Jan. 14, 1930. A. G. REDMOND 1,743,236

MEANS FOR SUPPLYING FUEL TO CHARGE FORMING DEVICES

Filed Aug. 18, 1922 3 Sheets-Sheet 1

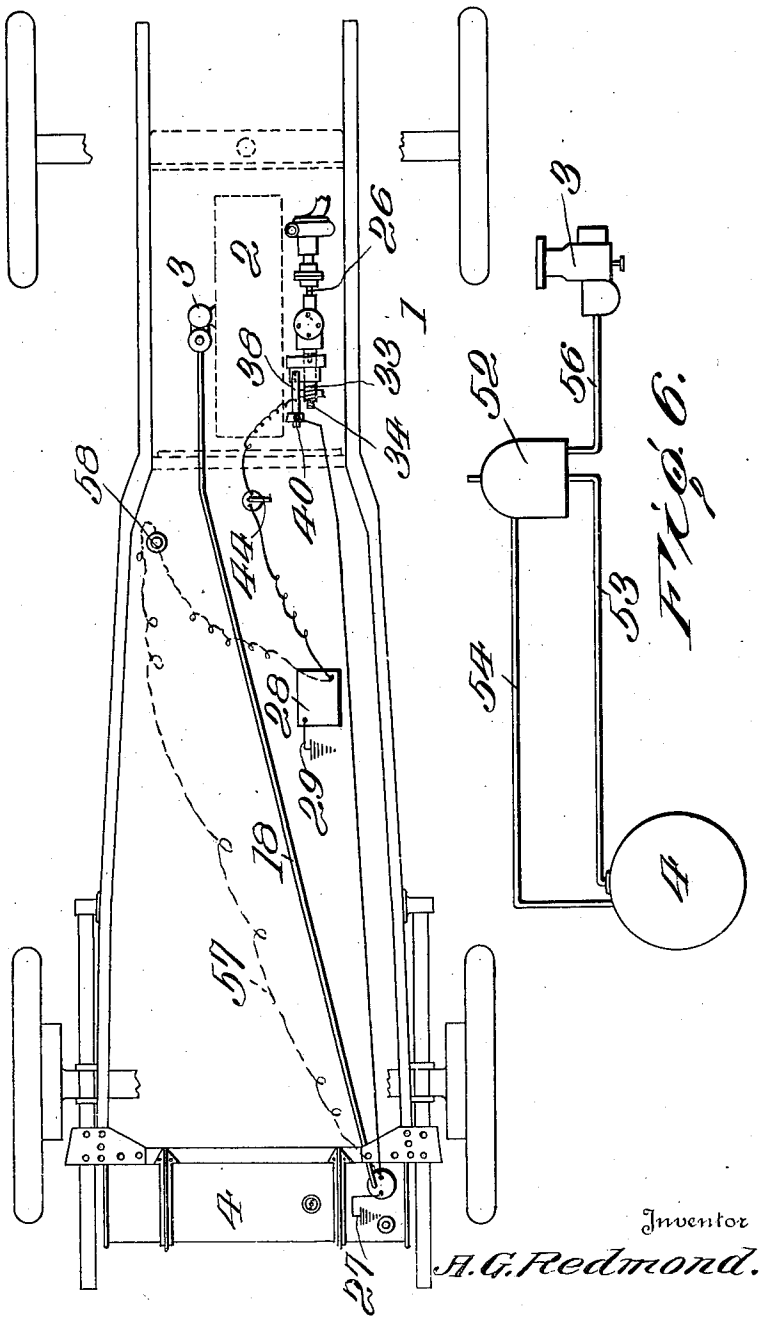


Fig. 1.

Fig. 6.

Inventor
A. G. Redmond.

By

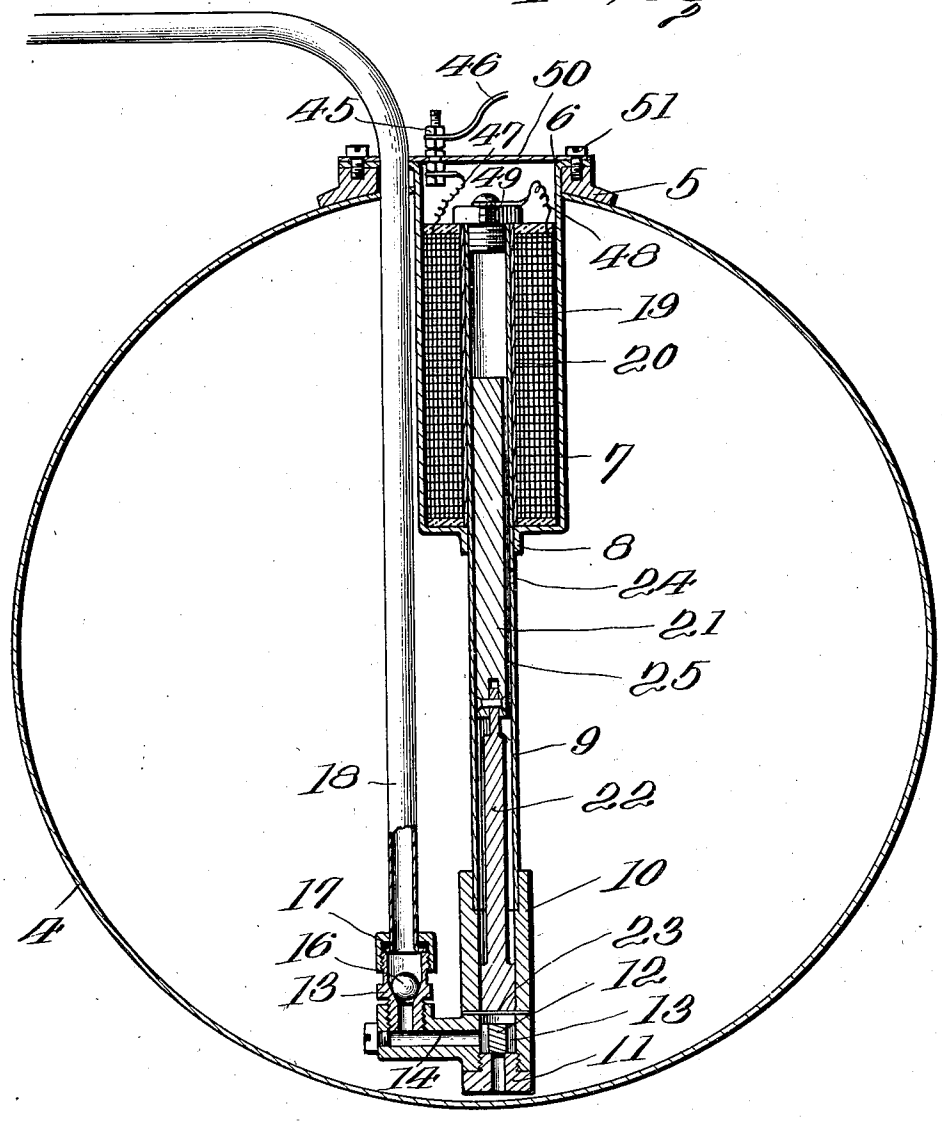
Attorney

Jan. 14, 1930. A. G. REDMOND 1,743,236

MEANS FOR SUPPLYING FUEL TO CHARGE FORMING DEVICES

Filed Aug. 18, 1922 3 Sheets-Sheet 2

Fig. 2.



Inventor
A. G. Redmond.

By

Attorney

Jan. 14, 1930. A. G. REDMOND 1,743,236

MEANS FOR SUPPLYING FUEL TO CHARGE FORMING DEVICES

Filed Aug. 18, 1922 3 Sheets-Sheet 3

FIG. 3.

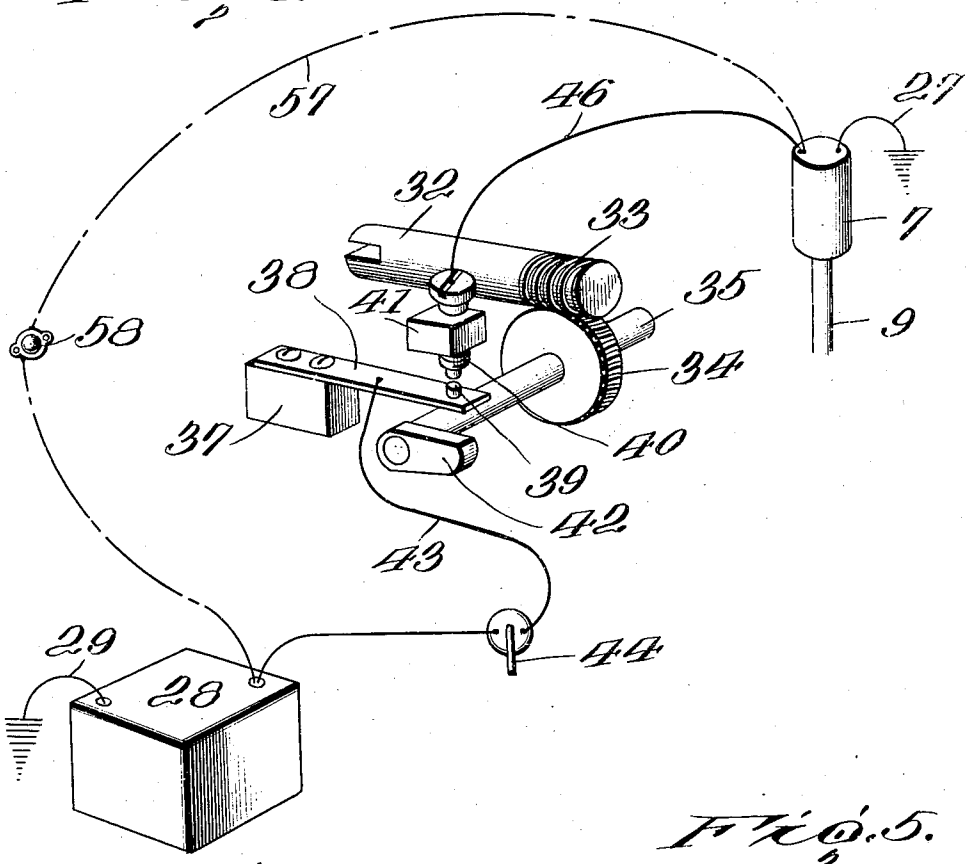


FIG. 4.

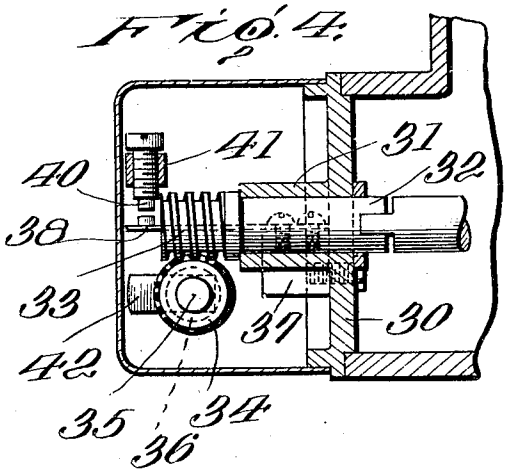
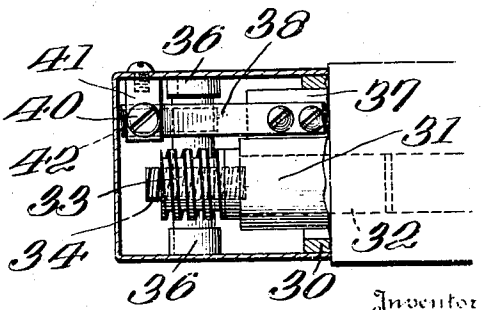


FIG. 5.



Inventor
A. G. Redmond.

By

Attorney

Patented Jan. 14, 1930

1,743,236

UNITED STATES PATENT OFFICE

ALBERT G. REDMOND, OF FLINT, MICHIGAN

MEANS FOR SUPPLYING FUEL TO CHARGE-FORMING DEVICES

Application filed August 18, 1922. Serial No. 582,574.

This invention relates to certain new and useful improvements in means for supplying fuel to charge forming devices used in connection with internal combustion engines, the object being to provide means for supplying fuel from the fuel tank to the charge forming device in the form of an electric pump operated from the source of energy derived from the internal combustion engine and so controlled that the pump will be operated automatically.

Another and further object of the invention is to provide a pump which is operated by an electromagnet energized intermittently so as to pump the fuel from the fuel tank which is placed on a level below the charge forming device whereby an ample supply of fuel will be obtained irrespective of the vacuum in the manifold so as to overcome the difficulties now existing in vacuum systems used for this purpose.

Another object of the invention is to provide a novel form of electromagnet pump in which the piston is raised by the magnet and drops when released so as to force the fluid out of the cylinder of the pump through the gas line either into a supplemental tank or directly to the charge forming device whereby a constant supply will be obtained, the stroke of the piston of the pump being determined by the consumption of the charge forming device.

Another and further object of the invention is to provide means for supplying fuel to a charge forming device which is exceedingly simple and cheap in construction and one which can be readily attached to any of the well known makes of motor vehicles now in use.

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

In the drawings,

Figure 1 is a diagrammatic view showing the application of my improved construction of means for supplying fuel to a charge forming device used in connection with an internal combustion engine on a motor vehicle;

Figure 2 is a vertical section through the fuel tank showing the pump in position therein;

Figure 3 is a diagrammatic view showing the wiring system and the timing device for making and breaking the circuit for intermittently energizing the electromagnet so as to operate the pump;

Figure 4 is a detail section of the timing device;

Figure 5 is a top plan view with the casing broken away; and

Figure 6 is a diagrammatic view showing an auxiliary tank or gage used in connection with the means for supplying fuel to the charge forming device to enable the fuel to be supplied to the charge forming device by gravity from said auxiliary tank or gage.

In the drawing 1 indicates the frame of a motor vehicle, 2 the internal combustion engine, 3 the charge forming device and 4 the fuel tank which is located in a plane below the charge forming device.

In the embodiment of the invention as herein shown the pump is placed in the fuel tank 4 but I am aware that the pump for supplying fuel to the charge forming device can be placed outside of the tank 4 at any point desired and therefore I do not wish to limit myself to the placing of the pump at any particular point, as I have found in practice that a pump located within the fuel tank or on the outside will operate successfully so as to pump the fuel to the charge forming device.

As shown in the drawing, an opening is formed in the top of the tank 4 around which is placed a collar 5 on which is seated a flange 6 of a cylindrical casing 7 which is provided with a reduced neck portion 8 at its lower end through which extends the upper end of a tube 9 which is secured in the upper end of a pump cylinder 10, the lower end of which is threaded and in which is screwed an apertured cap 11 above which is arranged a cylindrical check valve 12 having grooves 13 in its peripheral wall for allowing the fuel in the tank 4 to by-pass the check valve.

In practice I preferably arrange a strainer over the plug 11 and while I have shown the end of the plug arranged in close proximity to the bottom of the tank, it is, of course, un-

derstood that when a strainer is used, the pump cylinder is disposed in a higher plane and by having the inlet to the pump cylinder close to the bottom of the tank, I am able to practically drain the tank.

The pump cylinder is provided with a lateral offset having an outlet passage 14 to which is connected a valve casing 15 provided with a ball cneck valve 16, the upper end of said valve casing having a threaded portion over which is arranged a coupling sleeve 17 for connecting the fuel line pipe 18 thereto, said pipe, as shown in Figure 1, extends to the charge forming device 3 so that the fuel forced out of the pump cylinder by the piston, as will be later described, will be forced directly to the charge forming device.

The tube 9 and the cylindrical casing 7 form an annular chamber in which is arranged a solenoid 19 formed of a coil of wire wound around a tube 20 and while I have shown this particular construction of solenoid, it is, of course, understood that I do not wish to limit myself to the use of such a magnet for operating the piston in the pump as I am aware that various forms of electromagnets can be used without departing from the spirit of my invention.

Slidably mounted within the tube 9 is an armature 21 to which is pivotally connected a piston 22, the downward movement of which is limited by a bar 23 extending across the pump cylinder which also limits the upward movement of the check valve 12. The tube 9 is provided with an opening 24 and the armature 21 is grooved as shown at 25 to vent the upper end of the tube in order to allow the armature to reciprocate up and down in the tube as the solenoid is energized and deenergized.

As the current flows through the coil of the solenoid, the armature is drawn upwardly and when the current is interrupted, the armature is released and the piston and armature drop by gravity so as to force the fluid out of the pump cylinder through the fuel line pipe to the charge forming device. I have found in practice that the piston in the operation of the device on an internal combustion engine in a motor vehicle floats on top of a certain amount of fuel so as to hold the fuel under pressure, whereby a practically constant supply is obtained and by this particular construction of pump, the fuel supply is automatically regulated by the consumption of the fuel, as when the piston is supported by the fuel within the pump cylinder, the stroke of the piston is reduced and as the consumption is increased, the stroke of the piston increases whereby I am able to supply fuel constantly to an internal combustion engine.

In the drawing I have shown a timing device for making and breaking the circuit for supplying electrical energy to the solenoid for energizing the same; controlled by the speed of the engine but I am aware that this can be accomplished in various other ways and while in practice I have found a timing device constructed as illustrated in the drawing proves entirely satisfactory, I do not wish to limit myself to the use of any particular construction of timing device for making and breaking the circuit or to the use of any particular means for driving said timing device as I am aware that it can be driven in various ways without departing from the spirit of my invention.

In Figure 1 of the drawings 26 indicates the pump shaft of the internal combustion engine of the construction now used on a Dodge automobile as I have found that this shaft can be readily used for driving the timing device so as to energize the electromagnet every twenty revolutions of the motor which I have found to be sufficient to amply supply the charge forming device with fuel, but, of course, I am aware that in different size motors it may be necessary to increase the number of times that the magnet is energized or to increase the size of the pump and magnet, especially the weight of the piston as the construction of the pump herein shown is what might be termed a displacement pump, as the weight of the piston and armature forces the fuel by their weight out of the cylinder of the pump whereby a practically constant supply is obtained.

In Figure 3 I have shown diagrammatically the wiring system and timing device which I have used for energizing the electromagnet intermittently, although I have found that a two-wire system instead of a single wire system can be used with good results, but in order to simplify the wiring of the device I have illustrated a single wire system in which the pump is grounded as shown at 27 and the battery 28 is grounded as shown at 29.

In constructing the timing device I employ a housing 30 provided with a bearing 31 in which is mounted a shaft 32 which is herein shown coupled to the pump shaft of the motor, said shaft being provided with a worm 33 on its outer end which meshes with a worm wheel 34 carried by shaft 35, mounted in suitable bearings 36 so as to reduce the speed of the shaft 35.

Secured within the housing is a fiber block 37 on which is secured a flexible strip 38 provided with a contact point 39 adapted to engage an adjustable contact 40 carried by a fiber block 41, said strip being adapted to be engaged by a fiber cam 42 carried by the shaft 35 in order to force said contacts into engagement with one another so as to complete the circuit whereby the electromagnet will be energized.

The strip or spring 38 is connected to battery 28 by a wire 43 having a switch 44 which

may be the ignition switch of the electrical system of the motor vehicle. The contact 40 is connected to a binding post 45 by a wire 46, which binding post is connected to one end of the coil of the solenoid as shown at 47 by a wire, the other end of the wire of the coil being grounded as herein shown by a wire 48 connected to a plug 49 arranged in the end of the tube 9, but, of course, I do not wish to limit myself to the manner of connecting these wires to the solenoid and grounding the same.

The binding post 45 is arranged in a detachable cap 50 secured over the top of the cylindrical casing 7 by screws 51 and by this particular construction of securing the electromagnet in position within the casing, I am able to remove the magnet from the casing and the pump and magnet as a unit from the tank.

The construction of timing device as here illustrated makes a circuit every twenty revolutions of the motor so that the magnet is energized intermittently so that the piston of the pump makes a stroke every twenty revolutions of the motor and as the stroke of the piston is determined by the consumption of the fuel, I am able to supply the charge forming device on a motor vehicle with an ample supply of fuel under all conditions so as to overcome the difficulties now existing with the fuel supplying means now in use.

In order to provide means for initially supplying fuel to the charge forming device without cranking the motor to which the charge forming device is attached, I connect the battery 28 to the solenoid by wire 57 which is provided with a switch herein shown in the form of a push-button 58 which can be located at a convenient place so that by pushing the button, the solenoid will be energized so as to operate the pump. This also enables the operator to supply additional fuel to the charge forming device as desired and provides a novel and simple means for supplying fuel which is under the control of the operator independent of the automatic supplying means.

In Figure 6 I have diagrammatically illustrated my improved construction of fuel supplying means used in connection with an auxiliary tank or gage 52 into which the fuel is forced through a feed line 53 by a pump constructed substantially the same as shown and described, said tank having an overflow pipe 54 extending back into the fuel supply tank 4 so that fuel will be maintained in the tank or gage 52 at a predetermined level at all times from which it can be supplied to the charge forming device 3 by a pipe 56 by gravity.

While in the drawings I have illustrated certain details of construction of forming the pump and the electromagnet, I do not wish to limit myself to these details as my invention consists broadly in providing means for supplying fuel from the fuel tank to the charge forming device by an automatically controlled electrically operated pump so that a constant supply of fuel will be furnished to the charge forming device under all conditions.

What I claim is:—

A fuel feeding system for motor vehicles having internal combustion engines comprising a main fuel tank having an opening in its top provided with a collar surrounding the same, a casing having an annular flange arranged on said collar provided with a reduced neck portion at its lower end, a tube arranged in said neck portion forming an annular chamber in said casing, a pump cylinder carried by the lower end of said tube, a solenoid arranged in said chamber, an armature slidably mounted in said tube, a piston carried by the lower end of said armature working in said pump cylinder, inlet and outlet valves to said pump cylinder and means for energizing and deenergizing said solenoid controlled by the engine for lifting said piston.

In testimony whereof I hereunto affix my signature.

ALBERT G. REDMOND.