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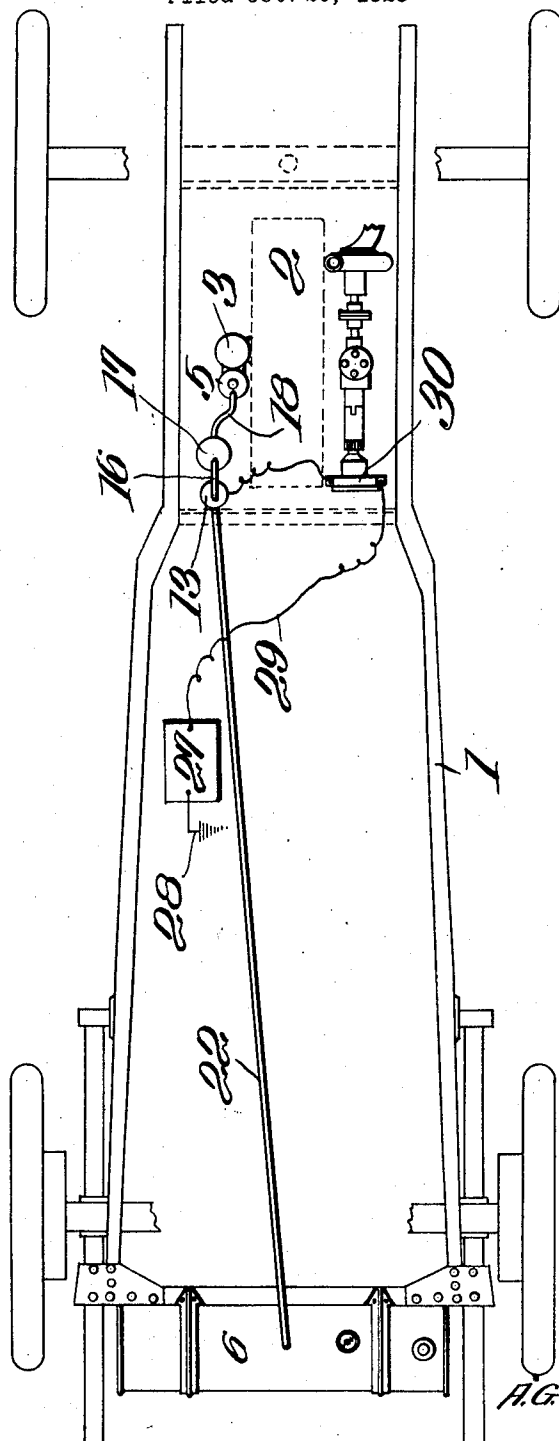
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FUEL FEEDING SYSTEM FOR MOTOR VEHICLES

Filed Oct. 25, 1923

3 Sheets-Sheet 1



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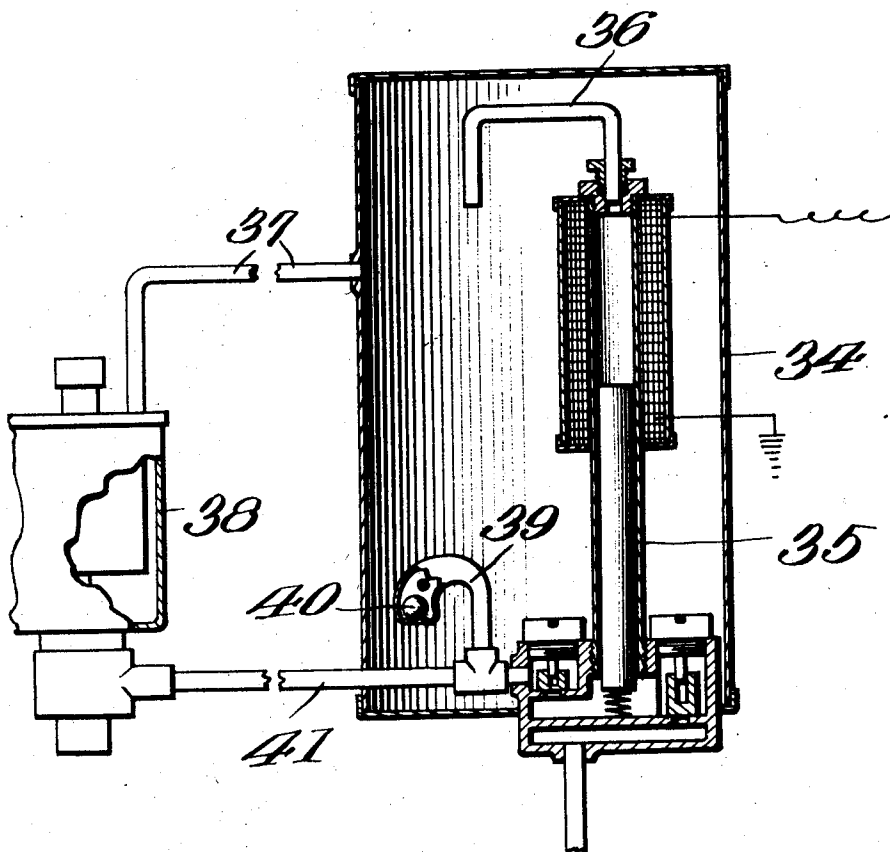
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3 Sheets-Sheet 3

FIG. 4.



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FUEL-FEEDING SYSTEM FOR MOTOR VEHICLES.

Application filed October 25, 1923. Serial No. 670,726.

This invention relates to certain new and useful improvements in fuel feeding systems for motor vehicles and is an improvement on the construction of fuel feeding means disclosed in my application filed August 18, 1922, Serial Number 582,574, the object being to provide means for collecting the fuel which leaks past the plunger of the pump in a receptacle having an overflow in communication with the bowl of the charge forming device and a valve controlled outlet in communication with the fuel line pipe extending from the pump to the bowl, whereby when the pressure is in the fuel line pipe is relieved, fuel will pass out of the receptacle into the bowl of the carbureter so that the fuel will be maintained at a predetermined level therein if the carbureter should leak.

Another and further object of the invention is to provide novel means in the form of an electric pump arranged in electric circuit having an interrupter disposed within the circuit and timed by the engine so that the solenoid of the electric pump will be energized and de-energized in order to raise the piston of the pump intermittently so as to allow the piston to drop by gravity in order to force the fuel into the bowl of the carbureter and maintain the fuel in the feed line from the bowl to the carbureter under pressure, whereby the stroke of the plunger is determined by the consumption of fuel by the charge forming device.

Another and further object of the invention is to provide a fuel feeding system which is exceedingly simple and cheap in construction and one which can be readily installed on any of the well known makes of automobiles now in use so that the fuel will be pumped directly from a low level tank carried by the vehicle to the carbureter of the internal combustion engine in such a manner that a constant supply of fuel will be supplied to the charge forming device at all times and under all conditions thereby overcoming the difficulties existing with what is well known as the vacuum feed system.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawings,

Figure 1 is a diagrammatic view showing the application of my improved construction

of fuel feeding system to a charge forming device used in connection with an internal combustion engine for driving a motor vehicle;

Figure 2 is a diagrammatic view showing the arrangements of the various parts of the fuel system and the wiring of the interrupter and solenoid pump;

Figure 3 is a vertical section through the pump showing the cover of the interrupter removed and the bowl of the carbureter and receptacle partly in section; and

Figure 4 is a vertical section through a receptacle showing the electric pump disposed therein.

In the drawing I have illustrated diagrammatically a motor vehicle of the ordinary construction in which 1 indicates the frame, 2 the internal combustion engine, 3 the charge forming device which is provided with a fuel bowl 4 having a float 5 mounted therein for actuating the needle valve which regulates the inlet to the bowl so as to maintain a predetermined level of fuel within the bowl at all times.

Arranged to the rear of the frame of the vehicle is a main fuel tank 6 located in a plane below the charge forming device and from which fuel is pumped directly to the charge forming device by my improved construction of fuel feeding system as will be hereinafter fully described.

In the embodiment of my invention as herein shown I arrange under the hood an electric pump which is provided with a base 7 having a check valve 8 for controlling the inlet 9 and a check valve 10 for controlling the outlet 11. Extending upwardly from the base is a pump cylinder 12 around the upper end of which is arranged a solenoid 13 which is grounded as shown at 14. The upper end of the pump cylinder is closed by a plug 15 from which extends a pipe 16 for conveying the fuel which leaks past the piston to a receptacle 17 located adjacent the pump as clearly shown, said receptacle being provided with an overflow pipe 18 extending into the top of the bowl 4 of the carbureter.

Mounted within the cylinder is a piston 19 which forms the core of the solenoid and disposed within the base under the piston is a spring 20 for arresting the downward movement of the same. The inlet of the base is in communication with a chamber

21 from which extends a fuel line pipe 22 passing rearwardly of the frame of the vehicle into the main fuel supply tank 6. The check valve 10 is mounted in a chamber 5 from which extends a delivery pipe 23 which is connected to the inlet of the fuel bowl of the charge forming device so that fuel will be pumped directly from the main fuel supply tank to the bowl of the charge forming device. 10

Extending from the delivery pipe 23 is a branch pipe 24 which passes into the receptacle 17 and is provided with a goose neck having an inlet opening 25 controlled by a 15 check valve 26, said valve being normally held closed by the pressure of the fuel within the delivery pipe and branch 24. This provides means for allowing fuel to pass out of the receptacle 17 when the pressure of the 20 fuel is reduced within the delivery pipe so that in case of leakage of the charge forming device, fuel can pass through the pipe 24 into the delivery pipe 23 into the bowl of the carbureter.

25 I have shown a particular construction of pump comprising a base with inlet and outlet check valves, but, it is, of course, understood that I do not wish to limit myself to these details of construction as my invention 30 consists in employing a pump formed of a cylinder having a piston slidably mounted therein forming the core for a solenoid arranged around the upper end of the cylinder and provided with inlet and outlet 35 check valves for allowing the piston to suck fuel from the low level tank in its upward movement and to force the fuel out of the cylinder in its downward movement in order to form a displacement pump so that the 40 weight of the piston in practice exerts substantially two pounds pressure per square inch on the fuel which is resisted by the action of the float in the fuel bowl of the carbureter so that the fuel is maintained in the 45 delivery pipe under pressure by the weight of the piston, whereby the stroke of the piston of the pump is determined by the consumption of fuel as the piston floats or rides on top of the gasoline until the needle valve 50 of the float chamber opens to allow fuel to pass into the bowl of the carbureter.

The solenoid is arranged in electric circuit from a source of energy which is herein shown in the form of a battery 27 which is 55 grounded at 28 and has extending therefrom a lead wire 29 connected to the solenoid as shown. Disposed in the circuit wire leading from the battery to the solenoid is an interrupter 30 provided with a fixed contact 31 and a movable contact 32 operated by a cam 33 driven by a moving part of the automobile and as herein shown is driven by the pump shaft of the internal 60 combustion engine in a similar manner as illustrated in my application, Serial Num-

ber 582,574, filed August 18, 1922, but it is, of course, understood that this interrupter can be driven from any other moving part of the engine and therefore I do not wish to limit myself to any particular manner of 70 driving the cam for interrupting the circuit to energize and de-energize the solenoid, as I am aware that various changes can be made without departing from the spirit of my invention. 75

The interrupter is so timed by the engine that the solenoid is preferably energized every thirty revolutions of the engine so that the piston is raised and then allowed to drop to force the fuel from the pump barrel 80 into the charge forming device.

By providing an additional receptacle to receive the leakage and overflow from the pump, I am able to remove the pump from the main fuel supply tank and place it at 85 any desired point on the motor vehicle, so long as the receptacle is arranged within a plane above the plane of the charge forming device, whereby the fuel which accumulates therein can flow therefrom by gravity. 90

I wish it to be clearly understood that when the pump is in operation and fuel is being fed from the low level fuel tank to the charge forming device that the fuel is 95 not drawn from the receptacle 17 or forced into the receptacle 17 by the pump, as this receptacle is for the purpose of collecting the fuel which leaks by the piston of the pump and as the receptacle is provided with an overflow which feeds into the bowl of the 100 carbureter, the surplus fuel only acts to maintain the inlet valve closed of the carbureter so that the pump fails to operate. As the fuel is consumed by the charge forming device, the pump automatically starts to 105 operate.

I am aware that prior to my invention it is old to pump fuel from a low level tank to a supplementary supply tank arranged in a higher plane above the carbureter and 110 from which the fuel is fed to the carbureter by gravity and therefore I wish it to be clearly understood that my invention differentiates from such a construction by providing means for feeding fuel direct from 115 the low level tank to the bowl of the carbureter by the use of the particular construction of electric pump, wherein the piston rides on the fuel so as to maintain the fuel in the fuel delivery line under pres- 120 sure, whereby the stroke of the piston is determined by the consumption of fuel.

If only a small amount of fuel is being used, the piston never travels its full downward stroke as it rides on top of the gasoline within the pump cylinder. As the consumption of fuel by the charge forming device is increased, the stroke of the piston is increased. 1

In the embodiment of the invention as 130

shown in Figure 4, instead of arranging the pump and receptacle side by side, I provide a receptacle 34 in which the electric pump 35 is disposed having a pipe 36 extending from its top from which the leakage of fuel past the piston is deposited into the receptacle. The receptacle is provided with an overflow pipe 37 extending to the bowl 38 of the carbureter and the outlet of the pump is provided with a branch 39 having a valve controlled inlet 40. The outlet or delivery pipe 41 extends to the bowl of the carbureter as clearly shown so that the leakage of fuel which has been collected in the receptacle can pass out through the valve controlled inlet into the bowl of the carbureter through pipe 41.

This construction combines the receptacle and electric pump in a single unit but the operation of fuel feeding system as disclosed in Figure 4 is substantially the same as shown in Figures 1, 2 and 3. While in Figures 1, 2 and 3 I have shown the pump and receptacle arranged as separate units, I wish it to be clearly understood that I do not wish to limit myself to the use of a receptacle separate and distinct from the pump to receive the leakage of the pump, as I reserve the right to arrange the pump within the receptacle as shown in Figure 4, as the operation of the fuel system is identical whether the pump is arranged on the outside or within the receptacle.

From the foregoing description it will be seen that I have provided a fuel feeding system for motor vehicles in which an electric pump is employed which is timed by the engine and in connection with a pump, a receptacle used for collecting the leakage of fuel which is in communication with the fuel bowl of the charge forming device so that the leakage of fuel from the pump when it reaches a predetermined level within the receptacle overflows and passes into the fuel bowl of the charge forming device. In connection with this receptacle I have also provided means for allowing fuel to pass out of the receptacle into the bowl of the carbureter when the engine is idle in case of leakage in the charge forming device.

While in the drawings I have shown certain details of construction of an interrupter, it is, of course, understood that various forms of interrupters can be used so as to make and break the circuit so as to energize and de-energize the solenoid for intermittently raising the piston of the pump and therefore I do not wish to limit myself to the details of construction shown nor to the particular manner of operating the interrupter, as I am aware that the same can be operated from any moving part of the motor vehicle without departing from the spirit of my invention.

What I claim is:—

1. In a fuel feeding system for motor vehicles, the combination with a main fuel supply tank, of a carbureter having a fuel bowl provided with a valve controlled inlet, a pump for pumping fuel from said main tank to said fuel bowl of the carbureter, a source of current, an electric circuit including a solenoid for actuating said pump, an interrupter arranged in said circuit, means actuated by the engine for operating said interrupter, a receptacle arranged in a plane above said carbureter and adapted to receive the leakage of fuel from said pump and an overflow pipe extending from said receptacle to the fuel bowl of said carbureter.

2. In a fuel feeding system for motor vehicles, the combination with a main fuel supply tank, of a carbureter having a fuel bowl provided with a valve controlled inlet, a pump for pumping fuel from said main tank to said fuel bowl of the carbureter, a source of current, an electric circuit including a solenoid for actuating said pump, an interrupter arranged in said circuit, means actuated by the engine for operating said interrupter, a receptacle arranged in a plane above said carbureter and adapted to receive the leakage of fuel from said pump and a pipe leading from said receptacle to the fuel line pipe from said pump to said carbureter having a valve controlled inlet in communication with said receptacle.

3. In a fuel feeding system for motor vehicles, the combination with a main fuel supply tank, of a carbureter having a bowl provided with a valve controlled inlet, an electric pump for drawing fuel from said main tank and forcing it to the bowl of the carbureter and maintaining the fuel under pressure, a receptacle adapted to receive the leakage of said pump and a branch extending from said receptacle to the delivery line of said pump having a valve controlled inlet.

4. In a fuel feeding system for motor vehicles, the combination with a main fuel supply tank, of a carbureter located in a plane above said tank having a fuel bowl provided with a valve controlled inlet, a pump for pumping fuel directly from said main fuel supply tank to the fuel bowl of said carbureter and maintaining said fuel under pressure, said pump comprising a pump chamber and a piston movable therein, a source of current, an electric circuit including a solenoid for raising the piston of said pump, means operated by the engine for energizing and de-energizing said solenoid, a receptacle adapted to receive the leakage from said pump and an overflow pipe extending from said receptacle to the bowl of said carbureter.

5. In a fuel feeding system for motor vehi-

cles, the combination with a main fuel supply tank, of a carbureter located in a plane above said tank having a fuel bowl provided with a valve controlled inlet, a pump for
 5 pumping fuel directly from said main fuel supply tank to the fuel bowl of said carbureter and maintaining said fuel under pressure, said pump comprising a pump chamber and a piston movable therein, a
 10 source of current, an electric circuit including a solenoid for raising the piston of said pump, means operated by the engine for energizing and de-energizing said solenoid, a receptacle adapted to receive the leakage
 15 from said pump, said receptacle being in communication with the feed line pipe by a valve controlled branch pipe.

6. A fuel feeding system for motor vehicles having an electrically operated pump
 20 timed by the engine for feeding fuel from a low level tank to the charge forming device, a receptacle adapted to receive the fuel leaking past the piston of said pump, said pump being adapted to maintain the fuel in the
 25 pipe line from said pump to said charge forming device under pressure, and means for allowing the fuel from said receptacle to pass to the charge forming device when the pressure is reduced in said pipe line.

30 7. In a fuel feeding system for motor vehicles, the combination with an internal combustion engine having a charge forming device connected thereto provided with a fuel bowl having a valve controlled inlet, of a
 35 low level tank, a pump for pumping fuel directly from said low level tank to the fuel bowl of said carbureter, said pump comprising a pump chamber and a piston movably mounted therein, a source of current, an
 40 electric circuit including a solenoid for raising said piston, an interrupter arranged in said circuit, means actuated by the engine for operating said interrupter and a receptacle arranged to receive the leakage from
 45 said pump in communication with the fuel bowl of said carbureter.

8. In a fuel feeding system for motor vehicles, the combination with a low level tank, of a carbureter arranged in a plane above
 50 said tank, an electrically operated pump for pumping fuel directly from said low level tank to the fuel bowl of said carbureter, a receptacle arranged to receive the leakage of fuel from said pump, said receptacle having
 55 an overflow pipe extending to the bowl of the carbureter and a pipe extending from said receptacle to the feed line pipe having a valve controlled inlet adapted to feed fuel to said carbureter when the pressure in said
 60 feed line pipe is reduced.

9. In a fuel feeding system for motor vehicles, the combination with a main supply tank for liquid fuel, of a carbureter arranged in a plane above said tank, an electric pump
 65 timed by the engine for pumping fuel di-

rectly from said main supply tank to the bowl of the carbureter and maintaining the fuel under pressure in the pipe line connecting said pump to said carbureter, a receptacle arranged to receive the leakage of fuel from
 70 said pump and a branch pipe extending from said pipe line to said receptacle having a valve controlled inlet.

10. A fuel feeding system for motor vehicles having means in the form of an electric
 75 pump for pumping fuel directly from a low level tank to the charge forming device and maintaining said fuel in the pipe line under pressure, of a receptacle arranged to receive the leakage of fuel from said pump,
 80 an overflow pipe extending from said receptacle to the bowl of the carbureter and a pipe extending from said feed line pipe into said receptacle provided with a check valve normally held in closed position by the pressure
 85 of fuel in said pipe line.

11. A fuel feeding system for motor vehicles having an electrically operated pump
 90 timed by the engine for pumping fuel directly from a low level tank to a carbureter arranged in a plane above said tank, said pump having a pump cylinder with a piston movably mounted therein for maintaining the fuel under pressure in said pipe line, a receptacle,
 95 a pipe leading from the upper end of said pump cylinder to said receptacle for conveying the leakage of fuel to said receptacle, an overflow pipe leading from said receptacle to the fuel bowl of the carbureter, and means for conveying the fuel from said receptacle to the carbureter when the pressure
 100 in the pipe line is reduced.

12. In a fuel feeding system for motor vehicles, the combination with a main fuel
 105 supply tank, of a carbureter located in a plane above said tank having a fuel bowl provided with a valve controlled inlet, a pump for pumping fuel directly from said main supply tank to the bowl of said carbureter, said pump comprising a pump chamber and a piston movably mounted therein for maintaining the fuel in the pipe line from said fuel supply tank to said carbureter under pressure, a source of current,
 110 an electric circuit including a solenoid for raising said piston, an interrupter arranged in said circuit, means operated by the engine operating said interrupter and a receptacle arranged to collect the leakage of fuel from said pump cylinder and means for allowing said fuel to pass from said receptacle to said carbureter when the pressure in said pipe line is reduced.
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13. A fuel feeding system for motor vehicles having an electrically operated pump
 125 for feeding fuel through a pipe line from a low level tank to a carbureter arranged in a plane above said tank and maintaining said fuel in the delivery end of said pipe line under pressure, a receptacle adapted to
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receive the leakage of fuel from said pump and means for allowing fuel to pass out of said receptacle into the delivery portion of said pipe line when the pressure is reduced.

5 14. In a fuel feeding system for motor vehicles, the combination with a main fuel supply tank, of a carbureter for pumping fuel from said main tank to said carbureter, a source of current, an electric circuit including a solenoid for actuating the piston 10 of said pump, an interrupter arranged in said circuit, means operated by the engine of the vehicle for actuating said interrupter for intermittently making and breaking 15 said circuit, a receptacle for collecting the fuel leaking past the piston of said pump, an overflow pipe extending from said receptacle to the fuel bowl of the carbureter and means for allowing fuel to pass directly 20 from said receptacle to the fuel bowl of the carbureter when the pressure in the feed line pipe extending from said pump to said carbureter is reduced.

15 15. A fuel feeding system for motor vehicles comprising a pump, a receptacle, an overflow pipe leading from said pump to said receptacle, a carbureter arranged in a

plane below said receptacle, a low level tank, a pipe line from said low level tank to said pump, a pipe line from said pump 30 to said carbureter, a branch pipe extending from said last-mentioned pipe line into said receptacle, and a pressure valve within said last-mentioned pipe line for allowing fuel to flow from said receptacle to said carbureter 35 when the pressure in said feed line is reduced.

16. In a fuel feeding system for motor vehicles, the combination with a main fuel supply tank, of a charge forming device located in a plane above said tank, having a 40 fuel bowl provided with a valve controlled inlet, a pump for feeding fuel from said tank to said charge forming device, a receptacle adapted to receive the leakage of fuel 45 from said pump, and pressure controlled means for feeding fuel by gravity out of said receptacle into the bowl of said charge forming device when the pressure in the fuel pipe line is reduced. 50

In testimony whereof I hereunto affix my signature.

ALBERT G. REDMOND.