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F. O. BALL ET AL
ANTIPERCOLATING DEVICE
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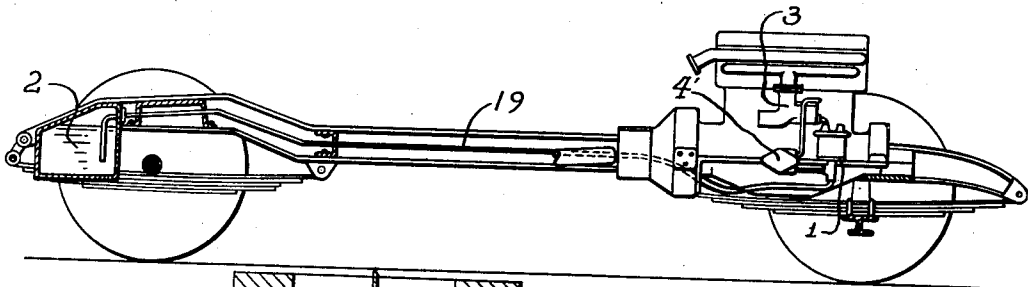


Fig. 1.

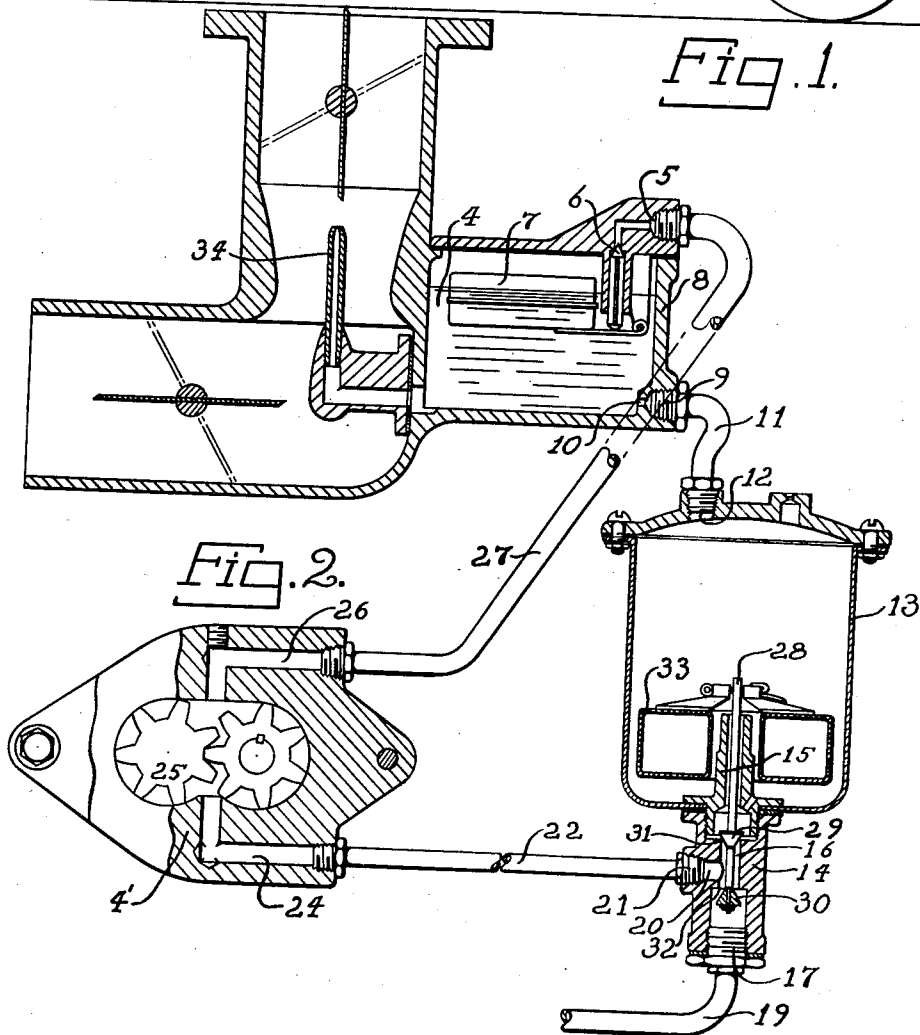


Fig. 2.

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ANTIPERCOLATING DEVICE

Application filed September 10, 1930. Serial No. 480,966.

This invention relates to an anti-percolating device for an internal combustion engine fuel system.

Heretofore, percolating of fuel from the 5 fuel reservoir of a carburetor and from the fuel feeding tubes by which the reservoir is connected with a fuel pump and a tank of the system, has been the source of considerable trouble and waste in motor vehicle 10 eration. This percolating action results from boiling of the liquid fuel and vaporization therefore by high temperatures which are developed in the hood compartment. The circulation of air through the hood 15 compartment by the fan, and during forward movement of the vehicle, and the rapid passage of air through the carburetor normally prevents excessive heating of the fuel in the reservoir during moderate and 20 high speed operation of a vehicle, but when the engine is stopped and the vehicle is at rest the heat radiated from the mass of metal in the engine accumulates in the hood compartment raising the pressure therein. 25 The fuel in the reservoir of the carburetor boils out through the fuel nozzle and excessively loads the carburetor mixing chamber, riser, manifold and cylinders with a rich charge of fuel vapor. This overloaded 30 or flooded condition prevents restarting of the engine and in extreme cases it is necessary to turn the engine over by towing the vehicle in order to drive out the vapor.

The main objects of this invention are to 35 provide a fuel system in which the contents of the carburetor fuel reservoir are drained as soon as the operation of the engine is discontinued and before sufficient heat is accumulated in the hood compartment to 40 cause percolation; to provide an auxiliary receptacle for receiving the fuel which is drained from the reservoir; to provide a metering orifice in the drain outlet of the reservoir for predetermining the period of 45 time required to drain it; and to provide an orifice of this kind which has a smaller capacity than the capacities of the fuel pump and inlet to the reservoir so as to permit accumulation of fuel therein during 50 starting and operating of the engine.

Further objects of this invention are to provide for recirculation of the fuel from the auxiliary receptacle to the low pressure or inlet of the fuel pump which communicates with the fuel tank of a vehicle; to 55 provide valve mechanism for closing the outlet of the auxiliary receptacle when the level of the fuel therein is at a predetermined elevation so as to seal the fuel passage to the inlet of the pump against the admission of air, thereby retaining the pump in 60 condition to feed fuel to the reservoir immediately upon cranking of the engine; and to provide means for closing the passage which communicates with the fuel tank, 65 pump inlet and auxiliary receptacle when the level of the fuel in the receptacle is at another predetermined elevation so as to prevent fuel from flowing through the receptacle and fuel reservoir and from escap- 70 ing from the latter when the vehicle is parked at a forwardly downward inclination.

An illustrative embodiment of our invention is shown in the accompanying drawing, in which: 75

Fig. 1 is a side elevation of a vehicle which includes our improved fuel system.

Fig. 2 is a diagrammatic illustration showing a carburetor, fuel pump and drain-back 80 reservoir in section, and illustrating the manner in which these elements are connected together,

In the illustration shown, the anti-percolating device includes a receptacle which is 85 located below the elevation of the fuel reservoir of the carburetor and which has an inlet communicating with the interior of the fuel reservoir near its lower extremity. The receptacle has a forked outlet passage, one 90 branch of which communicates with the inlet or low pressure side of a fuel pump and the other branch communicates with an outlet pipe of a fuel tank, the outlet of the fuel pump being connected with the inlet 95 of the fuel reservoir. Mounted in the receptacle is a pair of float operated valves one of which closes the outlet of the receptacle when the level of the fuel therein is at one predetermined elevation and the 100

other cuts off communication between the fuel tank, and the pump and receptacle when the level of the fuel in the latter is at another predetermined elevation.

5 In the form shown, the anti-percolating device 1 is illustrated in connection with a fuel system of the type used on motor vehicles which includes a fuel tank 2, carburetor 3 and fuel pump 4'. The carburetor 3 has a fuel reservoir 4 which is provided with an inlet 5 that is controlled in a conventional manner by a valve 6. The valve 6 is normally closed by a float 7 when the level of the fuel in the reservoir 4 is at a predetermined elevation.

15 Formed in the wall 8 of the reservoir 4 is a drain back outlet 9 which is located near the lower extremity of the reservoir and which is provided with a metering orifice 10. The drain-back outlet 9 communicates through a pipe 11 with an inlet 12 formed in the top of an auxiliary receptacle 13 which is located at an elevation below the fuel reservoir of the carburetor.

25 The receptacle 13 has an aperture in its lower wall in which is mounted a nipple 14 having a stem 15 extending into the interior of the receptacle. Formed in the nipple 14 and stem 15 is a longitudinal passage 16 which is enlarged at its lower and intermediate portions. The wall of the lower enlarged portion of the passage 16 is threaded for receiving a threaded fitting 17 by which a pipe 19, leading from the fuel tank, is connected to the nipple. The nipple 14 also has a laterally extending branch passage 20 communicating with the longitudinal passage 16. The wall of the lateral passage is threaded for receiving a threaded fitting 21 by which a pipe 22, leading to the inlet 24 of the fuel pump 4', is connected with the reservoir.

40 The fuel pump 4' is of conventional construction and includes a pair of meshed pinions 25 which are driven by the cam shaft (not shown) of the engine and an outlet 26 which communicates through a pipe 27 with the inlet 5 of the reservoir 4.

50 Slidably mounted in the passage 16 of the nipple 14 and stem 15 is a valve stem 28 having a pair of valves 29 and 30 which seat upon the shoulders 31 and 32, respectively, located at the adjacent extremities of the enlarged portions of the passage 16. The upper end of the valve stem 28 extends into the interior of the receptacle 13 and it carries a float 33 by which the valve stem and valves are raised and lowered in accordance with the level of the fuel in the reservoir.

60 In operation, when the engine is running the fuel pump 4' feeds fuel into the reservoir 4 at a much faster rate than the fuel is permitted to drain down into the receptacle 13, by the metering orifice 10, thus insuring a continuous supply of fuel to the nozzle 34

of the carburetor. When operation of the engine and fuel pump is discontinued the fuel accumulated in the reservoir 4 rapidly drains into the receptacle 13 through the pipe 11. The accumulation of fuel in the receptacle 13, both during operation of the engine and immediately following discontinuing of the engine operation causes the float 33 to hold the valve 29 open, thereby allowing the fuel to escape from the receptacle. During operation of the engine, the fuel which leaves the receptacle flows directly to the low pressure side or inlet of the fuel pump but when the valve 29 is open while the engine is stopped the fuel drains back into the fuel tank 2. When the fuel level in the receptacle 13 has been lowered to a predetermined elevation by the escapement of fuel, the valve 29 closes the outlet of the receptacle 13 leaving a slight head of fuel therein so as to seal the system against the admission of air and thereby condition the system so that sufficient suction will be created upon actuation of the fuel pump to feed fuel from the fuel tank 2 to the reservoir of the carburetor.

When a vehicle equipped with a fuel feeding system of this type is parked at a forwardly downward inclination the fuel tends to flow from the tank 2 towards the carburetor, fuel pump and auxiliary reservoir and in this event a small quantity of fuel passes into the receptacle 13 raising the float 33 until the valve 30 is closed. The valve 30 then obstructs further flow of fuel from the tank to the receptacle 13 and to the fuel pump, preventing spilling of fuel from the system.

70 The heat which causes percolation after the engine is stopped radiates from the metal of the engine and generally a period of time, approximately three to five minutes is required in order to develop a temperature in the vicinity of the carburetor which causes excessive percolation. With the above construction, the fuel is drained from the fuel reservoir before this temperature is developed, the size of the metering orifice 10 determining the time required to drain the reservoir.

115 Although but one specific embodiment of this invention has herein been shown and described, it will be understood that various changes in the size, shape and arrangement of parts may be made without department from the spirit of our invention and it is not our intention to limit its scope other than by the terms of the appended claims.

What we claim is:

1. In an internal combustion engine fuel system including a communicating fuel tank, carburetor fuel reservoir and fuel feeding means, an auxiliary receptacle having an inlet communicating with said reservoir near the lower extremity thereof and having

an outlet communicating with the inlet of said fuel feeding means, and a valve for controlling the outlet of said receptacle.

2. In an internal combustion engine fuel system including a communicating fuel tank, carburetor fuel reservoir and fuel feeding means, and an auxiliary receptacle located below said reservoir having an inlet communicating with said reservoir near the lower extremity thereof and having an outlet communicating with the inlet of said fuel feeding means.

3. In an internal combustion engine fuel system including a communicating fuel tank, carburetor fuel reservoir and fuel feeding means, an auxiliary receptacle having an inlet communicating with said reservoir near the lower extremity thereof and having an outlet communicating with the inlet of said fuel feeding means, and a float actuated valve for closing the outlet of said receptacle when the fuel therein is at a predetermined elevation.

4. In an internal combustion engine fuel system including a carburetor having a fuel reservoir and means for feeding fuel thereto, a drain-back receptacle permanently communicating with said reservoir near the lower extremity thereof having an outlet communication with the inlet of said fuel feeding means, and a valve normally closing said outlet when the level of the fuel in said receptacle is at a predetermined elevation so as to seal the inlet to said fuel feeding means against the admission of air.

5. In an internal combustion engine fuel system, a carburetor including a reservoir having a drain-back outlet therein located substantially at its lower extremity, a fuel tank, means for feeding fuel from said tank to said reservoir, a receptacle communicating with said drain-back outlet having an outlet communicating with said tank and fuel feeding means, and a valve in said outlet for obstructing the flow of fuel from said tank to said receptacle.

6. In an internal combustion engine fuel system, a carburetor including a reservoir having a drain-back outlet therein located substantially at its lower extremity, a fuel tank, means for feeding fuel from said tank to said reservoir, a receptacle communicating with said drain-back outlet having an outlet communicating with said tank and fuel feeding means, and a float actuated valve in said receptacle for preventing the flow of fuel from said tank to said receptacle when the fuel level in said receptacle is above a predetermined elevation.

7. In an internal combustion engine fuel system, a carburetor including a reservoir having a drain-back outlet therein located substantially at its lower extremity, a fuel tank, means for feeding fuel from said tank

to said reservoir, a receptacle communicating with said drain-back outlet having an outlet communicating with said tank and fuel feeding means, a valve in said outlet for preventing the flow of fuel from said tank to said receptacle and fuel feeding means when the fuel level therein is at one predetermined elevation, and a second valve for closing said outlet when the fuel level in said receptacle is at another elevation.

8. In an internal combustion engine fuel system including a communicating fuel tank, carburetor fuel reservoir and fuel pump, an auxiliary receptacle communicating with said reservoir near the lower extremity thereof and having an outlet communicating with the inlet of said pump and said fuel tank, and valve mechanism including float actuating means and a pair of valves, one for obstructing the flow of fuel from said tank to said pump and receptacle when the level of the fuel in said receptacle is at one predetermined elevation and the other for closing the outlet of said receptacle when the fuel level in said receptacle is at another predetermined elevation.

9. In an internal combustion engine operation, the method of preventing percolation which consists in simultaneously supplying a continuous flow of fuel to a carburetor fuel reservoir and draining a lesser metered flow of fuel therefrom during running of said engine, and continuing to drain fuel from said reservoir after operation of said engine is discontinued.

10. In an internal combustion engine fuel system including a communicating fuel tank and carburetor fuel reservoir, and an auxiliary receptacle having an inlet communicating with said reservoir near the lower extremity of the latter having an outlet communicating with said tank.

11. In an internal combustion engine fuel system including a communicating fuel tank and carburetor fuel reservoir, an auxiliary receptacle having an inlet communicating with said reservoir near the lower extremity of the latter having an outlet communicating with said tank, and a valve for preventing a reverse flow of fuel from said tank to the outlet of said receptacle when the fuel level therein is at a predetermined elevation.

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CERTIFICATE OF CORRECTION.

Patent No. 1,909,390.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, lines 106 and 113, claims 10 and 11 respectively, after "latter" insert the word "and"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of August, A. D. 1933.

M. J. Moore.

(Seal)

Acting Commissioner of Patents.