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(54) **FUEL CELL SYSTEM**

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(57) **ABSTRACT**

An apparatus for producing oxygen and hydrogen that uses only simplified electronic functions is shown in FIG. **1** and is described herein. The apparatus includes a container holding a solution such as water and multiple, closely-spaced, flat-plate electrodes arranged sequentially within the container and submerged in the solution. A power supply provides a constant voltage signal to the even numbered electrodes, and the odd numbered electrodes are grounded. The number and size of the electrodes are determined by the size of the engine being regulated.

Multiple, Flat-Plate
H, O_2 Producing Apparatus

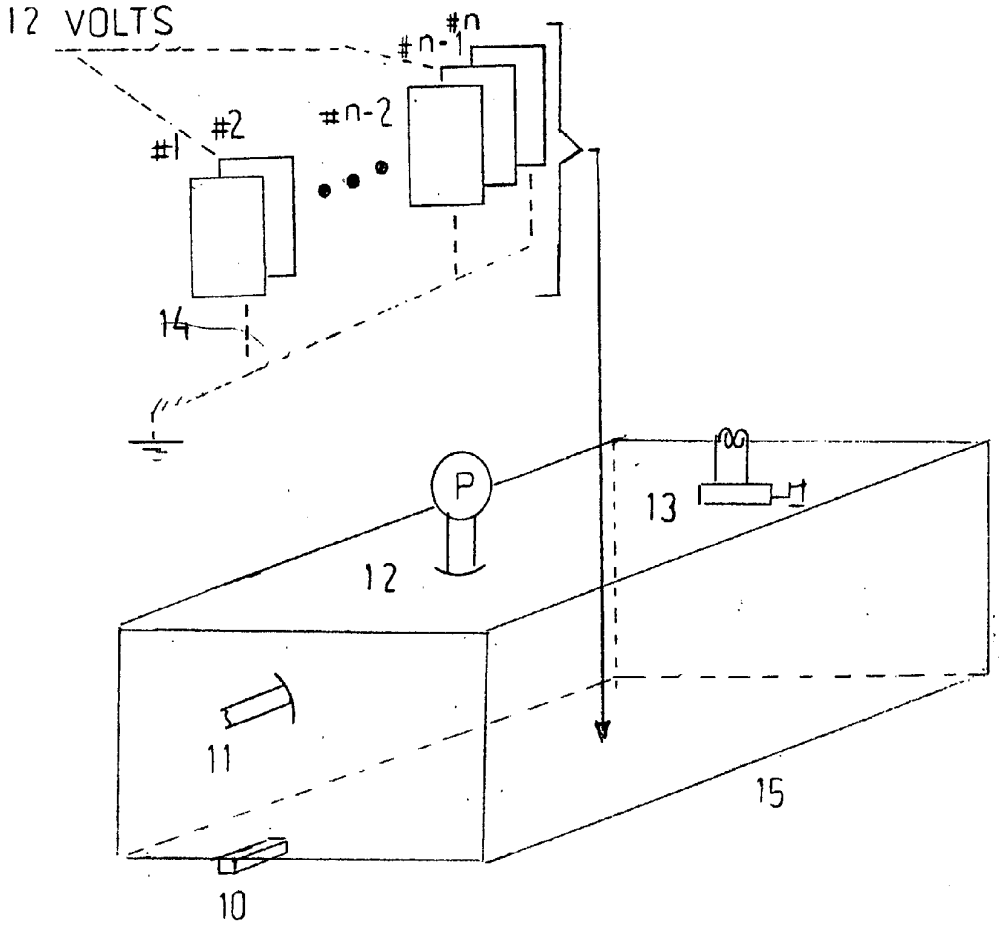


Figure 1.

Multiple, Flat-Plate
H, O_2 Producing Apparatus

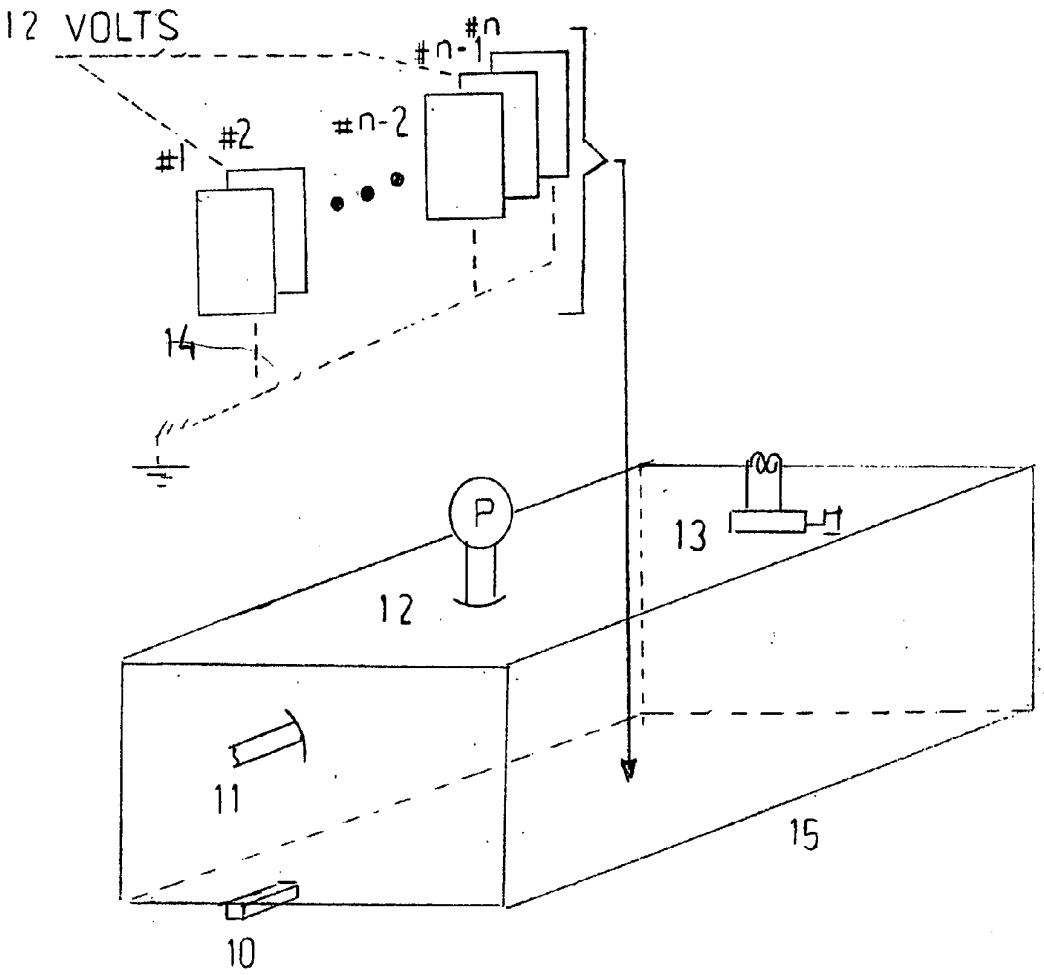
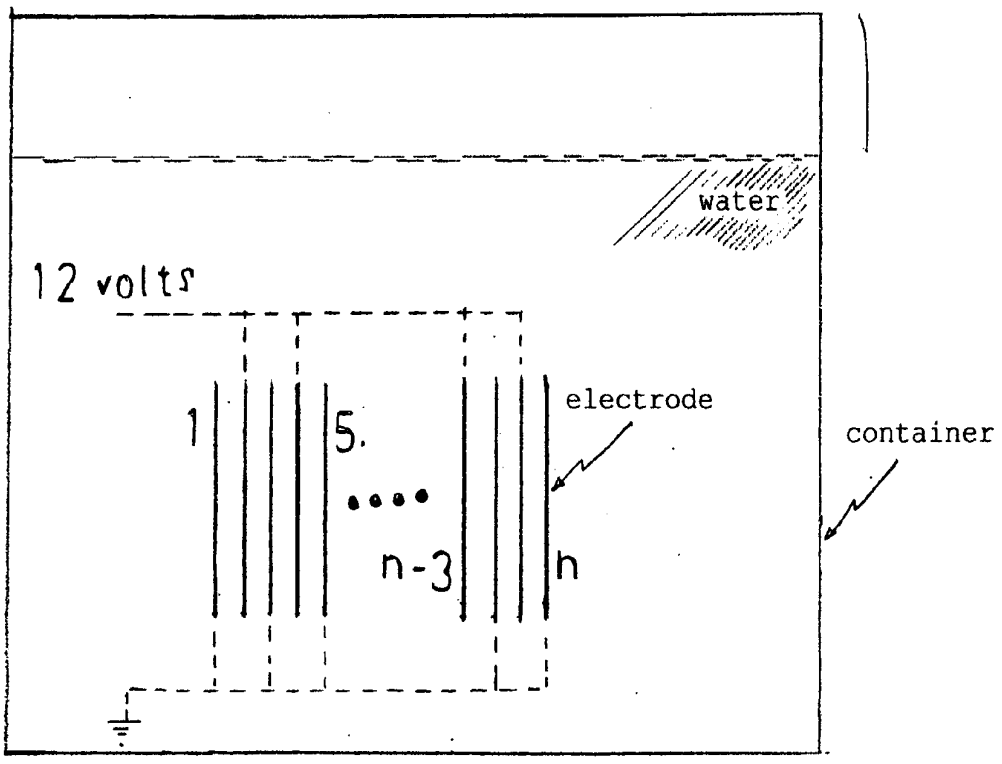


Figure 2.

The 2-Dimensional End View
of the "n" Electrodes



FUEL CELL SYSTEM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the invention

[0002] This invention will produce hydrogen and oxygen to power an automobile, for example, using only simple voltage functions.

[0003] 2. Related Technology

[0004] a. Global warming is caused in part by the hydrocarbons, CO2, etc.; these elements are in part emitted from the internal combustion engine burning fossel fuel. To help reduce global warming, an inexpensive and alternative fuel to power the internal combustion engine, for example, needs to be determined that does not emit these elements when ignited. An apparatus such as described herein provides clean burning hydrogen and oxygen from inexpensive water. A major byproduct produced by burning hydrogen and oxygen would be water.

[0005] b. Conventional electrolysis can produce hydrogen and oxygen from water. Two electrodes arranged within the cell apply energy to the water to produce hydrogen and oxygen. However, the hydrogen and oxygen generated are produced in an inefficient manner. Here a cheminal catalyst such as sodium hydroxide or potassium hydroxide must be added. Also, the conventional electrolysis produces this gas slowly and must be transported to a pressurized container for storage before burning.

[0006] c. There are other inventions that use concentric cylinders. However, complicated electronics and complicated voltage functions are used to extract hydrogen and oxygen by overcoming the bonds between the hydrogen and oxygen atoms. This is very exacting and detailed in that a precise voltage function and oscilatory frequency must be determined.

DETAILED DESCRIPTION OF THE APPARATUS

[0007] FIG. **1** gives a visual description of this apparatus containing rectangular, flat-plate electrodes **14** and is segmented into two parts.

[0008] The first part shows an enclosed, rectangular container **15** made of plexiglass ¼ inch thick. The maximum dimensions of this container would be 9 inches wide, 12 inches long and 9 inches high. This enclosed container 15 has gauges and orifices as shown. 1) This cell has a valve **10** connected near the base. This valve will automatically release the gas within the container and disconnect the apparatus from the battery when the pressure exceeds a predetermined level say 80 p.s.i. 2) This cell has a water inlet port **11** which will add water into the container when the water gets below a predetermined level. 3) A pressure gauge **12** is attach to the container to measure the pressure of the gas within the container. 4) A gas outlet port **13** is attached to the container to allow the gas generated to be transported to the reciprocaing engine, for example.

[0009] The second part of FIG. **1** shows a breakaway drawing of the enclosed rectangular electrodes #**1**, #**2**, . . . , #n-**2**, #n-**1**, #n. As shown there are "n" electrodes where "n" is odd. The exact number of electrodes and size will be dictated by the amount of hydrogen and oxygen that needs to be generated for the reciprocating engine for example. Each electrode **14** will be a rectangular sheet of 1/16th of an inch thick. To save weight, the electrodes should be made of aluminum. The even numbered electrodes #**2**, . . . , #n-**1** will be connected to a **12** volt power source. The odd numbered electrodes #**1**, . . . ,#n-**2**, #n will be connected to a ground.

[0010] If there are say **10** adjoining electrode pairs of different voltages (12 volts and ground), then there will be 10 independent streams of gas being released into the container. In this example there would be 11 electrodes total.

[0011] If a smaller amount of hydrogen and oxygen is required for a given number of electrodes, then the 12 volt power supply can be scaled to a lower voltage. For example, if the amount of hydrogen and oxygen generated needs to be reduced by ½, the voltage applied to the even numbered electrodes should be reduced to around 6 volts.

[0012] The voltage to the specific electrodes is not in the form of a square wave, rectangular wave, triangular wave,or any oscillatory wave form. Complex voltage functions are not required here. The voltage is a constant and could come directly off a 12 volt battery.

[0013] The apparatus does not require a transformer or any other electronic component to amplify the 12 volt signal applied to the electrodes. Also, this apparatus does not require any large voltage (say 200 volts) to operate correctly. The largest voltage required is 12 volts or less This apparatus is very safe and can operate within the voltage levels experienced in the car, truck, boat, etc.

[0014] This apparatus will not produce any large amounts of heat that must be dealt with. This apparatus will operate at ambient temperature.

[0015] The liquid in the container will likely be distilled water or tap water.

[0016] Also the water can transport a small current to the grounded electrodes. However, the alternator in the car, truck, boat, etc., will keep the battery charged to compensate for this small drain in voltage across the gap.

[0017] The water molecules M that separate to produce hydrogen and oxygen appear to be resting near the grounded electrode with the hydrogen atoms pointed towards the cathode. The voltage of the cathode and the surrounding water are both the constant voltage being considered, i.e. 12 volts. As soon as the cathode gets close to the grounded electrode, say within 1-2 mm, the water molecules M break apart with ease into hydrogen and oxygen atoms and accumulate within the container. One possible theory for this separation is as follows. The hydrogen atoms attached to molecule M accept two electrons from the cathode and at the same time the oxygen atom releases two electrons to the grounded electrode, and therefore the hydrogen atoms separate from molecules M.

The following is claimed:

1. With only a small amount of energy, the apparatus will produce a large flow of hydrogen and oxygen atoms from between electrodes, and therefore the gas can be consummed as soon as its generated eliminating the need to store this gas.

2. The apparatus in part is comprised of: a container for holding water that does not contain a chemical catalysis;a pressure relief valve which open if the pressure within the container exceeds a predetermined value; an outlet port and tubing that transports the gas from the container to fuel a device such as a reciprocating piston engine, an internal combustion engine, furnace, hydrogen flame jet, etc.; and an inlet port that will supply water into the container when the water level gets below a predetermined level.

3. The apparatus also is comprised of: multiple, flat-plate, closely-spaced electrodes arranged within the container, all spaced 1 to 5 mm apart, and submerged within the water; a power supply providing a constant voltage (maximum 12 volts) to the even numbered electrodes; a ground connected to the odd numbered electrodes; and electrodes of similar or different material such as stainless steel, aluminum, copper, etc.

4-10. (canceled)

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