C. F. SCHULZ.

ENGINE FUEL SUPPLY SYSTEM.

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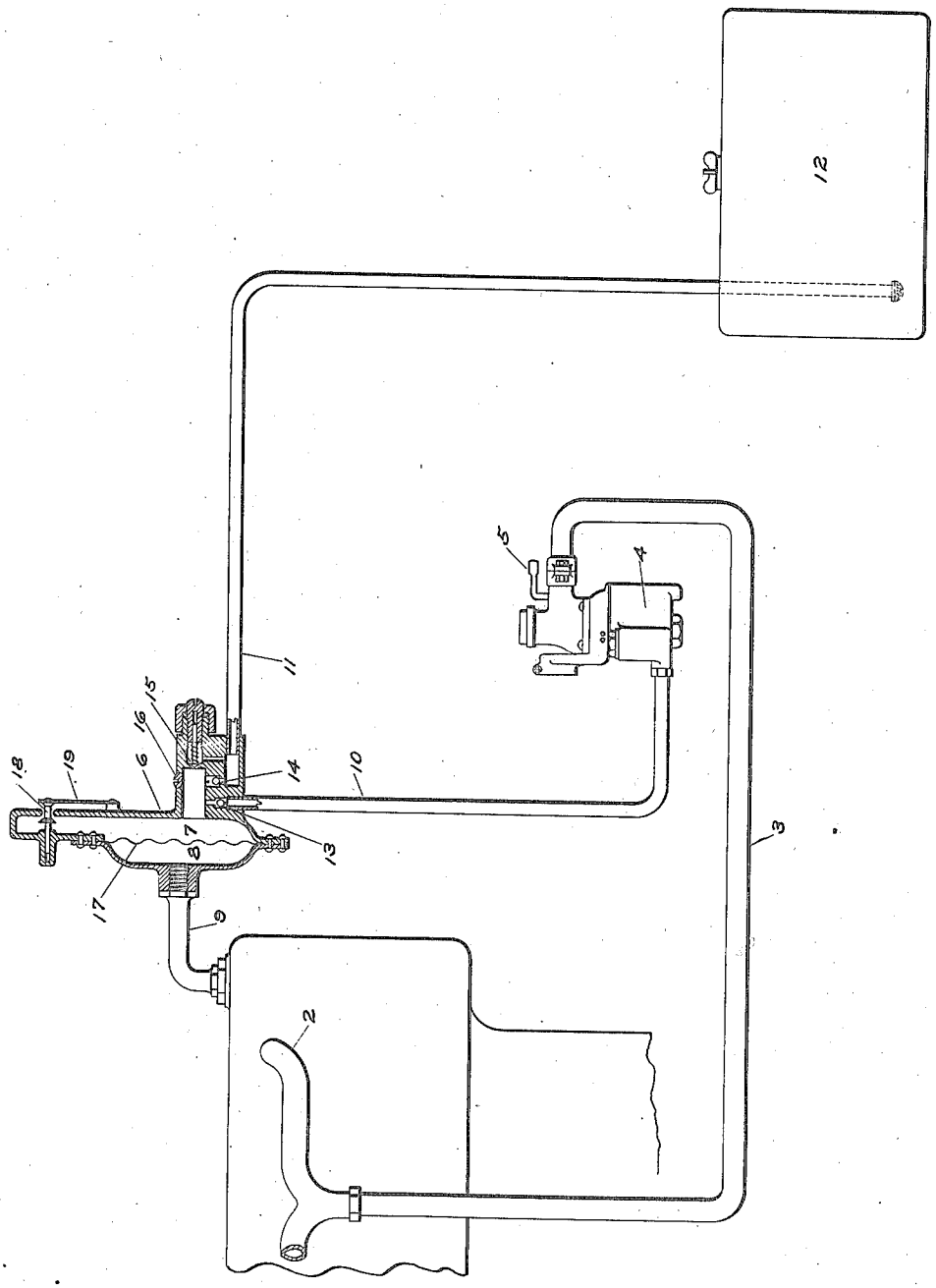

WITNESSES:

R. E. Fleming

J. A. Mitchell

INVENTOR.

CARL F. SCHULZ

BY

Albion D. T. Libby

ATTORNEY

UNITED STATES PATENT OFFICE.

CARL F. SCHULZ, OF JERSEY CITY, NEW JERSEY.

ENGINE-FUEL-SUPPLY SYSTEM.

1,270,446. Specification of Letters Patent. Patented June 25, 1918.

Application filed December 28, 1915. Serial No. 69,127.

To all whom it may concern:

Be it known that I, CARL F. SCHULZ, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Engine-Fuel-Supply Systems, of which the following is a specification.

In order to feed fuel such as gasolene to a hydro-carbon engine, it has been the practice in the past to place the supply tank above the carbureter so the fuel will travel by gravity to the carbureter or else force the fuel from the tank to the carbureter by an air pump driven by the engine; but more recently a vacuum tank is used that has a number of valves and levers operated by the engine so as to draw fuel from the supply tank to the vacuum tank from where it feeds by gravity to the carbureter.

One of the objects of my invention is to overcome objections to the above systems by providing a system for feeding fuel to the engine, that is simple, cheap to manufacture, install and maintain. Another object of my invention is to provide a pumping device that has a minimum number of moving parts and which is automatic in its action.

Other and further objects of my invention will be apparent to any one skilled in the art by reference to the attached drawing wherein my pumping device is shown connected in working relation with an engine, its carbureter and fuel supply tank. Specifically: 1 illustrates a portion of an internal combustion engine having an intake manifold 2, to which is connected by a pipe 3 a carbureter 4 with the usual throttle lever 5. 6 is a pumping device divided into two separate chambers 7 and 8 by a flexible diaphragm 17 preferably corrugated to allow for expansion and contraction. The chamber 8 is shown connected to one of the engine cylinders by a pipe 9 but it will be understood that it may be connected to more than one cylinder depending on the characteristics of the engine and other devices. The chamber 7 is connected by a fuel pipe 11 to a fuel tank 12 that may be placed in any suitable position, in the drawing it is shown below the carbureter. A check valve 14 is located in the opening of pipe 11 to chamber 7. Leading from chamber 7 is a feed pipe 10 to the float chamber of carbureter 4. A check valve 13 is located at the opening of pipe 10 into chamber 7. The valve 13 allows fuel to feed by gravity from chamber 7 to the carbureter 4 but will not allow fuel to come back in reverse direction. Valve 14 works in reverse order; *i. e.*, it will allow fuel to come from the tank 12 to the chamber 7 but not in the opposite direction. 16 is a screw cap for filling an opening used for boring out the seat for valve 14 and for renewing or cleaning the same. 15 is a relief valve whose object will be explained later. 18 is a two-way valve which is spring mounted, as by spring 19, onto the side of the pump casing. The valve 18 is normal off both its seats so as to let air into chamber 7.

The operation of my pumping system will now be described.

As the engine operates, diaphragm 17 is caused to move back and forth causing fuel to be drawn from the tank 12 to chamber 7 from where it feeds by gravity to the carbureter 4. When the float chamber of the carbureter is full and likewise pipe 10 the chamber 7 will fill to a certain level when further pressure therein will cause relief valve 15 to open and allow the fuel to run back into the pipe 11. It may be necessary sometimes to drain the carbureter and it is convenient to have a supply of fuel in chamber 7 as is the usual case so the float chamber can be again readily filled for a start. In order for the fuel to run from the chamber 7 to the carbureter float chamber it is necessary to have atmospheric pressure in the chamber 7. This I accomplish by the double acting spring mounted valve 18 which is normally open to allow air to enter chamber 7, but which work synchronously with diaphragm 17 so air is not drawn into chamber 7 on the induction stroke of the diaphragm 17.

It will be seen by one skilled in the art that changes may be made in the details shown in annexed drawing illustrating my invention without departing from the spirit thereof and the scope of the appended claims.

Having thus described my invention, what I claim is:

1. In an engine fuel supply system, an engine, a fuel tank, a carbureter connected to said engine, a pumping device divided into two separate compartments by a flexible diaphragm, one compartment being connected to said engine and the other to said tank, said diaphragm being responsive to the suction of said engine whereby fuel is

drawn from the tank to the compartment connected thereto, a feed pipe leading from this compartment to said carbureter, and a double acting valve at the top of said compartment responsive to the engine suction for preventing air entering said compartment while said engine is running but adapted to establish atmospheric pressure in the chamber when said engine is idle, for the purpose described.

2. In an engine fuel supply system, an engine, a fuel tank, a carbureter connected to said engine, a pumping device divided into two separate compartments by a flexible diaphragm, one compartment being connected to said engine and the other to said tank, said diaphragm being responsive to the suction of said engine whereby fuel is drawn from the tank to the compartment connected thereto, a feed pipe leading from this compartment to said carbureter, and a spring mounted double acting valve adapted normally to establish atmospheric pressure in said compartment whereby fuel will feed to said carbureter when said pumping device is not operating.

3. In an engine fuel supply system, an engine, a fuel tank, a carbureter connected to said engine, a pumping device divided into two separate chambers by a flexible diaphragm responsive to the engine suction, one chamber being connected to said engine and the other by a supply pipe to said tank, whereby fuel is drawn from said tank, a check valve in said pipe to prevent the fuel from returning to said tank, and a relief valve in shunt to said check valve, to allow fuel to return to the supply pipe when the fuel in the chamber reaches a certain height, a feed pipe from said chamber to said carbureter and a check valve in said feed pipe operating in an opposite direction from the first mentioned valve, and a valve, responsive to the engine suction, in the last mentioned chamber for preventing air from entering said chamber while the engine is operating but adapted to allow air to enter the chamber when said engine is idle for the purpose of allowing the fuel to run from the chamber to the carbureter.

4. In an engine fuel supply system, an engine, a fuel tank, a carbureter connected to the engine, a pumping device divided into a suction chamber and a fuel reserve supply chamber by a flexible diaphragm responsive to the engine suction, a supply pipe connecting the fuel tank with the fuel reserve supply chamber and a feed pipe running from this chamber to said carbureter and a relief valve adapted to be acted on directly by the fuel in the supply chamber for limiting the amount of fuel to be carried in said supply chamber.

5. In an engine fuel supply system, an engine, a fuel tank, a carbureter connected to the engine, a pumping device divided into a suction chamber and a fuel reserve supply chamber by a flexible diaphragm responsive to the engine suction, a supply pipe connecting the fuel tank with the fuel reserve supply chamber and a feed pipe running from this chamber to said carbureter and a relief valve opening from the supply chamber into the supply pipe for limiting the amount of fuel to be carried in said supply chamber, and means for allowing the fuel to feed to said carbureter when said engine is idle.

6. In an engine fuel supply system, an engine, a fuel tank, a carbureter connected to said engine, a unitary pumping device having a suction chamber and a fuel reservoir with a flexible corrugated diaphragm therebetween acted on by the suction of said engine whereby the movement of said diaphragm draws fuel from said tank into the fuel reservoir of the pumping device and a feed pipe to carry the fuel from the fuel reservoir in the pumping device to said carbureter.

7. In an engine fuel supply system, an engine, a fuel tank, a carbureter connected to said engine, a unitary pumping device having a suction chamber and a fuel chamber with a diaphragm therebetween adapted to be acted on by the suction of said engine whereby the movement of said diaphragm draws fuel from said tank into the fuel chamber of the pumping device, a feed pipe to carry the fuel from the fuel chamber of the pumping device to said carbureter and an adjustable relief valve opening from said fuel chamber to a fuel tank pipe to limit the amount of fuel to be carried in the fuel chamber of the pumping device.

In witness whereof, I affix my signature.

CARL F. SCHULZ.