the pump and line between the pump and carburetor. It is difficult to flow liquid through a hot pipe because it vaporizes and forms a back pressure. Under such conditions, the pump will not pump when dry and hot, and the operator cannot get his car started until the engine cools off. These conditions are known as vapor locks.

In many cases, carburetors will flood and run rich when driving at low speeds in extremely hot weather. Because there is not enough air going through the carburetor at such low speeds to keep the carburetor bowl cool, the heat from the engine will cause a slight percolation, which

causes the carburetor to run rich. The pressure against the needle seat, caused by heat expanding the fuel in the pump and line between the pump and needle seat, forces the needle valve open, because this pressure is so great that the float cannot shut off such a high pressure. This also causes the carburetor to run rich.

In my carburetor, an excess of fuel is flowed through the pump and carburetor bowl at all times. In other words, more fuel passes through the pump and the line between the pump and carburetor than is required by the engine. Naturally, this circulation cools the pump and the carburetor, also the lines between the carburetor and pump. This prevents boiling of the gasoline in the carburetor bowl, pump and gasoline lines, due to engine heat and underhood temperatures when driving at low speeds.

Another thing, in my carburetor difficult starting due to percolation is overcome because percolation, even if it should occur, will not cause the fuel to flow into the engine. It will flow back into the line between the gasoline tank and the pump instead. With my carburetor there is never a pressure in the pump or the pump line when the engine is stopped which, in the carburetors used at present, causes flooding due to heat forcing the gasoline out of the pump and line into the carburetor. For example, if the pump pressures were three pounds, the float in the carburetor will have enough buoyancy to shut off such a pressure when the float level raises to normal, but, if the pump and line become hot, the pressure in the pump and line between the carburetor and pump will raise to a point to approximately four or five pounds, which will force the needle seat open and submerge the float, causing flooding of the conventional carburetor whereas with my carburetor such fuel would flow back into the line running between the fuel tank and the fuel pump.

In the drawings:

Fig. 1 is a vertical section through the float bowl of my carburetor and through a conventional fuel pump showing the lines connecting the carburetor, fuel pump and fuel supply tank, and also showing the position of the carburetor parts while the engine is in operation and fuel is being pumped into the carburetor.

Fig. 2 is a vertical section through the float bowl of my carburetor showing the position of the parts when the engine is not in operation and after most of the fuel in the float bowl has run back into the supply tank.

Fig. 3 is a top plan view of my carburetor.

Fig. 4 is a section along the line 4-4 of Fig. 3.

Fig. 5 is an elevation partly in section through the float bowl of a modified form of my carburetor showing the same connected with a conventional fuel pump.

Fig. 6 is an elevation partly in section through the float bowl of a second modified form of my carburetor.

Figs. 7 and 8 show two different forms of float valve arrangements to prevent fuel from the fuel tank flooding the carburetor where the fuel tank is positioned at a higher elevation than the carburetor.

Referring more particularly to the drawings, the float bowl of the carburetor is designated 1. The float bowl is provided with a partition 4, 4a which separates the bowl into two receptacles 5 and 6.

Receptacle 5 is provided with a fuel inlet port 20 which is connected by means of pipe line 21 with a conventional fuel pump 22. Fuel inlet port 20 is controlled by valve 2. The fuel pump 22 is provided with a fuel chamber 23 having an inlet port 24 controlled by the ball check valve 25 and an outlet port 26 controlled by the ball check valve 27 in the usual manner. The pump is provided with a diaphragm 28 which is moved in one direction or on the discharge stroke by the compression spring 29. When the diaphragm 28 is moved by spring 29, fuel flows out of outlet port 26, past check valve 27 into fuel line 21. The intake stroke of diaphragm 28 is effected by lever 30 pivoted at 31 and connected to diaphragm 28 by connecting rod 32. The lever 31 is rocked counterclockwise by the rotating cam 33. This compresses spring 29 and retracts the diaphragm 28 to draw fuel into chamber 23 by check valve 25. Further description of the operation of the fuel pump is unnecessary because the above described fuel pump is merely one of numerous well-known types of fuel pumps that can be used for supplying fuel to my carburetor.

Receptacle 6 is provided with a fuel outlet port 34 which is controlled by valve 3. Port 34 is connected by line 35 with fuel line 8 which connects the fuel supply tank with pump intake port 24. The carburetor feeds out of receptacle 5 which communicates with fuel nozzle 36 positioned in the Venturi throat 37 of the carburetor. Valves 2 and 3 are provided with cylindrical body portions which are slidably guided in cylindrical housings 39 and 40 respectively. Receptacle 6 is provided with a float 41 which is fixed to an arm 42 pivotally supported on pin 43. The outer end 44 of arm 42 contacts with the upper end of valve stem 45 to depress valve 2 as the float 41 raises. However, lowering of the float 41 does not raise valve 2. On the other hand, arm 42 is connected with valve stem 46 so that as the float 41 raises, valve 3 is raised. Housing 39 is provided with fuel outlets 47 and housing 40 is provided with fuel outlets 48.

Assuming that the engine is running, the pump forces gasoline into receptacle 5. The force of the gasoline flowing through pipe line 21 raises valve 2, thereby opening outlet 20. After the gasoline reaches a certain level it will flow over the top 7 of partition 4 into receptacle 6. The needle valve 2 in receptacle 5 is never completely closed, even though the engine is idling, because there is always a slight excess of gasoline passing through the carburetor, or more than the engine requires. This circulation keeps the carburetor, pump and gasoline lines cooler. In the

event the engine should be stopped when hot and the gasoline started to boil in receptacle 5, it would raise and flow over into receptacle 6, which would raise the float and release the gasoline back through line 35 into the line 8, preventing the gasoline from going into the engine.

It will be seen that the valves 2 and 3 are operated from the same float, and, as the demand for gasoline is increased by the opening of the throttle, the flow from receptacle 5 to receptacle 6 will decrease, which causes the float to lower, thereby raising valve 2 and permitting more gasoline to pass through outlets 20 and 47. As the float 41 lowers, valve 3 drops thus restricting outlet 34, which decreases the flow of gasoline back to line 8. In other words, the flow is increased in valve 2 and decreased through valve 3 as the demand of gasoline is increased by the opening of the throttle.

In my carburetor, it is not necessary to burnish or grind the needle valve heads nor their seats to prevent leaking, which would cause flooding in the ordinary carburetor. This is because valve 2 is never closed and valve 3 can only be closed when there is but very little gasoline in the carburetor. Every time the engine stops, there will be gasoline in receptacle 5 but the gasoline in receptacle 6 drains through outlet 34 and receptacle 6 becomes practically empty because the gasoline in receptacle 6 drains back into line 8 and, where check valve 70 is omitted, back into the fuel tank. At this time, valve 3 will close port 34 to prevent air bleeding of line 8 so that the pump can draw gasoline from the main source. In the event the gasoline should start to boil or percolate in receptacle 5, it would overflow into receptacle 6, and would be located so far below the nozzle that even though it would boil on the bottom of the bowl in receptacle 6, it would not raise high enough to run out of the carburetor nozzle.

The position of the float and of valve 3 when the engine is at rest is shown in Fig. 2. Valve 2 will close port 20 only in case no gasoline is flowing through line 21.

Pump 22 feeds more fuel into receptacle 5 than the engine uses, that is, more than is withdrawn through nozzle 36. However, as the fuel flows over partition 4 into receptacle 6 to raise the level of the fuel in receptacle 6, the float 41 raises, thus lowering valve 2 to decrease the flow of fuel into receptacle 5 and raises valve 3 to increase the flow of fuel out of receptacle 6 through outlet 34. Thus the level of the fuel in receptacle 5 is maintained substantially constant. This being so, the fuel level in nozzle 36 remains substantially constant. This factor is very helpful in maintaining fuel mixture ratios as calibrated for various engine speeds.

In the modified form shown in Fig. 5, two floats 50 and 51 are used in receptacles 52 and 53 respectively. The float bowl is divided by partition wall 54 into the separate receptacles 52 and 53. Fuel flows into receptacle 52 through outlet 55 and bypass 10. Needle valve 56, carried by float 50, controls outlet 55. Needle valve 57, carried by float 51, controls outlet 58 from receptacle 53. Receptacle 52 corresponds to receptacle 5 in the principal form of the invention and receptacle 53 to receptacle 6. The fuel is withdrawn into the carburetor venturi from receptacle 52 in the same conventional manner as illustrated for the principal form of the invention. The fuel level in receptacle 52 is maintained substantially constant, the excess flowing through

opening 59 into receptacle 53. Opening 59 is sufficiently large to permit the overflowing into receptacle 53 of all fuel flowing into receptacle 52 which is not used by the engine. Fuel line 21 is provided with a small bypass 10 into receptacle 52 which insures a constant flow of gasoline from pipe line 21 into receptacle 52 even when float 50 closes valve 56. The operation of this carburetor is substantially the same as that above described for the principal form of the invention. With this arrangement, due to the bypass 10, there is always a slight excess of gasoline passing through the carburetor, that is, slightly more than the engine requires for any given speed.

Assuming that the engine is running, the level of the fuel in receptacle 52 will drop, thus permitting fuel to flow into receptacle 52 through outlet 55. As the engine speed increases valve 56 opens wider, permitting more fuel to flow into receptacle 52. When the engine stops fuel will flow out of receptacle 53 into pipe line 35 and thence back into line 8, whereupon valve 57 closes outlet port 58. If the gasoline should start to boil in receptacle 52, it will overflow into receptacle 53 from which it would drain back into line 8.

The modified form shown in Fig. 6 is substantially the same as that shown in Fig. 5 except that float 50 is omitted from receptacle 52. The fuel flows from pipe line 21 through outlet 55 into receptacle 52. In this form of the invention bypass 10 is unnecessary and is therefore omitted. Since the float in receptacle 52 is omitted and no valve is provided for controlling fuel inlet 55, pump 22 will pump as much fuel per stroke into receptacle 52 when the engine is idling as when the engine is operating at wide open throttle and highest speeds. Here again more fuel is pumped into receptacle 52 than is withdrawn therefrom through the fuel nozzle 36. All excess of fuel flows through opening 59 into receptacle 53. As float 51 raises, the amount of fuel withdrawn from receptacle 53 into pipe lines 35 and 8 increases. As the fuel level and float 51 in receptacle 53 drop, outlet 58 is restricted and the flow of fuel out of receptacle 53 decreased.

In the form of carburetor shown in Figs. 5 and 6 the float bowl is provided with an air bleed 61.

I prefer the construction shown in Figs. 1 and 2, because only one float is necessary and the fuel is metered, which makes it unnecessary to use a full stroke of the pump at low engine speeds, which might cause shorter life of the pump mechanism.

In the present day automobiles the fuel tank is located at a lower level than the carburetor. However, it is conceivable that while the automobile is traveling down an exceptionally steep grade, the fuel tank might be positioned at a higher elevation than the carburetor. When such a rather unusual condition obtains, possibly fuel might flow from the fuel tank into receptacle 6 and flood the same. To prevent such a contingency a ball check valve 70, backed up by coil spring 71, is inserted in line 8 between the fuel tank and line 35. Spring 71 is calculated so that it exerts just sufficient force against ball check valve 70 to slightly more than counterbalance the pressure in line 8 due to the fact that the fuel tank is positioned at a higher elevation than the carburetor. The pressure exerted by spring 71 on ball 70 is insufficient to overcome the force or pull exerted by the pump on the suction stroke. Therefore, on the suction stroke of the pump, check valve 70 will open in synchronism with check valve 25.

In the modified form shown in Fig. 7 instead of the ball check 70 a float reservoir 72 is connected at its top to fuel lines 8 and 35 and is connected adjacent its bottom by fuel line 73 with the intake port 24 of the fuel pump 22. Reservoir 72 is provided with a float 74 which carries a needle valve 75 which controls or completely shuts off the flow of fuel from line 8 into reservoir 72. Excess of fuel from fuel receptacle 6 flows back into reservoir 72 through pipe line 35 and outlet 76. Whenever the level of the fuel in reservoir 72 reaches the point indicated in Fig. 7, needle valve 75 closes off line 8. Thus, even though the fuel tank is positioned higher than the carburetor, float control valve 75 will shut off line 8 and prevent fuel from the fuel tank overflowing the carburetor.

In Fig. 8 the reservoir 72 is connected in line 8 between line 35 and the fuel tank. Fuel flows into the reservoir 72 at the top and is removed at the top. With this arrangement fuel line 8 is closed by valve 75 except when fuel is drawn through receptacle 72 on the intake stroke of the fuel pump 22, that is, when fuel is drawn through receptacle 72.

It is, of course, understood that check valve 70, as shown in Fig. 1, and needle check valve 75, shown in Figs. 7 and 8, can be and preferably are omitted, and are inserted in the fuel line 8 only as a precautionary measure.

I claim:

1. In a carburetting and fuel system for internal combustion engines, a carburetor bowl having a receptacle with a fuel inlet and a second receptacle with a fuel outlet, valves for controlling said carburetor fuel inlet and outlet, a fuel pump having an inlet and an outlet, a source of fuel, a conduit connected from the outlet of the pump to the inlet of the carburetor for feeding more fuel into the carburetor than the engine uses, a second conduit connected from the inlet of the pump to the source of fuel supply, a third conduit connected from the outlet of the carburetor to the second conduit that connects the pump inlet and source of fuel supply, an unrestricted fuel bypass from the first named fuel receptacle to the second named fuel receptacle, positioned above the bottom of the first receptacle at the point where it is desired to maintain the level of the fuel in said receptacle, a float in the second named receptacle operatively connected to the intake and outlet valves whereby the outlet valve will move towards open position to increase the outflow of fuel as the inlet valve moves toward closed position to restrict the inflow of fuel so as to permit the overflow of fuel from the first receptacle into the second receptacle to pass back into the second conduit connected to the fuel supply.

2. In a carburetting and fuel system for internal combustion engines, a carburetor bowl having a receptacle with a fuel inlet and a second receptacle with a fuel outlet, valves for controlling said carburetor fuel inlet and outlet, a fuel pump having an inlet and an outlet positioned remote from the carburetor bowl, a source of fuel positioned below the level of the fuel in the carburetor bowl, a conduit connected from the outlet of the pump to the inlet of the carburetor for feeding more fuel into the carburetor than the engine uses, a second conduit connected from the inlet of the pump to the source of fuel supply, a third conduit connected from the outlet of the carburetor to the second conduit that connects the pump inlet and source of fuel supply, an un-

restricted fuel bypass from the first named fuel receptacle to the second named fuel receptacle, positioned above the bottom of the first receptacle at the point where it is desired to maintain the level of the fuel in said receptacle, a float in the second named receptacle operatively connected to the intake and outlet valves whereby the outlet valve will move towards open position to increase the outflow of fuel as the inlet valve moves towards closed position to restrict the inflow of fuel so as to permit the overflow of fuel from the first receptacle into the second receptacle to pass back into the second conduit connected to the fuel supply.

3. In a carburetting and fuel system for internal combustion engines, a carburetor bowl having a receptacle with a fuel inlet and a second receptacle with a fuel outlet, valves for controlling said carburetor fuel inlet and outlet, a fuel pump having an inlet and an outlet, check valves for the inlet and outlet of said pump, a source of fuel positioned below the carburetor fuel level, a conduit connected from the outlet of the pump to the inlet of the carburetor for feeding more fuel into the carburetor than the engine uses, a second conduit connected from the inlet of the pump to the source of fuel supply, a third conduit connected from the outlet of the carburetor to the second conduit that connects to the pump inlet and source of fuel supply whereby the second fuel receptacle is in communication with the source of fuel whenever the valve controlling the fuel outlet for said second receptacle is open, an unrestricted fuel bypass from the first named fuel receptacle to the second named fuel receptacle positioned above the bottom of the first receptacle at the point where it is desired to maintain the level of the fuel in said receptacle, a float in the second named receptacle operatively connected to the intake and outlet valves whereby the outlet valve will move toward open position to increase the outflow of fuel as the inlet valve moves toward closed position to restrict the inflow of fuel so as to permit the overflow of fuel from the first receptacle into the second receptacle to pass back into the second conduit connected to the fuel supply.

4. In a carburetting and fuel system for internal combustion engines, a carburetor bowl having a receptacle with a fuel inlet, a communication between the first receptacle and the carburetor throat for feeding the fuel from the first receptacle into the throat of the carburetor, and a second receptacle with a fuel outlet, valves for controlling said carburetor fuel inlet and outlet, a fuel pump having an inlet and an outlet, a source of fuel, a conduit connected from the outlet of the pump to the inlet of the carburetor for feeding more fuel into the carburetor than the engine uses, a second conduit connected from the inlet of the pump to the source of fuel supply, a third conduit connected from the outlet of the carburetor to the second conduit that connects the pump inlet and source of fuel supply, an unrestricted fuel bypass from the first named fuel receptacle to the second named fuel receptacle positioned above the bottom of the first receptacle at the point where it is desired to maintain

the level of the fuel in said receptacle, a float in the second named receptacle operatively connected to the intake and outlet valves whereby the outlet valve will move towards open position to increase the outflow of fuel as the inlet valve moves toward closed position to restrict the inflow of fuel so as to permit the overflow of fuel from the first receptacle into the second receptacle to pass back into the second conduit connected to the fuel supply.

5. In a carburetting and fuel system for internal combustion engines, a carburetor bowl having a receptacle with a fuel inlet and a second receptacle with a fuel outlet, valves for controlling said carburetor fuel inlet and outlet, a fuel pump having an inlet and an outlet, a source of fuel, a conduit connected from the outlet of the pump to the inlet of the carburetor for feeding more fuel into the carburetor than the engine uses, a second conduit connected from the inlet of the pump to the source of fuel supply, a third conduit connected from the outlet of the carburetor to the second conduit that connects to the pump inlet and source of fuel supply, an unrestricted fuel bypass from the first named fuel receptacle to the second named fuel receptacle positioned above the bottom of the first receptacle at the point where it is desired to maintain the level of the fuel in said receptacle, a float in the second named receptacle, means operatively connecting the float with the intake and outlet valves whereby when the float raises the intake valve moves toward closed position reducing the flow of fuel into the first receptacle and the outlet valve moves toward open position increasing the flow of fuel from the second receptacle and when the float lowers the intake valve moves toward open position and the outlet valve moves toward closed position.

6. In a carburetting and fuel system for internal combustion engines, a carburetor bowl having a receptacle with a fuel inlet and a second receptacle with a fuel outlet, valves for controlling said carburetor fuel inlet and outlet, a fuel pump having an inlet and an outlet, a source of fuel, a conduit connected from the outlet of the pump to the inlet of the carburetor, a second conduit connected from the inlet of the pump to the source of fuel supply, a third conduit connected from the outlet of the carburetor to the second conduit that connects the pump inlet and source of fuel supply, a fuel bypass from the first named fuel receptacle to the second named fuel receptacle, a float in the second named receptacle operatively connected to the intake and outlet valves whereby the outlet valve will move towards an open position as the inlet valve moves toward a closed position so as to permit the overflow of fuel from the first receptacle into the second receptacle to pass back into the second conduit connected to the fuel supply, and check valve means positioned in the second conduit between the source of fuel and the third conduit responding only to the suction of the fuel pump to permit flow of fuel from the source of fuel through the second conduit to the pump.

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