

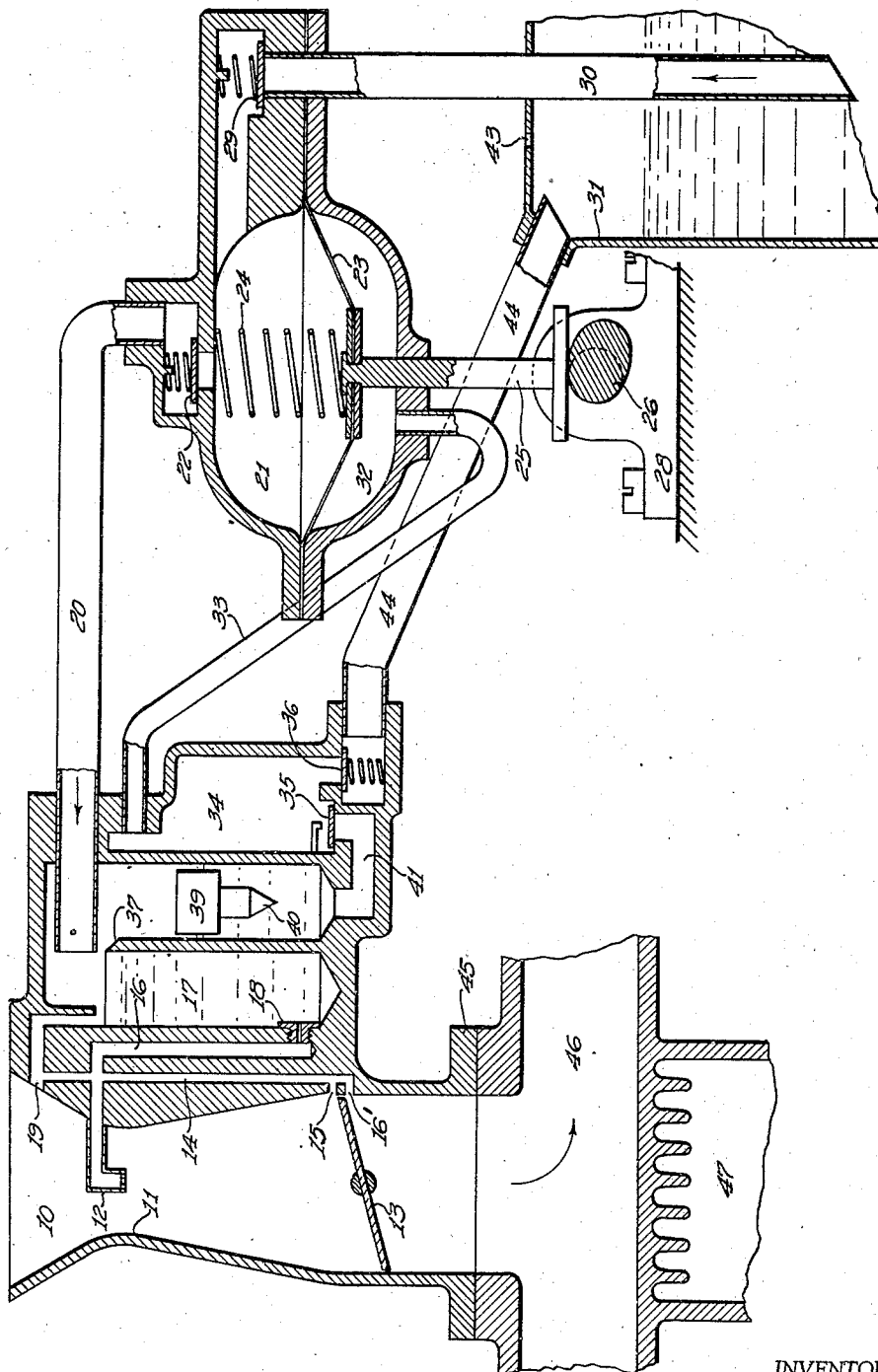
Oct. 22, 1946.

S. M. UDALE

2,409,965

FUEL PUMP

Filed April 10, 1944



INVENTOR.

Stanley M. Udale

UNITED STATES PATENT OFFICE

2,409,965

FUEL PUMP

Stanley M. Udale, Detroit, Mich., assignor to
George M. Holley and Earl Holley

Application April 10, 1944, Serial No. 530,417

1 Claim. (Cl. 158—36.3)

1

The object of this invention is to pump volatile fuel to the constant level fuel supply chamber of the carburetor on an automotive vehicle. Specifically the object is to keep both the pump and the carburetor cool by pumping 2, 3, 4 or even 5 times the requirements of the engine and returning the excess to the tank.

If fuel is merely pumped from the tank to a constant level fuel supply chamber, and the overflow permitted to run back by gravity to the rear tank, this return pipe must be big enough to offer little resistance. If it is of any appreciable size, however, when the brakes of an automobile are applied the contents of this pipe will be returned to the constant level fuel supply chamber which would be flooded. Hence, I propose to pump the excess quantity of fuel back to the fuel tank.

The functions of the float chambers now in universal use are to: (1) maintain a constant level; and (2) permit vapor to escape. To these two functions, I add a third function, namely, to cool the fuel passages so that the engine can be restarted on a hot day. At present, after running at from one-half to full power for an hour or more, and stopping from ten to twenty minutes, the engine refuses to start, as the temperature "builds up" and the float chamber reaches and exceeds the critical temperature at which "percolation" occurs.

An additional object is to raise in cold weather the temperature of the fuel, the pump and the fuel chamber so that freezing is made less of a hazard.

The figure is a cross-sectional view of a fuel feeding system incorporating the improved pumping apparatus.

In the figure, 10 is the air entrance to the carburetor, 11 is a venturi therein, 12 is a fuel nozzle discharging into the venturi, 13 is the throttle controlling the flow through the low speed fuel passage 14, and its outlet ports 15 and 16. 16 is the main fuel passage which derives its fuel supply from the constant level chamber 17, through the restriction 18.

An air vent 19 establishes atmospheric pressure in the chamber 17. Fuel is supplied from a pipe 20, connected to a chamber 21, so that the fuel flows past the non-return check valve 22. A diaphragm 23 is pressed down by compression spring 24, and pushed up by rod 25 operated by the cam 26, which is driven by the engine and is supported on the engine at 28 as is the pump itself. Fuel enters the chamber 21 past the check valve 29 from the pipe 30, which draws fuel from the fuel tank 31, which is vented to the atmosphere at 43.

2

The air in chamber 32 below the diaphragm 23 is compressed through a pipe 33 into the top of a chamber 34 connected by the non-return valve 35 with that portion of the chamber 17 located to the right of the overflow dam 37, which maintains the level at the crest of the dam 37.

A non-return valve 36 permits fuel to escape from the chamber 34 to the tank 31 upon the introduction of pressure into said chamber 34.

A float 39 in the overflow portion of the chamber 17 prevents air being drawn through the passage 41. The valve 40 carried by the float 39 acts as a shut-off valve for the passage 41. A pipe 44 discharges the returned fuel into the fuel tank 31.

The carburetor is connected by a flange 45 to the inlet manifold 46 heated by an exhaust-heated hot spot 47, as is the standard practice.

OPERATION

Hot weather

Assume that the engine has been operated for three or four hours at full throttle when the hot spot 47 is at a high temperature. The engine is then shut down. Heat flows through the flange 45 to the chambers 17 and 34. The whole engine radiates heat. The pump itself becomes heated, even the pipe 30 derives heat from the engine. After 15 to 20 minutes, it is necessary to restart the engine. Unless means are adopted, the engine will not restart because the fuel in the chamber 17 has been discharged into the inlet manifold 46, and the mixture is too rich to fire. If the engine does fire, the pump ceases to function as a liquid pump because vapor forms both in the pump and in the line 30.

Obviously, by pumping all the engine needs plus 100%, 200%, 300% or even 400% more than the engine needs, then the carburetor and the pump are cooled by the excess fuel.

Finally, the fact that the fuel is momentarily placed under suction in the chamber 34 after it leaves the constant level supply chamber and before it returns to the fuel tank encourages the release of air, vapor and water vapor and thus decreases the amount of these disturbing elements in the fuel, especially in hot weather.

What I claim is:

A pumping system for the constant level fuel supply chamber of a carburetor connected to an internal combustion engine, an air-vented tank, a fuel supply pipe forming an outlet from said tank and an inlet to said constant level supply chamber, a pump connected to said pipe adapted

3

to pump fuel from said tank to said constant level fuel supply chamber, a second chamber connected to said fuel supply chamber at the upper end thereof, a float in said second chamber, an outlet from the lower portions of said second chamber, a valve carried by the float and adapted to close said outlet when said second chamber is empty, an outlet pipe from said second chamber connected to said outlet and leading to said tank, a non-return valve in said pipe, an air chamber associated with said outlet pipe and located on

4

the discharge side of said non-return valve, a second non-return valve in the bottom of said air chamber adapted to permit fuel to flow to said outlet pipe out of said air chamber, means integral with said pump and connected with the upper portion of said air chamber for causing air to pulsate into and out of said air chamber whereby fuel is first drawn into said air chamber, past said first non-return valve and is then forced out, past said second non-return valve.

STANLEY M. UDALE.