OPIC
Office de la propriété intellectuelle du Canada

CIPO
Canadian Intellectual Property Office

(12) (19) (CA) **Demande-Application**

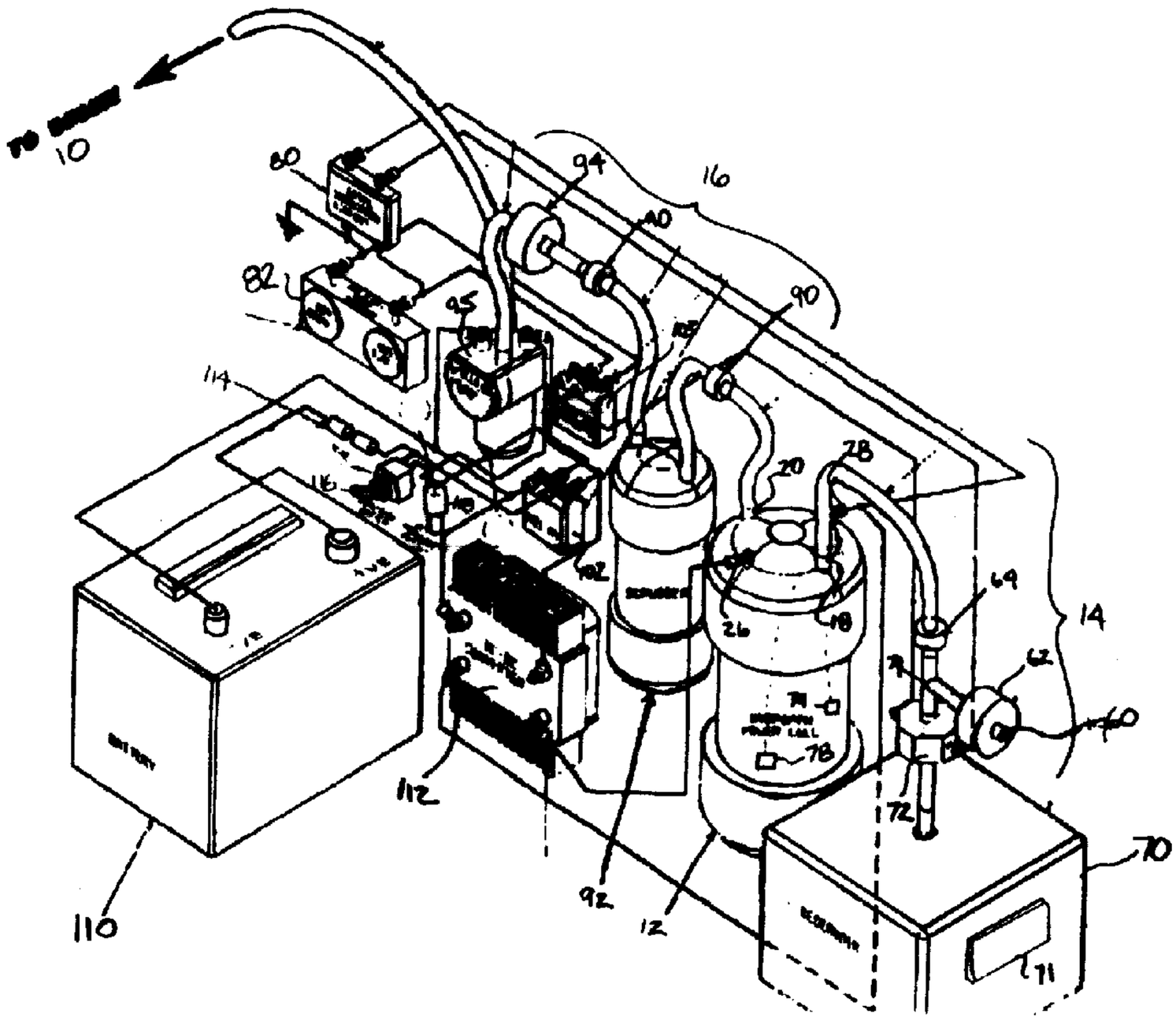
(21) (A1) **2,244,022**
(22) 1998/07/27
(43) 2000/01/27

(72) ROSS, Bill, CA
(71) GLOBAL TECH ENVIRONMENTAL PRODUCTS INC., CA

(51) Int.Cl.[6] C25B 9/00, C25B 1/04

(54) **CELLULE D'ELECTROLYSE ET ENSEMBLE DE MOTEUR THERMIQUE COMPRENANT LADITE CELLULE**

(54) **ELECTROLYSIS CELL AND INTERNAL COMBUSTION ENGINE KIT COMPRISING THE SAME**



(57) An electrolysis cell and internal combustion engine kit including an electrolysis cell is disclosed. The cell includes a sealed plastic body having an inlet and an outlet. The plastic body includes a first terminal located at the top of the body, a second terminal located adjacent to the first terminal and insulated conductors associated with each terminal extending through the body and towards the bottom end thereof. Each terminal ends in a respective anode and cathode which are operatively connected to the terminals. The anode and cathode are spaced apart from one another within the body. When an electrolysis solution is placed in the body, and a current provided across the electrodes, water is caused to decompose into hydrogen and oxygen. These combustible gases are then passed into the internal combustion engine to increase the efficiency and power thereof. In one embodiment a reservoir is provided to ensure that the level is maintained in the cell. Safety features include a low level sensor switch and low level shut off, a temperature sensor and high temperature cut off, and delay timing circuit for evacuation after shut down.

ABSTRACT OF THE DISCLOSURE

An electrolysis cell and internal combustion engine kit including an electrolysis cell is disclosed. The cell includes a sealed plastic body having an inlet and an outlet. The plastic body includes a first terminal located at the top of the body, a second terminal located adjacent to the first terminal and insulated conductors associated with each terminal extending through the body and towards the bottom end thereof. Each terminal ends in a respective anode and cathode which are operatively connected to the terminals. The anode and cathode are spaced apart from one another within the body. When an electrolysis solution is placed in the body, and a current provided across the electrodes, water is caused to decompose into hydrogen and oxygen. These combustible gases are then passed into the internal combustion engine to increase the efficiency and power thereof. In one embodiment a reservoir is provided to ensure that the level is maintained in the cell. Safety features include a low level sensor switch and low level shut off, a temperature sensor and high temperature cut off, and delay timing circuit for evacuation after shut down.

CANADA

PATENT APPLICATION

PIASETZKI & NENNIGER

File GTEP001/JTN

Title:

ELECTROLYSIS CELL AND INTERNAL COMBUSTION ENGINE KIT COMPRISING THE SAME

Inventor(s):

Bill Ross

Title: **ELECTROLYSIS CELL AND INTERNAL COMBUSTION ENGINE KIT COMPRISING THE SAME**

FIELD OF THE INVENTION

This invention relates to the general field of combustion engines, and more particularly, to combustion engines of the type that use conventional hydrocarbon fuels such as gasoline or diesel fuel, natural gas and propane in combination with fuel additives such as hydrogen and oxygen. Most particularly, this invention relates to an electrolysis cell capable of producing hydrogen and oxygen for use in an internal combustion engine as a fuel additive for improving performance and reducing pollution from the internal combustion engine.

BACKGROUND OF THE INVENTION

Modern gasoline and diesel engines are much more efficient and less polluting than similar engines of even a few years ago. However, due to the increased number of vehicles in use, levels of air pollution continue to rise even in light of more efficient and clean running vehicles. Therefore, there has been increasing pressure to develop vehicles which have lower emissions, and thus are less polluting than conventional automotive technology permits.

For example, under certain government "Clean Air" legislation, a certain number of vehicles are required to be emission free. This legislation has put pressure on OEM's to develop alternate fuel technologies including electric cars and vans, natural gas and propane fuelled vehicles, hydrogen cell vehicles and the like. While a number of these technologies are promising, some are still a long way from commercial implementation, and others appear to have reached the limit of present design capabilities without yielding a consumer acceptable product. Therefore, attention has

refocused on conventional gas and diesel burning engines, to try to develop a more pollution free and efficient combustion system.

In the past, it has been discovered that the use of hydrogen and oxygen as a fuel additive increases the efficiency of an internal combustion engine and reduces pollution considerably. Both advantages appear to be the byproduct of faster flame speed as much as 9 times that of gasoline resulting in more complete combustion of the fuel in the combustion chamber, with the resultant reduction in soot, (semi-burnt hydrocarbons) and other pollutants such as nitrous oxide, carbon monoxide and an increase in output energy for a greater fuel efficiency and horsepower.

U.S. Patent No. 5,231,954, which issued on August 3, 1993, teaches an electrolysis cell for use in connection with a combustion engine for generating hydrogen and oxygen gases which are added to the fuel delivery system as a supplement to the gasoline or other hydrocarbons burned therein. While this patent proposes an electrolysis unit which is relatively simple and easy to install, this prior device has a number of problems which require considerable maintenance and lead to higher costs associated with installing and using the device.

This patent teaches a low concentration of electrolyte, by weight, which is created by pre-mixing and pre-charging a concentrate for 24 hours. This results in a higher resistance electrolysis cell which can be connected directly to a conventional vehicle battery. In the context of consumer applications, it is too awkward to do this pre-charging and mixing. In addition, since the resistance of the solution is relatively high, a high amount of heat is created in the cell during use, which can be problematic.

The preferred form of the electrolysis chamber taught by this patent is a plastic walled chamber, into which the terminals are sealed. The terminals project from the lower side of the plastic shell of the electrolysis cell itself. The unit comes on when the motor is turned on and the cell, and in particular the terminals, tend to heat up considerably. Under the continual

heating and cooling cycling the seals around terminals can crack leading to a loss of seal integrity and leaks. This requires more frequent replenishment of the electrolyte, and a loss of function.

In addition, the electrodes of this prior device extend about two thirds to three quarters of the way to the top of the device. Thus, there is not much free board of solution above the top of the electrode which is disadvantageous. After only a short period of operation, parts of the electrodes become exposed, creating a need for addition of distilled water. This requires frequent replenishment of the fluid, which is awkward and time consuming. Further there is always a risk, when the electrodes are exposed, of a spark causing an explosion of the highly combustible gases in the unit.

In addition, the patent teaches that the gases produced in the electrolysis chamber be introduced directly into the PVC vacuum line used for circulating crank case gases to the intake manifold so that oxygen and hydrogen generated in the electrolysis cell are withdrawn by the vacuum effect in the vacuum line.

This has been found to be problematic. The introduction of the gases into the PVC vacuum line creates considerable problems for modern engines. Such engines typically include sensors for monitoring input air quality (the so called "MAP" or mass air pressure sensors) which provide output to a microprocessor which can for example adjust the fuel input to the engine accordingly. Additional sensors monitor the combustion outputs. Introducing these additional gases into the PVC means that they are put in downstream of the MAP sensors which creates an imbalance, fooling the microprocessor and causing the engine to misfire and behave poorly. Thus, in some cases, introduction of the gases creates a worse polluting engine. Considerable adjustment of the microprocessor controller is required to make resolve this issue, which increases installation and servicing costs.

SUMMARY OF THE INVENTION

What is required is a simple and inexpensive system which overcomes the problems associated with the prior art devices. Most particularly, this system should include a sealed chamber, to prevent the electrolytic solution from being lost to effects other than electrolysis. In addition, the device should include electrodes which are located well beneath surface of the electrolytic solution, to allow the electrolytic solution to be used up without exposing the electrodes. A deeper unit permits more fluid to be used which permits longer runs between fluid re-fillings. Further the system should include an automatic shut off switch to cause the unit to stop in the event the liquid level gets low enough to expose the electrodes. In addition, most preferably the device will conduct electrolysis in a low resistance electrolysis fluid, permitting it to operate at relatively low temperatures to prevent damaging heating and cooling cycles which can impair seal integrity. As well the device should have any joints or openings in the sealed chamber formed above the highest liquid level in the chamber. In this manner, even if a leak develops, the leak will simply allow additional air into the electrolysis chamber rather than leaking out electrolytic solution. Lastly, the system should optionally compensate for loss of liquid water to decomposition to prevent over concentration of the solution which can lead to a higher resistance cell and excessive heat generation.

Accordingly, there is provided an electrolysis cell according to the present invention comprising:

a sealed plastic body;

an outlet vent on the body;

an inlet vent on the body;

a first terminal located at a top of said body;

a second terminal located adjacent to said first terminal;

an insulated conductor associated with each terminal extending through said body and towards a bottom end thereof;

an anode operatively connected to one of said terminals; and

a cathode associated with the other of said terminals, said anode and said cathode being spaced apart from one another within said body.

BRIEF DESCRIPTION OF THE DRAWINGS

Reference will now be made, by way of example only, to preferred embodiments of the invention as illustrated in the attached figures.

Figure 1 illustrates a schematic of a kit of components assembled according to the present invention;

Figure 2 illustrates a component from the kit of Figure 1, shown in plan view;

Figure 3 is a cross-section through a portion of Figure 1 along lines 3-3;

Figure 4 is an isometric view of the electrolysis cell of Figure 1; and

Figure 5 is a schematic of the electrical circuit for a low level sensor of Figure 1.

Figure 6 is a schematic view of the kit according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 shows a schematic of a kit of components for providing combustion products to an internal combustion engine 10. The kit is generally indicated with reference numeral 11, and comprises an electrolysis cell 12, an inlet line 14 and an outlet line 16, each of which is discussed in more detail below.

Electrolysis is the well known technique whereby current is passed through liquid causing it to decompose. Where the liquid is water it can be caused to decompose to hydrogen and oxygen. The preferred form of the electrolysis cell 12 of the present invention is a sealed hollow unit having an inlet tube 18 and an outlet tube 20. These inlet and outlet tubes

18, 20 permit access to a space 22 inside the electrolysis cell 12, defined by a wall 24. As shown in Figure 1, a pair of electrical terminals 26, 28 are provided towards the top of the sealed cell 12. The electrical terminals 26, 28 include conventional electrical connector nuts such are known in the art.

Extending from each terminal, through the wall 24, is a conductor rod 30 made most preferably from stainless steel. Grade 304 steel has found to yield suitable results but other conductor material may also be suitable. In order to prevent short circuiting, the electrical conductor 30 must be insulated. It has been found that conventional shrink wrap plastic 31 is suitable for forming an insulation layer around the conductor 30. The conductor rod 30 must also be sealed to the wall 24, and any suitable insulating plastic or rubber compound may be used for this purpose,

At the end of each conductor 30 is located an electrode shown as 32, 33 respectively. The electrodes are preferably formed in a ring, with a plurality of fingers 34 as shown. Because of the nature of the electro-chemical reaction, gas bubbles 35 tend to form on the edges of the plates. Therefore, forming a plate with a plurality of edges, such as the fingers 34 as shown, is believed to enhance the production of hydrogen and oxygen gas in the cell.

Figure 2 shows an electrode 32 or 33 stretched out flat. It will be appreciated that the ends 36, 37 are joined, by any conventional means such a rivet 38, to form a circular loop. This loop is then secured by solder, welding on the like to the end of the conductor 30. One of the electrodes is placed inside of the other, thereby creating an annular gap 39 therebetween. Electrical current flows across the gap, through the electrolyte in a conventional manner, causing the decomposition of water into hydrogen and oxygen.

Satisfactory results have been achieved with fingers of about 13/16“ wide for the cathode and about ½“ wide for the anode. Other dimensions will also provide reasonable results, provided that a sufficient amount of the electrodes 32, 33 is provided. It is reasonably important for

smooth operation of the device to ensure that the electrodes are evenly spaced apart. Thus, it is preferred to provide a spacer 40 to secure the lower edge of the electrodes in an appropriate location. For example, grooves are formed in the bottom of the cell 12, which receive and retain a lower edge of the anode and the cathode therein. In this manner the electrodes are held in place at their top edges by the connector rods and at the bottom edges by the grooves. It is also desirable to use at least a few spacers 41 (Figure 3) in between the electrodes 32, 33 to make sure of an even annular gap 39.

In one form of the present invention, a liquid permeable but gas bubble proof barrier shown in dotted outline as 48 is provided between the inner and outer electrodes. This barrier may be made from woven polypropylene for example. Above the barrier 48 is located an impermeable cowl shown in dotted outline as 50. The space 52 inside the cowl 50 is vented by a further nozzle or vent shown in dotted outline as 54. It can now be appreciated that this embodiment of the invention comprehends separating produced hydrogen from produced oxygen.

In some cases, added oxygen can create difficulties with combustion sensors located in modern automobile engines. The extra oxygen may be more than is required for combustion and the extra oxygen is detected in the exhaust gases, causing the microprocessor to alter the fuel/air mixture inappropriately. Thus, when the oxygen concentration is artificially raised by reason of the electrolysis cell, the combustion control circuitry becomes confused, and this can lead to an increase in pollution and a decrease in productivity.

Therefore, in some cases it may be preferable to separately remove the oxygen and vent it to a separate destination. One destination for this extra oxygen would be to vent it directly into the passenger cabin of the vehicle, to increase the air quality contained in the cabin. Otherwise, the oxygen may simply be vented to atmosphere. It will also be understood that the present invention also includes not separating the hydrogen and oxygen,

but rather using both as fuel additives, with an alternative strategy for overcoming the combustion control problems as set out below.

In the following embodiment both oxygen and hydrogen are added to the engine as fuel additives and is to be considered as not including the components 48, 50 and 54. Turning now to the complete system as shown in Figure 1, there is shown an air intake line 60 which is then followed by a filter 62. The filter 62 prevents dust and debris or other particulates which might be present in the ambient air, from being drawn into the electrolysis cell 12. After the filter 62, is preferably a calibrated restriction 64 which provides for a controlled maximum flow of air into the system. Then, the air passes through the air inlet tube 18 on the sealed chamber into the space 22. Contained within the sealed chamber is an electrolyte in solution with water.

Although many different electrolytes may be used, good results have been achieved with distilled water and potassium hydroxide. The potassium hydroxide acts as an electrolyte, in a known manner, to lower the resistance of the water and to improve the performance of the electrolytic cell. Most preferably, the range of potassium hydroxide to water is about 15% to 40% by weight with about 30% being the most preferred ratio. As is known in the art, at this level the resistance of the solution is the lowest, meaning the a minimum amount of heat is generated during electrolysis. Other electrolytes may also be used such as HNO_3, H_2SO_4, CrO_3 and the like. Notwithstanding the low resistance however the production of hydrogen and oxygen is sufficient for the beneficial effects in combustion. In addition the concentration of potassium hydroxide noted will prevent the solution from freezing up to a temperature of about minus 70 degrees C.

Most preferably the electrolytic solution will be maintained at a relatively high level in the chamber as shown. However, over time, the electrolytic solution will be used up as hydrogen and oxygen gas are produced. The use of the electrolytic solution will require the addition of more distilled water. The potassium hydroxide does not get used up in the

reaction, and therefore does not need to be added in the usual case. Essentially, to fill the cell 12, one simply disengages the inlet and outlet tubes from the tubing system. Then, by means of an adaptor nozzle (not shown), distilled water can easily poured in through the inlet tube 18. Since the outlet tube 20 vents to air, it will be easy to pass the water in through the inlet tube.

However, it will be noted that as the liquid H_20 decomposes and is lost from the cell, the concentration of potassium hydroxide, which is not affected by the electrochemical reaction, will increase. Once the concentration passes about 30% by weight, the resistance of the cell increases with increasing concentration of electrolyte. As the resistance of the cell increases, the electrical potential across the electrodes also increases, the amount of heat generated increases. Thus if the electrodes become exposed, there is an even greater chance of a spark or the like, leading to a dangerous situation. This negatively reinforcing cycle is also addressed in the present invention, by the provision of a means to maintain the appropriate fluid level as described in more detail below.

A further feature optionally provided according to ~~of~~ the present invention is a distilled water reservoir 70 (shown in Figure 6), to automatically recharge the unit or cell 12 with water to maintain the electrolyte level within a safe operating range. The reservoir 70 is preferably connected with a union 74 in front of the calibrated restriction 64, with an automatic valve 72 for refilling when needed. In this way, the unit or cell 12 will be kept at an optimal concentration of liquid H_20 to electrolytes. It will be appreciated that as for any other fluids in a vehicle, there must be provided a means for preventing the reservoir 70 from freezing. The present invention proposes two possibilities to keep the reservoir 70 from freezing. The first, is to provide a resistance or other heater 71. The second is to provide a low concentration of potassium hydroxide in the reservoir. This is believed possible because certain amount of potassium hydroxide will be lost during the operation of the cell. Thus, a low concentration of potassium hydroxide

may be provided, as a form of antifreeze, in the reservoir. Of course the amount added to the cell through replenishment from thee reservoir would have to balance with the amount lost, so that a concentration or build up of potassium hydroxide in the cell is avoided. Thus, the electric resistance heater 71 is preferred in some cases, although it requires that power be used when the vehicle is not operating which could lead to a rundown of the battery, unless a further power source was provided.

As well, although an automatic valve 72 is preferred it will be appreciated by those skilled in the art that various valve means could be provided with equal effect. For example, a possible float valve would also work, where the float valve admits fresh make up liquid H_20 as the level of liquid drops in the cell.

As a further safety feature, the present invention also includes a temperature sensor 78 which leads to a shut off switch 80. Thus if the electrolyte becomes too concentrated the temperature will start to rise and a temperature cut off switch will be used to shut off the device before it rises too high. A temperature range of between 70 and 90 degrees Celsius is a suitable range for an upper cut off temperature, with 85 degrees Celsius being the most preferred temperature. It will now be appreciated that the temperature cut off will allow the vehicle operator to be warned about the unit, so the solution can be drained and a fresh less concentrated solution added. In addition a low level sensor is provided as discussed in more detail below.

It will also be appreciated that the present invention provides for a significant submerged depth for the electrodes of more than one half of the depth of the fluid in the cell and preferably more that two thirds of the fluid depth before the electrodes become exposed. However, since the fluid will be used up over time as it decomposes the present invention also comprehends a low level safety sensor 79 which also leads to shut off switch 80. The sensor 79 can be of any conventional type, such as a float valve, limit switch, electrical or optical sensor or the like. What is required

is to provide an indication of when the level is down enough that it is approaching the point that the device will need to be refilled. As a safety measure the present invention also contemplates tripping a low water level shut off switch before the electrodes are exposed to prevent any undesirable effects. The shut off switch 80 simply electrically disengages the cell 12 from the battery upon an over temperature or low water level condition.

Associated with the level switch is an indicator 82, visible to the driver. In this way the vehicle operator will know when the water has run out and thus when the unit needs to be refilled, or if the temperature is acceptable, and that the unit is powered appropriately. In the preferred form the indicator 82 includes light, which is visible in the cab.

At various locations are provided safety check valves 90 which are to prevent any gases which have passed past the check valve 90 from being returned upstream. This is a further safety feature which prevents the unwanted pooling of the combustible gases produced in the cell 12. Then, a gas scrubber 92 is provided which is essentially distilled water and K0H to prevent freezing. The hydrogen/oxygen gas mixture is simply bubbled through the gas scrubber to ensure that it is clean and free from contaminates. Then, a filter 94 is provided for the purpose of filtering out moisture carried by the gases. Most preferably, this filter is made from polypropylene, silicone gel or the like to wick away the moisture.

In the combined gas embodiment, it is preferred to introduce the hydrogen/oxygen gas into the engine ahead of the MAP sensors, for example at the air intake filter. In this way, the MAP sensors will be able to detect and compensate for the extra input oxygen, meaning that an efficient combustion can be maintained. This avoids the problems of unbalanced readings and removes the need to substantially revise the microprocessor combustion controls on most cars. Thus, rather than removing the oxygen, this embodiment relies on introducing the gases upstream of the sensors to avoid the problems of the prior art.

To drive the gases into the engine, a vacuum motor 95 may be provided. The vacuum motor 95 creates suction for the purpose of drawing the hydrogen and oxygen which are produced along through the system for introduction into the engine (not shown). Alternately, rather than a pull (vacuum), there may be provided a push (positive pressure head) in the form of a blower motor, shown at 100, for the purpose of providing positive pressure to drive the hydrogen/oxygen gas mixture out of the electrolysis cell and into the combustion portion of the automobile engine. What is desired, for safety, is to make sure that any combustible gases that are produced by the system are not allowed to pool in a dangerous concentration. Thus, the push and pull models discussed above provide for a way to quickly and efficiently force the gases into the combustion path of the engine. It can now be appreciated that a calibrated restriction provides a choke to restrict the flow through the system to an appropriate level. Too much flow would add to much extra air to the internal combustion engine, whereas too little flow will allow too much produced gas to accumulate.

A further safety feature of the present invention is the provision of a delay timing circuit and relays 102, 103 so that the vacuum motor runs on for a period of time after the current is turned off. In this way any gas remaining is drawn out of the cell 12 and vented harmlessly to the atmosphere. Alternately the present invention could vent itself through the calibrated restriction and filter upstream of the cell 12 upon the unit being shut down. This allows further air into the unit and flushes the hydrogen/oxygen gas out of the cell 12, preventing the build up of an explosive composition.

Some of the advantages of the present invention can now be more clearly understood. As can be seen in Figure 1, there is a large distance D between the top of the electrolysis cell and the beginning of the electrodes. Therefore, the unit can run for a considerable period of time without exposing the electrodes. Further, a reservoir is provided to permit the liquid level to be maintained in the unit for longer running between

replacements. As safety features, temperature sensor and low level sensors are also provided.

In addition, rather than introducing pure hydrogen and pure oxygen into the automotive system, it is possible to separate the oxygen and hydrogen produced to permit them to be delivered to separate destinations. This separation has the benefit of improving the efficiency of the automatic combustion control circuitry for the automotive engine, since it is not fooled by the presence of any excess oxygen.

As shown in Figure 4, there may also be provided a sight glass 102 on the side of the unit to permit the operator to determine whether or not additional distilled water needs to be added to the cell 12. This may be an alternate, or used in combination with sensor 80 to alert the user/driver that there is a low electrolyte situation in the unit.

Most preferably, the electrical current will be provided from a power source 10, such as a 12 volt battery as are commonly used in conventional vehicles. However, rather than applying the 12 volt current directly to the unit, it is most preferred to adapt and condition the electrical signal, to change the 12 volt power to make 20 amp 3 volt power. This decreases the amount of heat energy produced in the system and is possible because of the lower resistance electrolyte solution that is preferred. An DC to DC converter 112 produced by CALEX of California is suitable for this purpose. In the power circuit are also provided a fuse 114, and a switch 116 to start the unit. As a further safety, motor condition sensor 118 is provided. Unless the sensor 118 detects that the motor is on, the unit will be not energized.

Example I

A kit according to the present invention (but without reservoir) was installed on a 1996 Ford Escort having about 130,000 kilometres on the odometer.

Emissions

The following emission results were noted:

A. At Idle

GAS	Reading (Unit Off)	Reading (Unit On)	% Change
CO_2	15.18	14.71	-3%
CO	0.07	0.03	-57%
O_2	0.07	0.10	+42%
HC	98	33	-66%

B. At 2500 RPM

Gas	Reading (Unit Off)	Reading (Unit On)	% Change
Co_2	15.25	14.78	-3%
CO	0.12	0.01	-92%
O_2	-0.02	-0.05	----
HC	7	3	-57%

Example 2

This same vehicle was tested for gas mileage. Typically, without the unit, highway mileage was 10.0 kilometres per litre. Results of two trials with the unit in place, and activated, yielded 15.29 kilometres per litre and 17.07 kilometres per litre respectively, and average increase of about 61.8%. This was all highway driving, and with air conditioning on.

The most preferred form of the present invention is in the form of an after market add-on kit to an existing automobile. However, it will be appreciated by those skilled in the art that the unit can also be installed by OEM's as a factory installation and achieve the same results. The sealed electrolysis chamber merely needs to be installed under the hood, in the trunk or on the frame of an H.G.V. unit and appropriately connected.

It will be appreciated by those skilled in the art that the foregoing description was in respect of preferred embodiments and that various alterations and modifications are possible within the broad scope of the appended claims without departing from the spirit of the invention such as operating under full vacuum with the necessary modifications. For example, while reference is made to an electrolyte solution made with

potassium hydroxide, other forms of electrolyte solutions will also yield reasonable results. Further, the present invention contemplates integrating the kit with modern microprocessor controlled combustion engines by either separating out the oxygen or by introducing the oxygen prior to the MAP sensors, both of which are within the scope of the present invention. Various other modifications will apparent to those skilled in the art but are not described in any further detail herein.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An electrolysis cell for conducting electrolysis for producing a combustible gas, the electrolysis cell comprising:

a sealed plastic body;

an outlet on the body;

an inlet on the body;

a first terminal located at a top of said body;

a second terminal located adjacent to said first terminal;

an insulated conductor associated with each terminal extending through said body and towards a bottom end thereof;

an anode operatively connected to one of said terminals; and

a cathode operatively connected to the other of said terminals, said anode and said cathode being spaced apart from one another within said body.

2. An electrolysis cell as claimed in claim 1, further including an water based electrolysis solution covering said anode and said cathode, wherein upon connecting said terminals to a source of electrical power, said electrolysis cell produces hydrogen and oxygen gases.

3. An electrolysis cell as claimed in claim 2 having an electrolyte potassium hydroxide electrolyte in sufficient quantities to prevent freezing of the solution under normal operating conditions, and to lower the resistance of the solution sufficiently to permit efficient electrolysis.

4. An electrolysis cell as claimed in claim 3 wherein said potassium hydroxide is present in a weight ration of between 15 and 45 %.

5. An electrolysis cell as claimed in claim 3 wherein said solution is comprised of distilled water and between 25% to 35% by weight potassium hydroxide.

6. An electrolysis cell as claimed in claim 2 wherein said source of electrical power is a 12 volt vehicle battery, and said cell further includes a power conditioning means for converting an eight to nine amp DC current to a 24 amp, DC output, said power conditioning means being connected between said battery and one of said terminals.

7. An electrolysis cell as claimed in claim 1 wherein said anode and said cathode are in the form of spaced apart rings, each ring having a plurality of fingers extending therefrom.

8. An electrolysis cell as claimed in claim 6 wherein said electrolysis cell further includes a barrier, located between said cathode and said anode for separating hydrogen gas from oxygen gas.

9. An electrolysis cell as claimed in claim 1 wherein said outlet is connected to a gas scrubber.

10. An electrolysis cell as claimed in claim 9 wherein said gas scrubber is connected to a filter.

11. An electrolysis cell as claimed in claim 1 further including a low liquid level sensing means for sensing a low liquid level in said cell.

12. An electrolysis cell as claimed in claim 11 wherein said low liquid level sensing means activates a warning signal for an operator.

13. An electrolysis cell as claimed in claim 11 wherein said low liquid sensing means activates a power shut off switch to shut off the device.

14. An electrolysis cell as claimed in claim 1 further including a distilled water reservoir fluidly connected to said cell, to extend the time for operation of the device between refilling the cell with distilled water.

15. An electrolysis cell as claimed in claim 11 wherein said filter is connected to a internal combustion engine ahead of any MAP sensors.

16. An electrolysis cell as claimed in claim 1 including a means for removing gases from said cell as the gases are produced.

17. An electrolysis cell as claimed in claim 17 wherein said means for removing said gases comprises an air pump for pushing air through said cell to remove said gases from said cell.

18. An electrolysis cell as claimed in claim 18 wherein said means for removing said gases comprises a vacuum pump for pulling air through said cell to remove gases from said cell.

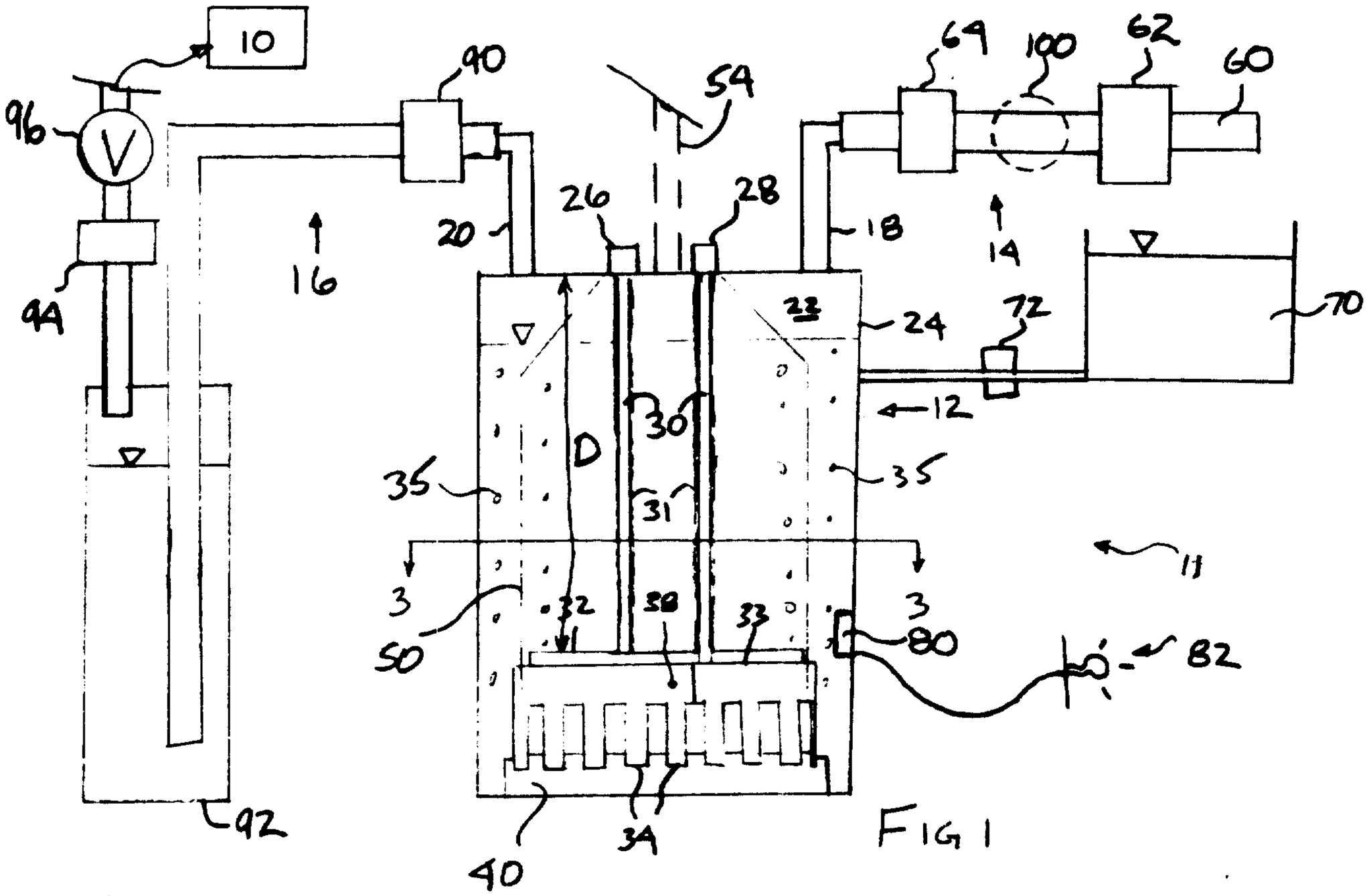


FIG 1

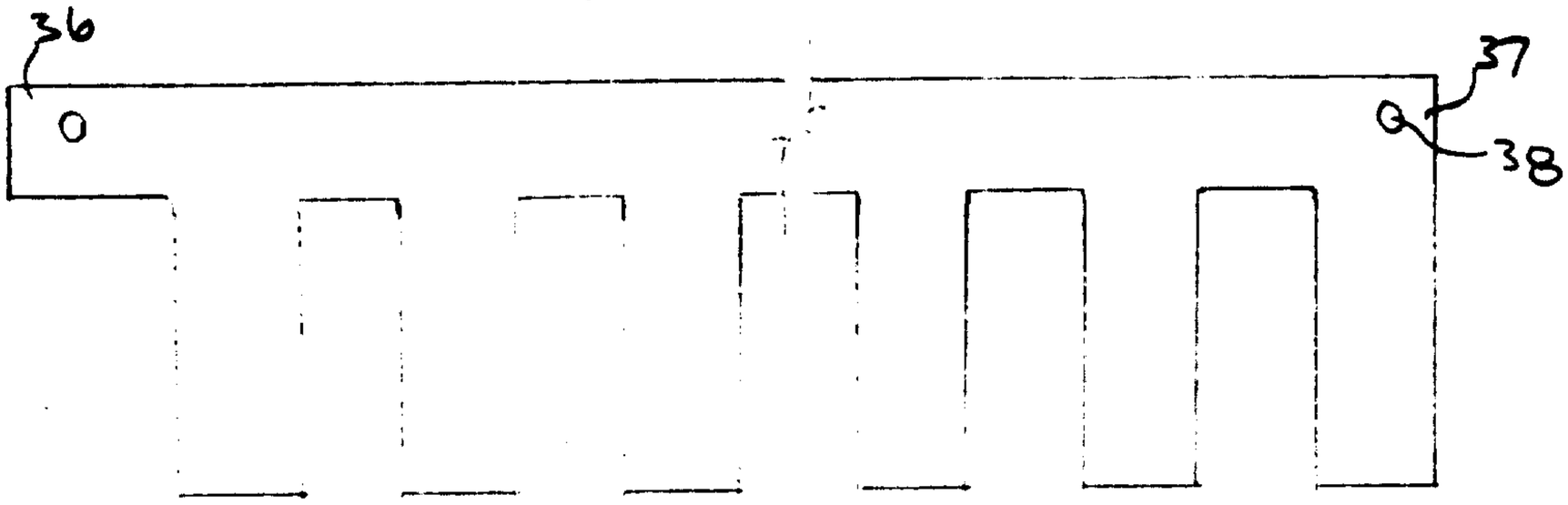


FIG 2

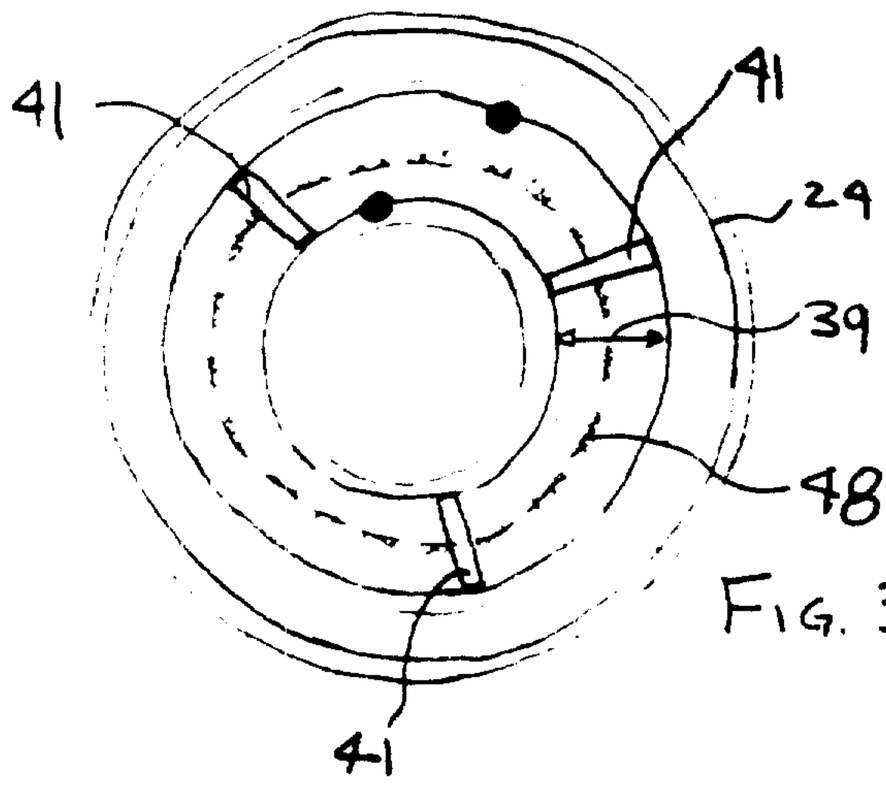


FIG. 3

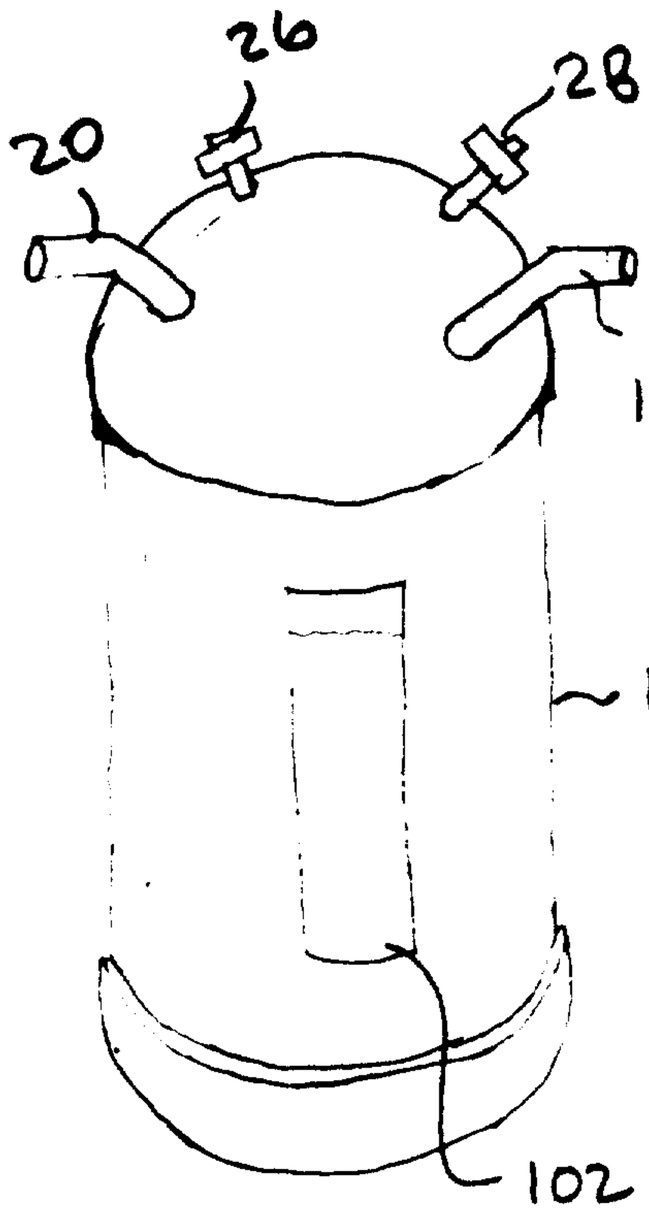


FIG 4

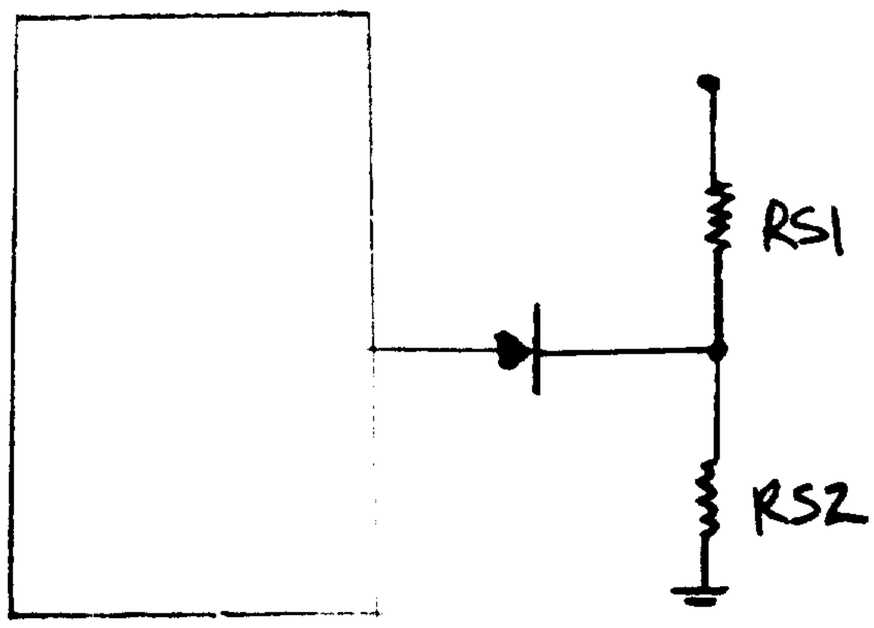


FIG. 5

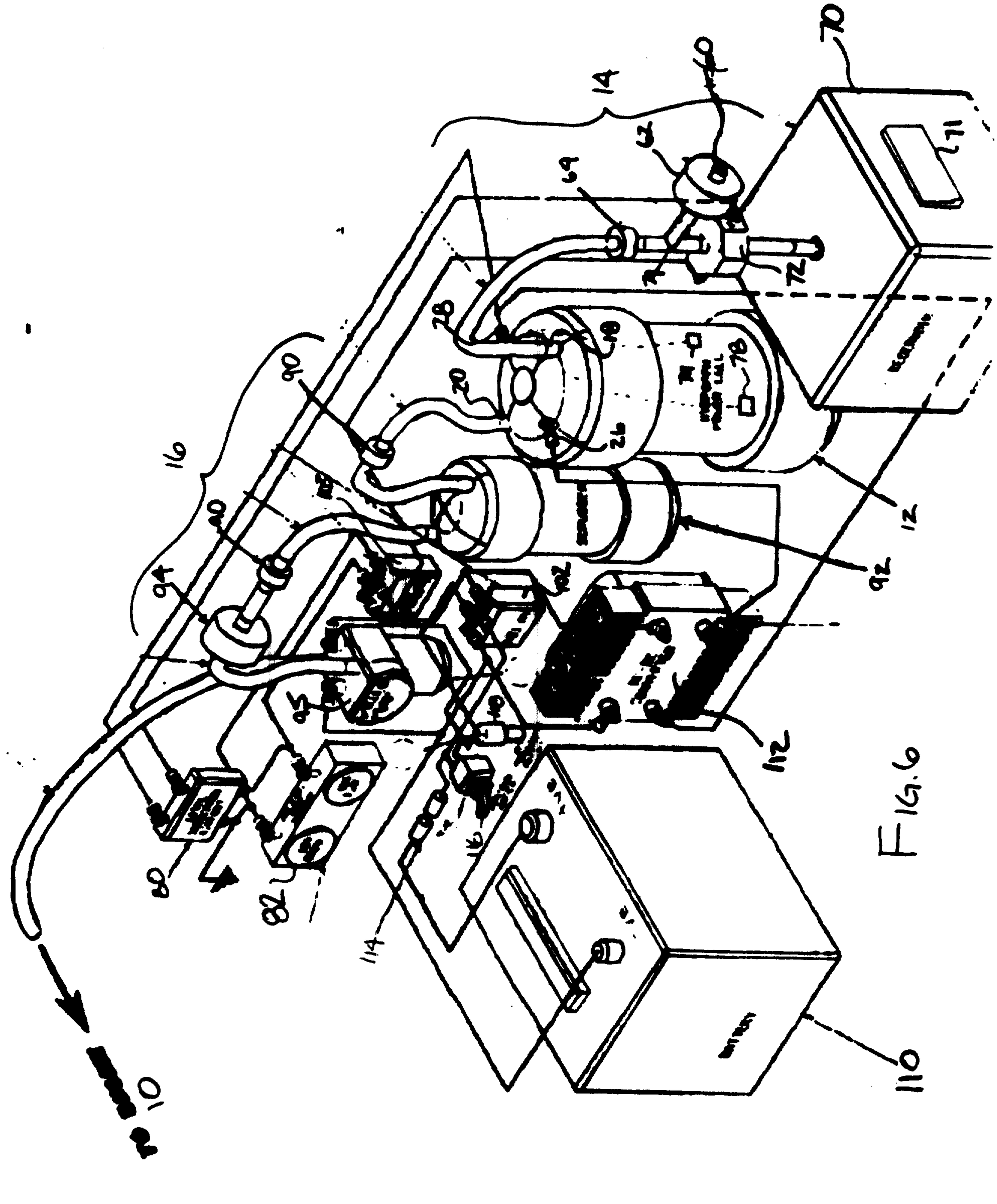

14
16
70
71
72
62
64
60
28
18
20
26
78
12
90
92
94
80
82
85
102
112
114
116
110
10

FIG. 6