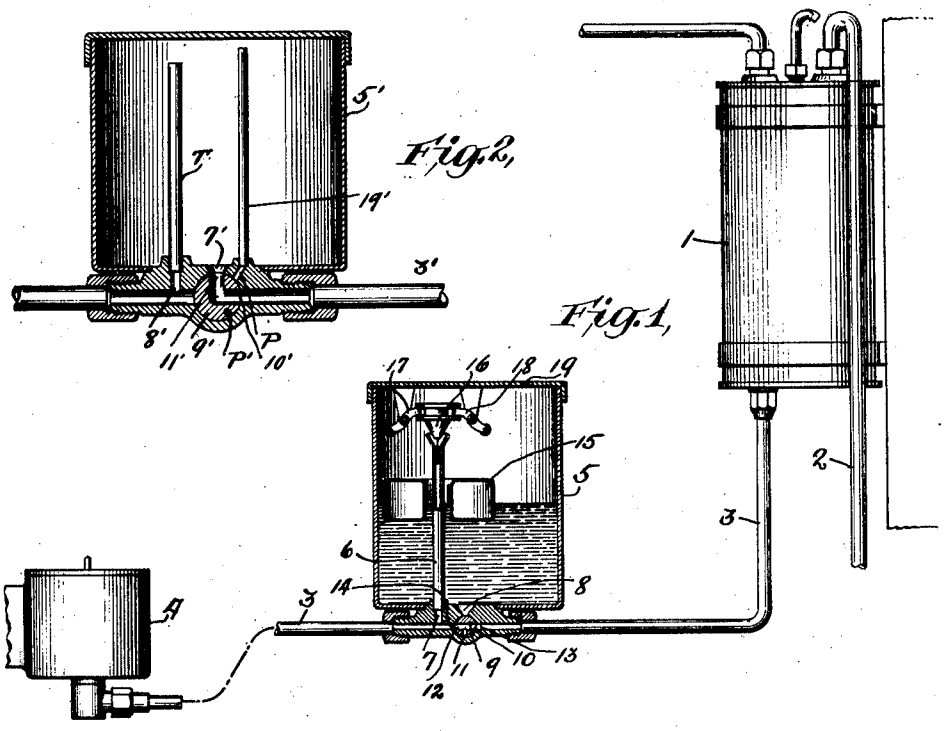
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FUEL SYSTEM

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FUEL SYSTEM.

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My invention relates generally to an improvement in fuel systems but is primarily directed to an improvement in fuel systems adapted to be used in connection with internal combustion engines.

The primary object of the invention is to provide auxiliary means for supplying fuel to a consumer which in the present instance is an internal combustion engine, this auxiliary device being of such a character as to be always available for use, means being provided whereby it is impossible to supply fuel to the engine without filling the auxiliary tank forming part of my improved apparatus thereby insuring a supply of fuel in the auxiliary tank at all times.

In the accompanying drawings I have illustrated my invention in two different forms applied directly to or in connection with a main fuel tank and as will be hereinafter pointed out in detail I have so constructed and arranged the various parts of my improved apparatus that the main tank is employed in the usual way for supplying fuel to the engine the auxiliary tank or compartment while available for use at any time being employed only when the supply of fuel in the main tank has become exhausted or is no longer available for any other reason.

It is to be understood that the present device is not merely an auxiliary tank containing a supply of spare fuel which might be a container carried in the car. On the contrary my device is so arranged in one embodiment of my invention that when the fuel tank is filled in the ordinary way and the engine operated the auxiliary tank is automatically filled also and in addition to this if the fuel is drawn from the auxiliary tank and fed to the engine the device must be set to its original position again before the fuel can be again taken from the main tank.

In another form of my invention the ordinary vacuum tank and the auxiliary tank are so arranged that all fuel drawn into the vacuum tank from the main tank must first pass through and fill the auxiliary tank, the latter being filled to a predetermined level which is always maintained therein and then and not until then fuel is taken into the vacuum tank. The result is that the main tank can be emptied but the auxiliary tank is kept filled until manipulated so as to permit fuel to be drawn from it. This arrangement provides for restoring everything to normal before again commencing operation.

I may here mention that in the embodiments of my invention where a vacuum tank is employed the auxiliary tank has been shown separate therefrom but it is to be understood that if desired the auxiliary tank can be built right into the vacuum tank itself.

As will be hereinafter pointed out I have provided an auxiliary tank which is more or less remote from the vacuum if a vacuum tank is employed, but it is to be understood that if desired the auxiliary tank may be placed directly below the vacuum tank, in fact for the purposes of this invention the auxiliary tank may be placed in any position desired.

In the accompanying drawings I have illustrated two embodiments of my invention,—

Fig. 1 showing the same applied to an internal combustion engine in connection with the usual vacuum tank for supplying fuel to the engine;

Fig. 2 is a sectional elevational view of a modified form of auxiliary tank and valve mechanism therefor;

I wish it to be distinctly understood that a vacuum tank is by no means indispensable to the operation of my invention, the same being equally adapted for use in connection with gravity and pressure feed systems.

Referring first of all to Fig. 1: In this embodiment of my invention I have illustrated a vacuum tank 1 of the usual construction the details of which form no part of my invention. This vacuum tank is connected to the manifold of an internal combustion engine and draws fuel through the pipe 2 from a main fuel tank not shown. A pipe connection 3 conducts the fuel that is drawn into the vacuum tank to the carburetor 4 of the engine. This construction is old and well known.

Inserted in the pipe line 3 between the vacuum tank 1 and the carburetor is an auxiliary tank 5. This tank is provided with a filling tube or pipe 6 in communication at all times with the pipe line 3 by way of a port 7. The auxiliary tank is also provided with an outlet port 8 adapted to be controlled by the three-way valve 9 in the pipe line 3 and operable from the dash of an

automobile or from any other convenient location, so as to shut off or open up communication with the pipe line. This three-way valve has ports 10, 11 and 12 the ports 10 and 12 normally registering with the ports 13 and 14 of the pipe line.

Within the auxiliary tank 5 I provide a float 15 and a needle valve 16 the latter being mounted for convenience on the filling tube 6 and connected to a pair of pivoted arms 17 and 18. These arms are adapted to be engaged by the float 15 when the latter moves upwardly in the tank in the process of filling the tank to finally cause the valve 16 to close off the upper end of the filling pipe 6 to thereby prevent further flow of fuel from the pipe line into the auxiliary tank. The top of the tank is provided with an air vent 19. If desired this air vent can be closed by the action of the float 15 or by a separate float. It is to be understood of course that the top of the tube 6 is either on a level with or below the fuel in the vacuum tank so as to cause fuel to be discharged from the top of the tube into the auxiliary tank.

The operation of this embodiment of my invention is as follows: I will assume first of all that the main fuel tank is filled. If the engine be started fuel will be drawn from the main tank into the vacuum tank and from thence will flow in a well understood manner through the pipe line 3 to the carburetor 4. At this time the valve 9 controlling the ports 8, 13 and 14 is in the position of Fig. 1 shutting off the discharge port 8 of the auxiliary tank fuel however being free to flow into this tank through the port 7 of the filling pipe 6 overflowing at the top of the latter until the level in the auxiliary tank has caused the float 15 to engage the arms 17 and 18 to thereby close off the needle valve 16 and shut off the further flow of fuel to the auxiliary tank. The engine of course may be operated indefinitely so long as the supply of fuel in the main tank is replenished at proper intervals in which event it will not be necessary to make use of the fuel in the auxiliary tank 5 at all. Assuming however that the main supply tank is not refilled and that the fuel therein has become exhausted, it is then merely necessary to operate the valve 9 into position to close off the port 13 and open communication between the outlet port 8 in the auxiliary tank and the port 14 in the pipe line 3. Fuel will now flow from the auxiliary tank to the carburetor enabling the engine to continue operation. Upon refilling the main tank it may very well happen that the operator will omit to return the valve 9 to its original position, that is to the position of Fig. 1, in which event of course the engine will continue operation only until the supply of fuel in the auxiliary tank has become exhausted inasmuch as the port 13 at this is closed whereupon the operator's attention will be drawn to this fact at which time he may restore the valve 9 to its original position to thereby permit fuel to flow from the vacuum tank to the carburetor in the usual normal way through the pipe line 3. By returning the valve 9 to its original position it will be obvious as I have above pointed out the tank 5 will be refilled again. It will be seen therefore from the description thus far given that I have provided auxiliary means for supplying fuel to an internal combustion engine which is automatically maintained available for use at all times.

While I have described my apparatus in connection with a vacuum tank it is to be understood and it is obvious that the same could be used with equal facility with a pressure feed system or a gravity feed. I may here mention also that in connection with a gravity feed system the use of my invention would eliminate the troubles now experienced in driving up a steep grade.

Referring now to Fig. 2, 5′ illustrates an auxiliary tank which may take the place of the tank 5 of Fig. 1. This tank is provided with a filling port 7′ controlled by a valve 9′ provided with ports 10′ and 11′. The auxiliary tank is provided with a discharge tube or pipe T always in communication with the pipe line 3′ through the port 8′. This tank is also provided with an air vent tube 19′ extending upwardly therein to a point above the level of the top of the discharge pipe T. The lower end of this air vent tube is in communication constantly with a port P of the valve body and is adapted when the valve 9′ is properly set to be placed in communication with another port P′ in the valve body communicating with the atmosphere.

In operation the valve 9′ is set as shown in the drawings to permit of fuel flowing from the main fuel tank or from the vacuum tank as the case may be, into the auxiliary tank 5′ by way of the pipe 3′, ports 10′, 11′ and 7′. Fuel will continue flowing into the auxiliary tank until the tank is filled to the level of the top of the discharge pipe T, the fuel thereafter flowing from the vacuum tank or the main tank overflowing into this discharge pipe to pass from thence to the engine carburetor. This operation will continue indefinitely so long as the main tank is kept replenished with fuel. Should however the supply of fuel in the main tank or the vacuum tank become exhausted it is merely necessary to turn the valve 9′ to position to move the port 10′ in register with the port 7′ in the auxiliary tank and the port 11′ in register with the pipe line 3′. This movement of the valve brings the ports P and P′ into

register to admit air over the top of the fuel in the auxiliary tank to cause this fuel to flow by gravity to the engine carburetor.

In this embodiment of my invention I have provided the same advantageous features as provided in the embodiment of Fig. 1, the auxiliary tank being maintained in a filled condition automatically and when the valve 9′ is in position to permit fuel being taken from the auxiliary tank, it shuts off the pipe line leading from the main fuel tank, so that should the operator forget to reset the valve 9′ to permit the auxiliary tank to be refilled his attention will be drawn to this fact inasmuch as it will be impossible to take fuel from the main tank.

Both tanks so far described could be used in connection with any fuel system if desired instead of in connection with a vacuum system.

While I have illustrated several embodiments of my invention it is to be understood that changes may be made in the details of construction thereof and location of parts within the purview of the invention.

I claim:

1. An auxiliary tank adapted for use in a fuel system provided with a discharge port and an inlet port, a discharge tube at said discharge port extending vertically in said auxiliary tank, an air vent tube in said auxiliary tank extending above the level of said discharge tube and means for closing the inlet port and establishing communication between said air vent tube and the atmosphere when fuel is to be discharged from the auxiliary tank through said discharge tube.

2. An auxiliary tank for fuel systems provided with inlet and discharge ports at the lower part; a tube permanently communicating with the discharge port and extending to the upper part of the tank; a vent for the tank extending above the level of the tube; and means adapted when in one position to establish communication between the inlet port or the discharge port and the lower part of the tank and to close said vent when the inlet port communicates with the tank.

3. The combination with a tank having a pipe line therefrom, of an auxiliary tank having an inlet port and an outlet port, said outlet port communicating with said pipe line, and valve means disposed in said pipe line and adapted for normally cooperating between said pipe line and said inlet port for intake from said pipe line into said auxiliary tank and by operation of said valve means cooperating between said inlet port and said pipe line so that said inlet port constitutes a discharge port from the auxiliary tank into said pipe line.

4. The combination with a tank having a pipe line therefrom, of an auxiliary tank having an inlet port and an outlet port, said outlet port communicating with said pipe line, and valve means disposed in said pipe line and having a passage normally cooperating between said pipe line and said inlet port for intake from said pipe line into said auxiliary tank and by operation of said valve means cooperating between said pipe line and said inlet port so that said inlet port constitutes a discharge port from the auxiliary tank into said pipe line.

5. The combination with a tank having a pipe line thereform, of an auxiliary tank having an inlet port and an outlet port, said outlet port constantly communicating with said pipe line, air vent means opening into said tank at the upper end of the tank, and valve means disposed in said pipe line and including means normally cooperating between said pipe line and said inlet port for intake from said pipe line into said auxiliary tank and by operation of said valve means cooperating between said pipe line and said inlet port so that said inlet port constitutes a discharge port from the auxiliary tank into said pipe line.

6. The combination with a tank having a pipe line therefrom, of an auxiliary tank having an inlet port and an outlet port, a vertical pipe in the auxiliary tank communicating at its upper end with the interior of said tank near the top of the tank and communicating at its lower end with said outlet port, air vent means opening into the auxiliary tank at the upper end of the tank and at a level above the upper end of said pipe, and valve means disposed in said pipe line and including means normally cooperating between said pipe line and said inlet port for intake from said pipe line into said auxiliary tank and by operation of said valve means cooperating between said pipe line and said inlet port so that said inlet port constitutes a discharge port from the auxiliary tank into said pipe line.

7. The combination with a tank having a pipe line therefrom, of an auxiliary tank having an inlet port and an outlet port, a vertical pipe in the auxiliary tank communicating at its upper end with the interior of said tank near the top of the tank and constantly communicating at its lower end with said discharge port, air vent means opening into the auxiliary tank at the upper end of the tank and at a level above the upper end of said pipe, and valve means disposed in said pipe line and including an elbow-shaped passage normally cooperating between said pipe line and said inlet port for intake from said pipe line into said auxiliary tank and by operation of said valve means cooperating between said pipe line and said inlet port so that said inlet port constitutes a discharge port from the auxiliary tank into said pipe line.

8. An auxiliary tank for fuel systems provided with an inlet port at the lower part;

a discharge port permanently communicating with the upper part of the tank; a vent for the tank above the level of the tube; and a valve adapted when in one position to establish communication between the discharge port and the lower part of the tank and when in another position to establish communication between the inlet port and the lower part of the tank and bring about the passage of fuel through said discharge port.

9. In a fuel system, a tank provided with inlet and outlet ports at its lower part, said outlet port communicating with a pipe line, a tube communicating with said discharge outlet and extending in said tank to the upper part of the tank and having its upper end open, a vent for the tank above the level of the upper end of said tube, and a valve including means adapted when the valve is in one position for establishing communication between said inlet port and said pipe line for intake from the pipe line into said tank and when the valve is in another position for establishing communication between said inlet port and pipe line whereby said inlet port constitutes a discharge port from said tank into said pipe line.

10. In combination, an auxiliary tank for fuel systems; a valve body mounted in the bottom of the auxiliary tank provided with a valve member receiving bore and alined inlet and discharge ports; said valve body also being provided with a short port from the upper part of said bore to the lower part of the auxiliary tank, and an upwardly extending port from said discharge port; a tube from said upwardly extending port to the upper part of the auxiliary tank; a vent being provided for the tank above the top of said tube; and a valve member in said bore provided with ports adapted, when the valve member is in one position, to close the inlet port and establish communication between the discharge port and said short port, and when in another position to bring about the passage of fuel through said tubes.

This specification signed this 16th day of May, 1923.

CAESAR A. MANDOLINI.