Dumping capacitor C5 will determine a ratio of charging time to discharge time which will be largely independent of the pulse rate and the pulse rate determined by the oscillation transistor Q1 must be chosen so that the discharge time is not so long as to produce overheating of the transformer coils and more particularly the secondary coil **89** of transformer TR2. Experiments indicate that overheating problems are encountered at pulse rates below about 5,000 and that the system will behave much like a DC system, with consequently reduced performance at pulse rates greater than about 40,000. A pulse rate of about 10,000 pulses per minute will be nearly optimum. With the saw tooth wave input and sharply spiked output pulses of the preferred oscillator circuit the duty cycle of the pulses produced at a frequency of 10,000 pulses per minute was about 0.006. This pulse form helps to minimize overheating problems in the components of the oscillator circuit at the high pulse rates involved. A duty cycle of up to 0.1, as may result from a square wave input, would be feasible but at a pulse rate of 10,000 pulses per minute some of the components of the oscillator circuit would then be required to withstand unusually high heat inputs. A duty cycle of about 0.005 would be a minimum which could be obtained with the illustrated type of oscillator circuitry.

From the foregoing description it can be seen that the electrolytic cell **41** converts water to hydrogen and oxygen whenever ignition switch **44** is closed to activate solenoid **51**, and this hydrogen and oxygen are mixed in chamber **308**. Closure of the ignition switch also activates solenoid **56** to permit entry of the hydrogen and oxygen mixture into chamber **319**, when it mixes with air admitted into the chamber by air valve flap **332**. As described above, air valve flap **332** may be set to admit air in an amount as required to avoid a vacuum condition in the engine.

In operation the throttle cable **356** causes bracket **355** to pivot about throttle valve shaft **353**, which rotates flap **351** to control the amount of hydrogen-oxygen-air mixture entering the engine. At the same time shaft **353** acts via the linkage shown in FIG. **37** to control the position of shaft **314**, and shaft **314** adjusts the amount of hydrogen-oxygen mixture provided for mixing with the air. As shown in FIG. **30**, bracket **355** may also be linked to a shaft **357**, which is connected to the automobile transmission. Shaft **357** is a common type of shaft used for down shifting into a passing gear when the throttle has been advanced beyond a predetermined point. Thus there is provided a compact fuel generation system which is compatible with existing internal combustion engines and which has been designed to fit into a standard passenger automobile.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention.

I claim:

1. For an internal combustion engine having inlet means to receive a combustible fuel, fuel supply apparatus comprising:

a vessel to hold an aqueous electrolyte solution;

an anode and a cathode to contact the electrolyte solution within the vessel;

electrical supply means to apply between said anode and said cathode pulses of electrical energy to induce a pulsating current in the electrolyte solution thereby to generate by electrolysis hydrogen and oxygen gases;

gas collection and delivery means to collect the hydrogen and oxygen gases and to direct them to the engine inlet means; and

water admission means to admit water to said vessel;

said electrical supply means comprising a source of direct current electrical energy of substantially uniform voltage and current and electrical converter means to convert that energy to said pulses, said converter means comprising a

transformer means having primary coil means energized by direct current energy from said source and secondary coil means inductively coupled to the primary coil means; a dump capacitor connected to the secondary coil means of the transformer means so as to be charged by electrical output of that coil means; oscillator means to derive electrical pulses from direct current energy of said source; a switching device switchable from a non-conducting state to a conducting state in response to each of the electrical pulses derived by the oscillator means and connected to the secondary coil means of the transformer means and the dump capacitor such that each switching from its non-conducting state to its conducting state causes the dump capacitor to discharge and also short circuits the transformer means to cause the switching means to revert to its non-conducting state; and electrical conversion means to receive the pulse discharges from the dump capacitor and to convert them to said pulses of electrical energy which are applied between the anode and cathode.

2. Fuel supply as claimed in claim **1**, wherein the electrical supply means applies said pulses of electrical energy at a frequency of ranging between about 5,000 and 40,000 pulses per minute.

3. Fuel supply apparatus as claimed in claim **2**, wherein the electrical supply means applies said pulses of electrical energy at a frequency of about 10,000 pulses per minute.

4. Fuel supply apparatus as claimed in claim **2**, wherein the electrical supply means comprises a source of direct current electrical energy of substantially uniform voltage and current and electrical converter means to convert that energy to said pulses.

5. Fuel supply apparatus as claimed in claim **1**, wherein the electrical conversion means is a voltage step-down transformer comprising a primary coil to receive the pulse discharge from said dump capacitor and a secondary coil electrically connected between the anode and cathode and inductively coupled to the primary coil.

6. Fuel supply apparatus as claimed in claim **5**, wherein said cathode encompasses the anode.

7. Fuel supply apparatus as claimed in claim **1**, wherein the cathode encompasses the anode which is hollow and the primary and secondary coils of the second transformer means are disposed within the anode.

8. Fuel supply apparatus as claimed in claim **1**, wherein the anode is tubular and its ends are closed to form a chamber which contains the primary and secondary coils of the second transformer means and which is charged with oil.