FIG. 10 is a cross-section on the line 10—10 in FIG. 4;

FIG. 11 is a cross-section on the line 11—11 in FIG. 5;

FIG. 12 is a cross-section through a terminal block mounted in the floor of the housing;

FIG. 13 is a plan view of an electrolytic cell incorporated in the fuel supply apparatus;

FIG. 14 is a cross-section on the line 14—14 in FIG. 13;

FIG. 15 is a cross-section generally on the line 15—15 in FIG. 14;

FIG. 16 is a cross-section on the line 16—16 in FIG. 14;

FIG. 17 is a cross-section on the line 17—17 in FIG. 13;

FIG. 18 is a cross-section on the line 18—18 of FIG. 13;

FIG. 19 is a vertical cross-section through a gas valve taken generally on line 19—19 in FIG. 13;

FIG. 20 is a perspective view of a membrane assembly disposed in the electrolytic cell;

FIG. 21 is a cross-section through part of the membrane assembly;

FIG. 22 is a perspective view of a float disposed in the electrolytic cell;

FIG. 23 is an enlargement of part of FIG. 14;

FIG. 24 is an enlarged cross-section on the line 24—24 in FIG. 16;

FIG. 25 is a perspective view of a water inlet valve member included in the components shown in FIG. 24;

FIG. 26 is a cross-section on line 26—26 in FIG. 16;

FIG. 27 is an exploded and partly broken view of a cathode and cathode collar fitted to the upper end of the cathode;

FIG. 28 is an enlarged cross-section showing some of the components of FIG. 15;

FIG. 29 is a perspective view of a valve cover member;

FIG. 30 shows a gas mixing and delivery unit of the apparatus generally in side elevation but with an air filter assembly included in the unit shown in section;

FIG. 31 is a vertical cross-section through the gas mixing and delivery unit with the air filter assembly removed;

FIG. 32 is a cross-section on the line 32—32 in FIG. 31;

FIG. 33 is a perspective view of a valve and jet nozzle assembly incorporated in the gas mixing and delivery unit;

FIG. 34 is a cross-section generally on the line 34—34 in FIG. 31;

FIG. 35 is a cross-section through a solenoid assembly;

FIG. 36 is a cross-section on the line 36—36 in FIG. 32; FIG. 32;

FIG. 37 is a rear elevation of part of the gas mixing and delivery unit;

FIG. 38 is a cross-section on the line 38—38 in FIG. 34;

FIG. 39 is a plan view of the lower section of the gas mixing and delivery unit, which is broken away from the upper section along the interface 39—39 of FIG. 30;

FIG. 40 is a cross-section on the line 40—40 in FIG. 32; and

FIG. 41 is a plan of a lower body part of the gas mixing and delivery unit.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows an assembly denoted generally as 31 having an engine bay 32 in which an internal combustion engine 33 is mounted behind a radiator 34. Engine 33 is a conventional engine and, as illustrated, it may have two banks of cylinders in "V" formation. Specifically, it may be a V8 engine. It is generally of conventional construction and FIG. 1 shows the usual cooling fan 34, fan belt 36 and generator or alternator 37.

In accordance with the invention the engine does not run on the usual petroleum fuel but is equipped with fuel supply apparatus which supplies it with a mixture of hydrogen and oxygen gases generated as products of a water electrolysis process carried out in the fuel supply apparatus. The major components of the fuel supply apparatus are an electrolytic cell denoted generally as 41 and a gas mixing and delivery unit 38 to mix the hydrogen and oxygen gases generated within the cell 41 and to deliver them to engine 33. The electrolytic cell 41 receives water through a water delivery line 39 to make up the electrolyte solution within it. It has an anode and a cathode which contact the electrolyte solution, and in operation of the apparatus pulses of electrical energy are applied between the anode and cathode to produce pulses of high current flow through the electrolyte solution. Some of the electrical components necessary to produce the pulses of electrical energy applied between the anode and cathode are carried in a housing 40 mounted on one side of engine bay 32. The automobile battery 30 is mounted at the other side of the engine bay.

Before the physical construction of the fuel delivery apparatus is described in detail the general principles of its operation will firstly be described with reference to the electrical circuit diagram of FIG. 2.

In the illustrated circuit terminals 44, 45, 46 are all connected to the positive terminal of the automobile battery 30 and terminal 47 is connected to the negative terminal of that battery. Switch 48 is the usual ignition switch of the automobile and closure of this switch provides current to the coil 49 of a relay 51. The moving contact 52 of relay 51 receives current at 12 volts from terminal 45, and when the relay is operated by closure of ignition switch 48 current is supplied through this contact to line 53 so that line 53 may be considered as receiving a positive input and line 54 from terminal 47 may be considered as a common negative for the circuit. Closure of ignition switch 48 also supplies current to one side of the coil 55 of a solenoid 56. The other side of solenoid coil 55 is earthed by a connection to the automobile body within the engine bay. As will be explained below solenoid 56 must be energized to open a valve which controls supply of hydrogen and oxygen gases to the engine and the valve closes to cut off that supply as soon as ignition switch 48 is opened.

The function of relay 51 is to connect circuit line 53 directly to the positive terminal of the automobile battery so that it receives a positive signal directly rather than through the ignition switch and wiring.

The circuit comprises pulse generator circuitry which includes unijunction transistor Q1 with associated resistors R1, R2 and R3 and capacitors C2 and C3. This circuitry produces pulses which are used to trigger an NPN silicon power transistor Q2 which in turn provides via a capacitor C4 triggering pulses for a thyristor T1.