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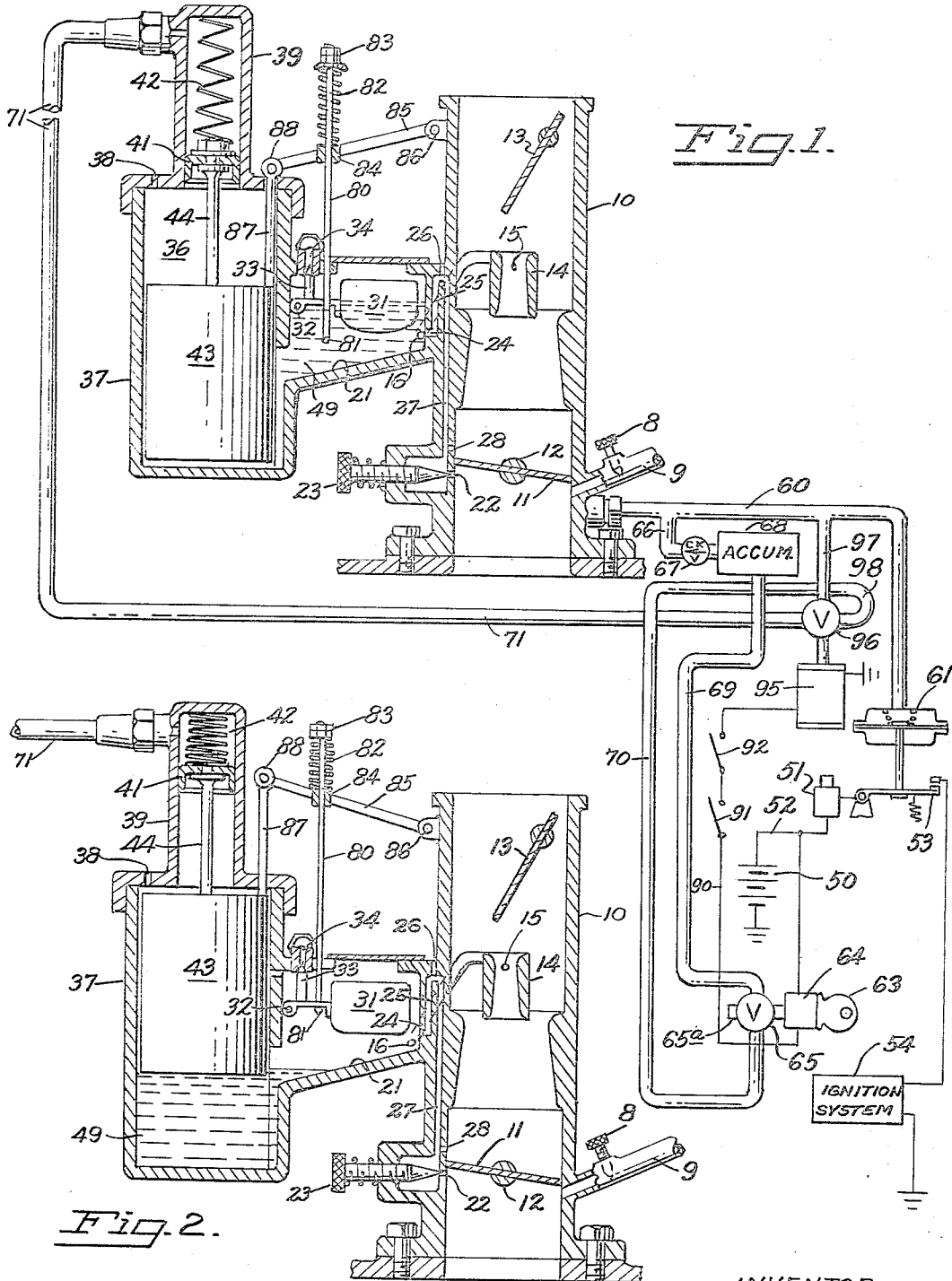
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VEHICLE CARBURETOR

Filed Nov. 6, 1964

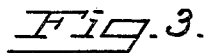
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VEHICLE CARBURETOR

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VEHICLE CARBURETOR

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This invention pertains to an improvement in the fuel feeding devices for a vehicle motor with particular emphasis on the means for stopping the flow of fuel to the engine on high speed decelerations at closed throttle.

My application, Ser. No. 166,592, entitled, "Carburetor," covers a vacuum operated diaphragm suck out for the fuel from the carburetor bowl during high speed closed throttle decelerations, so that both the fuel to the main jets and the idle jets will be terminated because the level of the fuel has been drawn down to the level of the intake to the supply lines to the idle jets and main jets.

This invention is a modification or improvement in the means of controlling the withdrawal from the float bowl of the idle fuel by utilizing a movable plug in an auxiliary chamber adjacent to said float bowl in such a way that when said plug has been pushed fully into the auxiliary chamber, the fuel is raised to the normal level in the float bowl so that the float is fully supported on the fuel. This is the normal driving condition of the carburetor. Under conditions of high speed decelerations, the plunger will be automatically withdrawn from the auxiliary chamber and the level of the fuel dropped below the intake ports leading from the float bowl chamber to the main and idle jets so there will be no fuel supplied to the engine during such decelerations until the throttle is opened or the engine drops below a predetermined speed when the plug will be automatically returned to the bottom of the auxiliary chamber to reestablish the normal level of the fuel in the float bowl. The means for accomplishing the control to operate the device automatically on high speed closed throttle decelerations has been covered in said pending application.

Another feature of the invention is the method of shutting the engine off by removing the fuel from the float bowl first by the use of a device such as a plug or any other suitable means and then shutting the ignition of automatically after the engine stops by some suitable means such as an engine vacuum operated ignition switch operated by a diaphragm which closes at very low intake suction such as are available at full throttle and even cranking speeds at part throttle or "high throttle cam positions."

Another feature is the use of a panic button in case a throttle spring broke or the means for withdrawing the fuel from the bowl failed so that the ignition could be cut off to stop an otherwise possible runaway engine.

Other features of the invention will be more particularly pointed out in the accompanying specification and claims.

I have illustrated my invention by way of example in the accompanying drawings, in which:

FIG. 1 is a side elevation, partly in section and partly diagrammatic, showing one form of the invention.

FIG. 2 is similar to the carburetor portion of FIG. 1 but with the fuel in the lowered position relative to the carburetor float.

FIG. 3 is a view of the top portion of the auxiliary chamber and cover and operating piston and spring showing another form of the invention.

In all figures like numerals of reference refer to corresponding parts.

In FIGS. 1 and 2 I have shown a carburetor 10, a butterfly 11 operated by throttle control shaft 12, a choke

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valve 13 which is usually automatically operated, a main jet 14 fed by tube 15 with pick up port 16 near the bottom of the float bowl 21. Fuel to idle is admitted through port 22 as adjusted by adjustment screw 23 and reaches port 22 by entering through port 24 going through passage 25, past anti-siphon port 26, down passage 27, past transfer port 28 to idle fuel port 22. Float 31 is pivoted at 32 and operates float needle valve 33 to control the fuel entering from the fuel pump through line 34 in the usual manner. Auxiliary chamber 36 is closed in housing 37 which includes a cylinder 39 in which a piston or plunger 43 is reciprocally mounted and urged downwardly by spring 42. Plug 43 is nearly the same diameter as auxiliary chamber 36 but so fitted as to be able to move freely in chamber 36 which can be round or any other shape necessitated by the limitations of the space available for the carburetor and these mechanisms. Rod 44 connects piston 41 to plug 43. This is the normal or inactive position of the plunger 43, as shown in FIG. 1.

FIG. 1 shows the carburetor in its normal or "readiness" position, as after a long shutdown. The fuel 49 has reached its maximum allowable level, so that the float 31, in conjunction with the needle valve 33, closes off the fuel supply which comes from a conventional source, e.g. a pressurized fuel supply (not shown), through a line 34. As soon as demand for fuel arises, generally when suction is created in the throat of the carburetor 10, the fuel will pass through port 24, line 27, past needle valve 23 and port 22, to enter the throat of the carburetor where it is mixed with air which is admitted through a pipe 9 under the control of a valve 8. In another mode of operation, the fuel would emerge primarily through a port 15 which may be situated within some venturi element 14. However, such arrangements are conventional and so well known that it is deemed unnecessary to elaborate upon them. The significant consideration in the context of the present invention is that the fuel in the fuel bowl is in normal operation sucked out of the fuel bowl and into the throat of the carburetor.

The ignition is supplied from battery 50 past panic button 51 by line 52 and controlled by vacuum operated ignition switch 53 which connects panic button 51 with the ignition system 54 through suitable wiring whenever the engine is running. When the suction in line 60 to vacuum motor 61 is at a value equal to or greater than the suction existing below butterfly 11 when cranking the engine while butterfly 11 is on high cams such as is common when starting cold or when operating at full speeds at low throttle, etc., vacuum operated switch 53 will be closed, providing power for ignition.

The understanding of the invention as illustrated in FIG. 1 will be facilitated by keeping in mind that the valve 65 is operated by the ignition key 63 in such a manner that it connects in the "off" position the lines 69 and 70, thereby subjecting the plunger 43 to whatever suction then prevail in the accumulator 68. This happens whenever the key 63 is turned to "off." When the key 63 is in the "on" position, the connection between lines 69 and 70 is broken and the actuation of the plunger 43 is subjected to a regimen resulting from the combined function of the switches 91 and 92 which at a given time may, or may not, have caused valve 96 to connect line 97 with line 71, so that the raising or lowering of the plunger 43 (by means of suction prevailing in the throat of the carburetor) is controlled by the switches 91 and 92 as long as the ignition key 63 is in the "on" position. In contrast with the foregoing, and upon the following explanation, the plunger 43 is immediately subjected to the suction in accumulator 68 whenever the ignition key 63 is in the "off" position.

Key 63 operates lock 64 to actuate valve 65 which

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controls the flow of suction from the area below butterfly 11, through line 66, past check valve 67, accumulator 68 and line 69. When valve 65 has been opened by key 63, flow of suction will pass valve 65 and go into line 70 to the cylinder 39 by passing through port 98 in valve 96 to line 71, and draw piston 41, piston rod 44 and plug 43 to the raised position, shown in FIG. 2, and hold it there as long as suction is provided from the throat of the carburetor either directly or, after such suction has dropped below the limit of the check valve 67, indirectly in the form of suction stored in the accumulator 68, until no suction is available sufficient to overcome the force of the spring 42. This will cause the fuel in the float bowl 21 to be lowered to the position shown in FIG. 2, below the intake 16 to the main jet or below intake port 24 to the idle jets, so that fuel to the engine will be shut off, the engine will stop. The vacuum below the butterfly will drop to zero and the spring in vacuum motor 61 will cause switch 53 to open and the ignition will be turned off well after the stopping of the engine. This will allow an engine shut off by terminating the fuel first and the ignition later in a different manner than the time delayed shut off as described in my copending application, Ser. No. 219,586, entitled "Engine Shut Off," or different than the controls shown in my copending application, Ser. No. 354,323, entitled "Delayed Ignition Shut Off After Engine Stops," which also uses a vacuum operated ignition switch but a different method of turning off the fuel to the engine.

In the position shown in FIG. 2, it is necessary to hold the float needle valve 33 closed as float 31 would drop down when the level of the fuel in the float bowl 21 is lowered which would normally open float needle valve 33. To prevent this I have provided stem 80 with a hooked end 81 which passes under the arm connecting pivot 32 to float 31 to hold float 31 up and float needle valve 33 closed. This is accomplished by the action of spring 82 which is mounted between the nuts 83 on the upper end of rod 80 and the swivel collar 84 through which rod 80 passes and which swivel collar 84 is pivotally attached to arm 85. Arm 85 is pivoted to the carburetor at pivot 86 and the left hand end of arm 85, as viewed in FIGS. 1 and 2, is connected to plunger 87 by pivot end 88. Plunger 87 rides on the top of plug 43 or maybe loosely pinned to the top of plug 43 so as to move up and down with plug 43. When plug 43 is in the position shown in FIG. 2, plunger 87 will be raised, arm 85 will be raised, spring 82 will be compressed pulling on rod 80 to hold float 31 up and float needle valve 33 closed so that fuel from the fuel pump will not be forced into the float bowl. After the engine stops, the vacuum below the butterfly 11 will drop to zero and plug 43 will slowly be lowered to the position shown in FIG. 1 as minor leaks in the valve 65, check valve 67 allow the suction above piston 41 to be dissipated. This could take a short time or a long time depending on the tightness of the circuit but in any case the fuel will be sucked out of the bowl long enough for the engine to stop well before the fuel is returned and may be many minutes before it is returned which would help reduce the percolating of the fuel in the float bowl if chamber 36 could be kept cooler than the float bowl because it is more remote than the heat source of the motor which would have to travel up from the base of the carburetor 10.

When plug 43 is lowered to the position shown in FIG. 1, the pressure on spring 82 will be relaxed. Rod 80 will be lowered to the position shown in FIG. 1 with turned end 81 well below the arm which connects pivot 32 to float 31 so that float 31 can operate float needle 33 in the normal manner for engine idle or power operations.

To start the engine after a short or long shut down, key 63 is turned to the "on" position, valve 65 will close the connection between lines 69 and 70 and open a connection between bleed port 65a and line 70 so that the suction in cylinder 39 will be reduced to atmospheric air

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going from bleed port 65a, through valve 65, line 70, port 98, valve 96, and line 71 to cylinder 39. Plug 43 will be promptly lowered (if not already lowered due to suction leakages up through line 71) and the fuel 49 will be at engine operating level in the float bowl, as shown in FIG. 1 for engine starting and operating conditions. As soon as the engine is cranked with key 63 in the "on" position, suction will be developed through line 60 to close ignition switch 53 and since fuel is at the normal height in the float bowl 21, the engine is ready to start and continue to run.

A control circuit for shutting off the flow of idle fuel by lowering the fuel to the position shown in FIG. 2 during high speed closed throttle decelerations includes wire 90 which may pass through a switch in lock 64 and goes to throttle closed switch 91 and governor operated switch 92 to solenoid 95 which works valve 96. Valve 96 when solenoid 95 is energized connects the suction on the engine side of throttle butterfly 11 to cylinder 39 by means of line 60, line 97 and line 71. When deenergized, the connection between lines 97 and 71 is blocked off and 71 is connected with a bleed 98. This connection will provide suction above piston 41. When solenoid 95 is energized, valve 96 will connect line 97 to line 71 and close the connection to port 98 so that the suction below the throttle butterfly 11 will act in cylinder 39 to move plug 43 to the position shown in FIG. 2. This takes place when throttle butterfly 11 is closed, closing switch 91, and when the engine is above a predetermined speed such as 1000 r.p.m. when switch 92 will be closed.

In order that the engine shall not die when decelerating with a closed throttle, switch 92 will open when the engine speed gets in the neighborhood of 1000 r.p.m. on deceleration, solenoid 95 will be deenergized, and port 98 will be connected through line 70, valve 65, to bleed port 65a which changes the pressure in cylinder 39 to atmospheric and spring 42 will return plug 43 to the position shown in FIG. 1 which returns the fuel to the normal operating level shown in FIG. 1. The effect just described will necessarily be achieved also when the throttle 11 is opened at any time during deceleration.

In FIG. 3 I have shown another form of the invention, in which spring 100 acts to push piston rod upward to raise plug 45 to the position where the fuel will be withdrawn from the float bowl 21 as the fuel is shown in FIG. 2. Plug 45 is lowered by suction coming through line 103 from engine intake through port 102 to the under side of cup piston 101 to overcome the action of spring 100 and lower plug 45 to the position where the fuel will be returned to the normal level in the float bowl as the fuel is shown in FIG. 1.

An operating structure for the vacuum is shown in which the accumulator 68 is connected to the intake manifold on the engine side of butterfly 11 through check valve 67 and line 66. Accumulator 68 is connected through pipe 109 to plunger valve 105. Plunger 106 in valve 105 is operated by solenoid 95 which could be operated by a circuit including a throttle switch 91 which is closed when the throttle is closed and a governor switch 92 which is closed approximately above 1000 r.p.m. so that the solenoid will be energized above 1000 r.p.m. on closed throttle decelerations. This energizing of solenoid 95 will pull the plunger 106 down against the action of spring 106a so that air bleed port 108 will be connected to line 103 so that atmospheric pressure will exist under piston 101 and spring 100 will raise plug 45 to the position shown in FIG. 3 when the fuel will be withdrawn from the float bowl to stop the flow of fuel through the main jet 14 and the idle jet 22 during high speed decelerates with closed throttle.

As the throttle is opened, switch 91 will open or when the speed drops below 1000 r.p.m. switch 92 will open. The solenoid will be deenergized and the valve plunger 106 will be moved to the position shown in FIG. 3 where in the accumulator is connected by line 109 to line 103

by groove 107 to provide suction to lower piston 101 against spring 100 to lower plug 45 so that the fuel will be restored to the normal level in the float bowl provided the key 120 is in the "on" position shutting off bleed 114. In order to shut the engine off, I have shown a key 120, a lock cylinder 121 operating valve 113 so that in the "on" position the passage through valve 113 is shut off disconnecting bleed 114 for all starting and running conditions of the engine, as shown in FIG. 3. When it is desired to stop the engine, key 120 is turned to the "off" position, the passage 115 through valve 113 is moved to connect bleed port 114 to line 123 and will establish the atmospheric pressure under piston 101. Under these conditions spring 100 will raise plug 45 to the position shown in FIG. 3 and the fuel will be withdrawn from the float bowl 21. One advantage of this construction, shown in FIG. 2, is that whenever the engine is turned off and for long periods after such time the fuel will be withdrawn from the float bowl into the auxiliary chamber under plug 43 which is generally cooler than the float bowl and this will reduce the percolation of the fuel in the carburetor after shut down. The fuel will be retained in this position of withdrawal from the float bowl through the action of spring 100 rather than by the suction, as shown in FIG. 1. When the engine is to be started up the key 63 is turned to the "on" position closing off bleed 114 and connecting the first cranking of the engine will establish a suction in the accumulator 68, piston 101 will be promptly lowered, and the fuel in the float bowl will be raised to the normal level so that the engine will start with the aid of automatically controlled choke 13. The throttle 11 will be cracked open by the throttle lever riding on the high cam in the normal choke throttle interlock, not shown.

I have illustrated my invention in these various forms; however, many other variations may be possible within the scope of this invention.

To those skilled in the art to which this invention relates many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and description herein are purely illustrative and are not intended to be in any sense limiting.

What is claimed is:

1. A carburetor for an internal combustion engine having an ignition system comprising a housing, a partition wall dividing the housing into a pair of adjacent chambers, an opening through said wall connecting said chambers, one of said chambers comprising a float bowl, a float in said bowl, a needle valve connected to said bowl for controlling the flow of fuel thereto from a supply source, means connecting said float and valve for closing the valve when the float is at a predetermined level in said bowl and for opening the valve when the float is below said level whereby to maintain a predetermined volume of fuel in said bowl; a plunger mounted in the other of said chambers for reciprocating movement therein, the

volume of said second chamber beneath the plunger at one end of its stroke being sufficient to store the fuel from the float chamber whereby to prevent the feeding of fuel from the bowl, the cross-sectional area of the plunger being less than the cross-sectional area of the chamber to provide a loose fitting therein of the plunger, and the volume of said plunger being at least equal to the volume of the stored fuel, means for raising the plunger to one end of its stroke to withdraw fuel from the float bowl through said opening and into the other chamber, means for lowering the plunger to the other end of its stroke to force the fuel to return to the float bowl, and means connected to the plunger and said float for closing the needle valve when the fuel is withdrawn from the float bowl and opening the valve after the fuel is returned.

2. A device as defined in claim 1 wherein the means for raising the plunger comprises a vacuum motor, conduit means for connecting said motor to a source of vacuum, and valve means in said conduit means responsive to a predetermined engine speed at closed throttle operation of the engine for connecting the source to the motor.

3. A device as defined in claim 1 wherein the means for raising the plunger comprises a vacuum motor, conduit means for connecting said motor to a source of vacuum, and manually operable valve means in said conduit means to connect the source to the motor to cause the engine to stop for lack of fuel.

4. A device as defined in claim 1 further including a vacuum motor, a switch in the ignition system for maintaining the system energized when closed, means connecting said motor and switch for operating the switch by the motor, conduit means connecting the motor to an engine created vacuum source to operate the motor to hold the switch closed, and means for opening the switch when the vacuum is destroyed.

5. A device as defined in claim 1 wherein the means for raising the plunger comprises a spring and the means for lowering the plunger comprises a vacuum motor, conduit means connecting the motor to a vacuum source or to atmosphere, a valve in said conduit means responsive to a predetermined engine speed at closed throttle for connecting the motor to atmosphere.

6. A device as defined in claim 5 further including a manually operable valve in said conduit means for disconnecting the motor from the vacuum source and connecting said motor to atmosphere to withdraw the fuel from the bowl and stop the engine.

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