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SAFETY FUEL SYSTEM FOR INTERNAL COMBUSTION ENGINES

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This invention relates to fuel systems and particularly to an improved safety fuel system, and has for an object to provide a construction wherein a desired amount of fuel is fed to an internal combustion engine under varying circumstances.

Another object of the invention is to provide a safety fuel system for internal combustion engines wherein gasoline or other fuel is supplied to an internal combustion engine by the main part of the system and through auxiliary sections of the system under unusual conditions.

A further object is to provide a control member for the fuel system of an automobile engine positioned between the carburetor of the engine and the supply of fuel with the parts so arranged that the carburetor may usually function in a normal way, but where it may be caused to continue to function when certain of the pipes become clogged or filled with vapor under pressure.

An additional object is to provide a fuel system for an internal combustion engine with indicating means of faulty delivery to the dispenser.

A still further object is to provide a fuel system for an internal combustion engine wherein fuel, as for instance, gasoline, may be supplied to the carburetor of the engine by a pump, by suction or by gravity.

In the accompanying drawing—

Fig. 1 is a diagram of a safety fuel system disclosing an embodiment of the invention;

Fig. 2 is a longitudinal vertical sectional view through the control system shown in Fig. 1;

Fig. 3 is an enlarged fragmentary sectional view through Fig. 1 on the line 3—3;

Fig. 4 is a fragmentary sectional view showing a slightly modified form of indicator to that illustrated in Fig. 2;

Fig. 5 is a sectional view through one of the three-way valves shown in Fig. 1.

Referring to the accompanying drawing by numerals, 1 indicates an intake manifold adapted to form part of an internal combustion engine. A carburetor 2 is connected with the manifold 1 and is adapted to supply a proper combustible to the manifold whenever the engine is functioning. The parts just described are old and well known as the manifold 1 and also the carburetor 2 may be of any desired kind.

In automobiles and elsewhere sometimes the gasoline feed line to the carburetor 2 is positioned so as to receive an appreciable amount of heat and under some circumstances becomes so hot as to vaporize the gasoline attempting to pass therethrough. This produces a back pres-

sure and deprives the carburetor of the proper supply of gasoline or other fuel. It will be evident that under these circumstances the engine will not function properly and in a short time will stop. To avoid this condition and yet permit the supply pipe to be placed wherever desired, a safety system has been provided and the general arrangement is shown in Fig. 1 of the accompanying drawing.

Referring particularly to Fig. 1, it will readily be seen that the fuel supply pipe 3 for the carburetor 2 is connected to a device 4 which acts, in a certain sense, as a control. When the valve 5 is open, as shown in Fig. 1, and all parts are functioning in a normal way, gasoline or other fuel is passing through pipe 3 to the carburetor 2 and the carburetor 2 is functioning in the usual manner. As indicated in Fig. 1, a pump 6 draws gasoline or other fuel from the supply pipe 7 and forces the same through the pipes 8 and 9 to the control 4. From control 4 the gasoline passes through pipe 3 to the carburetor and if the automobile and other parts are functioning normally the gasoline will continue to flow in this order as long as the engine is functioning. However, under some circumstances, the gasoline can not flow in the circuit just mentioned. As herein-after fully described, when it is impossible for any reason for the gasoline to pass through the pipe 3, it may pass through pipe 10 to the carburetor 2, or if the carburetor 2 is out of operation, the three-way valve 11 may be turned so that the gasoline from the pipe 10 may pass through the auxiliary pipe 12 and discharge directly into the manifold 1. Also in case the pump 6 fails to function for any reason, the three-way valves 13 and 14 may be shifted so that suction from the engine will draw gasoline from the supply pipe 7 and this gasoline will pass through valve 13, pipe 15, valve 14, and pipe 9 to the control 4. If desired, gasoline could be fed to the control 4 under the action of gravity through the pipes 16 and 17 and valve 18. The arrangement of these pipes and valve 18 is to take care of an emergency. If desired, a permanent small container could be connected to the upper end of pipe 16 and the fuel from the container could be turned on at any time by turning valve 18 to the desired position. The various valves heretofore mentioned, except valve 18, are all three-way valves, as indicated by the valve 19 in Fig. 5. It will be observed that these valves are each provided with a casing 20 having ports 21, 22 and 23, and a valve key or member 24 having a straight passageway 25 extending

entirely therethrough and a right-angle passageway 26.

When the system is functioning normally, gasoline will pass from pipe 9 into the control 4, and from control 4 to the carburetor 2 through pipe 3. This control, as shown in Fig. 2, is preferably formed from a casing 27 which may be metal or other suitable material and which may be solid throughout or have on opposite sides windows 28. By providing the glass panels in windows 28, the interior of the control may be readily examined at any time. The casing 27 is formed with a chamber 29 for the reception of the gasoline or other fuel 30. A cover or cap 31 normally closes the upper end of the chamber 29 so that the chamber is leak-proof. One or more depending lugs 32 are preferably formed integral with the cap 31 so that a pintle 33 may be carried thereby and may extend through the end of a float bar 34, which bar carries a float 35. A needle valve 36 is supported by bar 34 and is normally tight against its seat 37 in valve casing 38. A cap 39 clamps the enlarged end 40 of pipe 10 to the valve casing 38 so as to make a fuel-tight connection. Normally float 35 has a tendency to move the needle valve 36 upwardly so as to close the passageway 41. However, this can be prevented by an adjusting pin 42 shown in Fig. 3. Pin 42 has a threaded portion 43 co-acting with a sleeve 44. A thumb member 45 is secured to the end of the pin 42. By a proper adjustment of this pin, the needle valve 36 may be held in the position shown in Fig. 2 or held in a more open position. An indicating bar 46 is permanently connected with the float bar 34 and extends upwardly into a glass cap 47 which is closed at the upper end. This glass cap is desirable particularly when the glass windows are not used as it will indicate the position of float 35. As shown in Figs. 2 and 3, float 35 can not move upwardly any further even if the chamber 29 becomes entirely filled with fuel, as pin 42 holds the same from any further upward movement. In this way, the valve 36 is positively held open to the desired extent.

Preferably valve 36 is set to be continually open sufficiently to supply the fuel needed for idling the engine or a less amount. This amount may be taken directly into the idling inlet or into the carburetor chamber or where atmosphere prevails. Under certain conditions valve 36 is preferably set to be continually closed. Normally the parts are in the position shown in Fig. 1 and gasoline is being drawn from the supply pipe 7 by pump 6 and forced into chamber 29. From chamber 29, the gasoline passes through a strainer 48 and through pipe 3 to the carburetor 2, provided the carburetor 2 is not already filled. Under certain conditions valve 36 is held open by pin 42 for providing enough fuel for idling.

In case there is a stoppage in pipe 3, the gasoline will pass through pipe 10 into the carburetor 2 in sufficient quantities to maintain the engine idling or even running at a higher speed, provided the screw 42 is properly adjusted.

In case vapor or gas has formed in pipe 9 or air has found its way into this pipe to the extent of stopping or cutting down delivery of fuel, the float level and float 35 in chamber 4 would drop, thus opening valve 36 or causing it to open more, thereby releasing the vapors through pipe 10 and reducing the excessive pressures against the pump in pipe 9, the fuel 30 delivered previous to opening of valve 36 in chamber 29 insuring continuous supply to the car-

buretor 2 through pipe 3. The pump 6 will deliver the full amount of fuel again the moment high pressures against it have been released by valve 36 through pipe 10, and the chamber 29 in turn will fill again. If the pump 6 for any reason including the aforesaid, fails to deliver sufficient fuel to feed the engine at all speeds, the float 35 in chamber 29 will drop, thus lowering the indicating pin 46, which indicates that troubles have occurred in the fuel delivery system and not in the carburetor.

If the device is on an automobile and there is no convenient repair shop when pipe 3 becomes stopped up, the driver may rotate the pin 42 for opening the valve 36 to the correct extent so that he can continue to drive the automobile at a desired speed. In case the carburetor also should get out of order, the driver may turn valve 11 to direct the gasoline from pipe 10 to the intake manifold 1 through pipe 12.

In case the pump 6 should get out of order, gasoline may be supplied to the control 4 either by gravity or by suction. Where gasoline is being supplied through gravity, valve 18 is opened and the gasoline is allowed to flow directly into the control. If suction is to be used, the valves 13 and 14 are opened and through suction gasoline is taken from pipe 7 and discharged into chamber 29 from which it is fed to the carburetor 2.

By these various emergency arrangements, the driver may continue to cause the engine of the automobile to function until he reaches his destination or a repair shop.

In Fig. 4 a slightly modified construction of indicating device is presented. This device is similar to that shown in Fig. 2 but instead of being secured to bar 34, it loosely rests thereon under the action of gravity and slidably fits into a tubular boss 49. A stop 50 limits the downward movement of the indicator 46'. The indicator 46 and 46' is provided to indicate the position of the float 35 but does not control the action of the float. The pin 42, however, controls the action of the float to a certain extent. If the pin 42 were unscrewed, float 35 would move upwardly as the chamber 29 fills and would move the needle valve 36 against its seat whereby no fuel would pass through pipe 10.

I claim:

1. A safety feed system for an internal combustion engine including a carburetor, piping leading to said carburetor, means including a pump for forcing liquid fuel through said piping to said carburetor and a control interposed in said piping, said control being provided with a chamber having one inlet and a pair of outlets, one of said outlets leading from the bottom of the chamber to said carburetor and the other outlet leading from the top of the chamber to the carburetor, a float positioned in said chamber, a valve actuated by said float for closing the second-mentioned outlet and hand adjustable means for preventing said float from closing said valve.

2. A safety fuel system for an internal combustion engine including a carburetor, a pair of pipes for directing liquid fuel to said carburetor, a control formed with a chamber in free communication with said carburetor and means for supplying liquid fuel to said chamber, said control being provided with a valve for one of said pipes, a float acting on said valve for closing the same and a hand actuated screw positioned to limit the movement of said float in a direction for closing said valve.

3. In a safety fuel system for an internal combustion engine, a control formed with a housing presenting a liquid fuel chamber having an inlet, an outlet at the bottom and a second outlet at the top, means forming a valve seat in said second outlet, a valve member movable toward and from said valve seat, a float in said chamber for moving said valve member toward and from said valve seat as the liquid fuel in said chamber rises and falls and a hand adjustable member acting on said float for limiting the closing action of said valve member.

4. In a device of the character described including a control formed with a housing having a removable top, said housing presenting a liquid receiving and dispensing chamber, the lower part of the housing having an inlet near the top and an outlet near the bottom, said removable top having a depending lug, an outlet opening and a threaded opening spaced from said outlet opening, a float positioned in said chamber, a float bar rigidly secured to said float and pivotally connected with said lug, a reciprocating valve member carried by said float bar and movable therewith, a tubular member positioned in the outlet in said removable top, said tubular member having a valve seat arranged in the path of movement of said valve member and a threaded member screwed into said threaded opening, said threaded member being positioned to engage said float bar and limit the closing movement of said valve member.

5. A fuel system for an internal combustion engine including a carbureter, a chamber provided with a single inlet, a primary outlet near the bottom and an auxiliary outlet in the top, a pipe for directing liquid fuel through said inlet into said chamber, a pipe for directing liquid fuel from said primary outlet to said carbureter, a second pipe for directing liquid fuel from said auxiliary outlet to said carbureter, a float-actuated valve tending to close said auxiliary outlet and hand-adjustable means for limiting the movement of said float and the closing action of said valve.

6. A fuel system for internal combustion engines including a carbureter, and means for supplying said carbureter with fuel, said means including a chamber, means connecting said chamber with said carbureter for normally supplying fuel to the carbureter, an auxiliary pipe connecting the top of said chamber with the top of said carbureter, a supply pipe for supplying a liquid fuel to said chamber, and means for forcing said liquid fuel through said supply pipe into said chamber under pressure sufficient to force fuel from said chamber into said carbureter continuously through said auxiliary pipe.

7. A fuel system for internal combustion en-

gines including a carbureter and a primary and an auxiliary pipe leading into said carbureter for supplying liquid fuel to the carbureter, said primary pipe supplying sufficient fuel to operate said engine at all speeds and the auxiliary pipe supplying fuel under pressure to the top part of the carbureter in sufficient quantity to cause the float in said carbureter to be less operative and thereby partly close the valve to said primary pipe.

8. A fuel system for an internal combustion engine, including a carbureter, a pump, a fuel line extending from said pump to the carbureter, means forming a control chamber interposed in said fuel line, means forming a primary outlet of said fuel line to the carbureter, said primary outlet being controlled by the carbureter, a tubular structure extending from the upper part of said control chamber to the upper part of said carbureter, a valve controlling the inlet end of said tubular structure, a float acting to move said valve toward a closed position when said chamber is filled with fuel and a hand-adjustable member acting on said float for limiting the closing action of said valve, whereby fuel in a limited amount may flow through said tubular structure at all times to said carbureter.

9. In a fuel feed system, the combination of a device having a chamber provided with an inlet, a primary outlet at the bottom and an auxiliary outlet at the top, conduit means communicating with said inlet for supplying liquid fuel to said chamber, a carbureter, a primary pipe leading from said primary outlet to the float chamber of said carbureter, an auxiliary pipe leading from said auxiliary outlet to the top of said float chamber, and a float valve operated by liquid fuel in said first chamber which controls said auxiliary outlet, said auxiliary pipe serving to convey fuel from the first chamber to the float chamber when the flow of fuel in the primary pipe is wholly or partly impeded.

10. In a fuel feed system, the combination of a device having a chamber provided with an inlet, a primary outlet at the bottom and an auxiliary outlet at the top, conduit means communicating with said inlet for supplying liquid fuel to said chamber, a carbureter, a primary pipe leading from said primary outlet to the float chamber of said carbureter, an auxiliary pipe leading from said auxiliary outlet to the top of said float chamber, a float valve operated by liquid fuel in said first chamber controlling said auxiliary outlet, said auxiliary pipe serving to allow the passage of vapor forming in said chamber to said float chamber or from said float chamber to said first chamber in order to prevent vapor locks within said system.

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