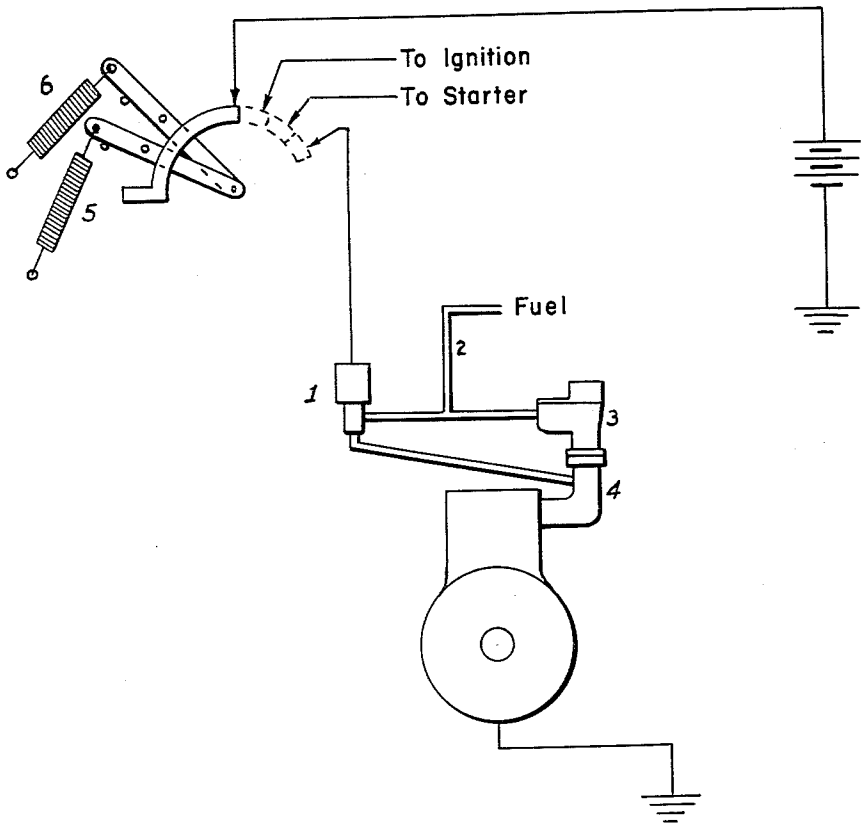
April 5, 1960 M. B. HEFTLER 2,931,350

ENGINE PRIMERS

Filed Oct. 25, 1956



INVENTOR.

Maurice Ben Heftler

United States Patent Office

2,931,350

Patented Apr. 5, 1960

2,931,350

ENGINE PRIMERS

Maurice Ben Heftler, Grosse Pointe Park, Mich.

Application October 25, 1956, Serial No. 618,250

3 Claims. (Cl. 123—180)

In order to start an internal combustion engine, it is necessary to supply it with fuel in greater quantity than is necessary to keep it running. This temporary requirement for additional fuel is a function of the temperature of the engine and of how much time has elapsed since the engine was operated. If the engine is warm and the time at rest is short, the additional starting fuel required is so little that it is probably found in the intake manifold. As the engine temperature is lowered and as the time since it ran is increased the amount of starting fuel required is increased, and soon becomes much greater than the amount remaining in the manifold, greater even than can conveniently be supplied by repeatedly oscillating the throttle and thus actuating the accelerating pump in the carburetor. The required additional fuel is usually induced to flow into the manifold by closing the air intake of the carburetor by the choke. In some cases it is supplied by a manually operated pump or primer.

In this invention, I propose to control the flow of such additional fuel into the manifold during cranking, and only when needed, a solenoid priming valve.

Reference to the drawing will facilitate an understanding of the points involved.

The figure is a schematic diagram showing an internal combustion engine in combination with the novel ignition starter switch and fuel priming means.

The solenoid valve 1 is kept normally closed by gravity acting on its plunger or by a spring and by the pressure difference across its orifice. It opens only when its coil is energized. The valve is supplied with fuel from the same source 2 as the carburetor or fuel injector 3 and it is therefore under some pressure whenever the engine is being cranked or is running. The outlet of the valve is connected to one or more nozzles in the intake manifold 4.

On many cars the starter is energized by turning the ignition key against a spring 5 to a position beyond what is required to turn on the ignition. When torque is no longer applied to the key, the spring 5 returns it to the ignition position and turns off the starter. In this invention, the solenoid valve is energized by rotating the key, against a second spring 6, to a position beyond what is required to actuate the starter, in which position the ignition, the starter and the primer are all energized.

This invention results in an improved control by the operator over the supply of priming fuel, and it renders that control substantially automatic in operation. The operator does not have to think to use it. If the engine does not start as soon as the key is turned to the start position the operator gets impatient and applies more torque to the key, turning it to the prime position, thus energizing the solenoid primer and passing enough fuel into the manifold to get a start. The amount of fuel required to keep the engine running, at any temperature, is readily supplied automatically by using the structure

described in copending application Serial No. 289,755, filed May 24, 1952, now Patent No. 2,793,633, of which I am a joint inventor.

This invention avoids the causes of failure that plague the usual automatic choke. The change in force acting on the plunger of the solenoid valve can be quite considerable, and its proper functioning is relatively free of interference by dirt that might be entrained in the fuel.

The majority of starts required of an engine can be obtained without supplying any appreciable amount of priming fuel. It is only necessary to turn on the ignition, crank, and open the throttle slightly. This procedure always gives a start unless the engine has been at rest for six to eight hours or longer and if the engine temperature is below about 40° F. In which case, a start is obtained by exactly the same procedure as before but with more rotation of the ignition key. The operation is automatic, without requiring thought or skill of the operator, and without requiring any change in present driving habits.

This invention makes the warm restart as easy as any other start, whereas the automatic choke gets so confused under this condition as to sometimes make a start very difficult. The engine is still warm enough so that no additional or priming fuel is required. The air is cold, and the automatic choke calls for full choke. As soon as the engine is cranked the manifold becomes flooded and the start becomes embarrassingly difficult. It calls for a special technique unknown to many operators. This invention avoids that problem because the engine is running by the time the operator can get the key turned as far as the prime position. As soon as the engine starts to run the operator instinctively lets go of the key and it returns to the ignition position.

I claim:

1. An electrical starter and primer control system for an internal combustion engine having a fuel metering system, an ignition system, a starter and an electric power source, said control system comprising in combination with a normally closed solenoid primer valve having means, when energized, to pass extra fuel to said engine, an electrical switch having a control member and contact means providing an off position and three consecutively operable on positions of said control member, first circuit means connecting said power source through the contact means at the first of said on positions to said ignition system, second circuit means connecting said power source through the contact means at the second of said on positions to said starter and said ignition system, third circuit means connecting said power source through said contact means at the third of said on positions to said ignition system, said starter and said solenoid primer valve.

2. An electrical starter and primer control system according to claim 1 further characterized by means normally urging said switch control element to the first of said on positions from either of said second or third on positions.

3. An electrical starter and primer control system according to claim 2 wherein said means normally urging said switch control element comprises first spring means normally urging said contact element from said third on position toward said second on position and second spring means normally urging said contact element from said second on position to said first on position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,437,622	Thomas	Dec. 5, 1922
2,630,502	Hept	Mar. 3, 1953
2,679,837	Tyler	June 1, 1954