

A Practical Guide to 'Free Energy' Devices

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Please note that this is a slightly re-worded excerpt from this patent.

Canadian Patent 2,067,735

16th May 1991

Inventor: Stanley Meyer

WATER FUEL INJECTION SYSTEM

ABSTRACT

An injector system comprising an improved method and apparatus useful in the production of a hydrogen containing fuel gas from water in a process in which the dielectric property of water and/or a mixture of water and other components determines a resonant condition that produces a breakdown of the atomic bonding of atoms in the water molecule. The injector delivers a mixture of water mist, ionised gases and non-combustible gas to a zone within which the breakdown process leading to the release of elemental hydrogen from the water molecules occurs.

DESCRIPTION

This invention relates to a method and apparatus useful in producing thermal combustive energy from the hydrogen component of water.

In my patent no. 4,936,961 "Method for the Production of a Fuel Gas", I describe a water fuel cell which produces a gas energy source by a method which utilises water as a dielectric component of a resonant electrical circuit.

In my patent no. 4,826,581 "Controlled Process for the Production of Thermal Energy From Gasses and Apparatus Useful Therefore", I describe a method and apparatus for obtaining the enhanced release of thermal energy from a gas mixture including hydrogen and oxygen in which the gas is subjected to various electrical, ionising and electromagnetic fields.

In my co-pending application serial no. 07/460,859 "Process and Apparatus for the Production of Fuel Gas and the Enhanced Release of Thermal Energy from Fuel Gas", I describe various means and methods for obtaining the release of thermal/combustive energy from the hydrogen (H) component of a fuel gas obtained from the disassociation of a water (H₂O) molecule by a process which utilises the dielectric properties of water in a resonant circuit; and in that application I more thoroughly describe the physical dynamics and chemical aspects of the water-to-fuel conversion process.

The invention of this present application represents generational improvement in methods and apparatus useful in the utilisation of water as a fuel source. In brief, the present invention is a microminiaturised water fuel cell which permits the direct injection of water, and its simultaneous transformation into a hydrogen-containing fuel, in a combustion zone, such as a cylinder in an internal combustion engine, a jet engine or a furnace. Alternatively, the injection system of the present invention may be utilised in any non-engine application in which a concentrated flame or heat source is desired, for example: welding.

The present injection system eliminates the need for an enclosed gas pressure vessel in a hydrogen fuel system and thereby reduces a potential physical hazard heretofore associated with the use of hydrogen-based fuels. The system produces fuel-on-demand in real-time operation and sets up an integrated environment of optimum parameters so that a water-to-fuel conversion process works at high efficiency.

The preferred embodiment of the invention is more fully explained below with reference to the drawings in which:

Fig.1 figuratively illustrates the sections and operating zones included in a single injector of the invention.

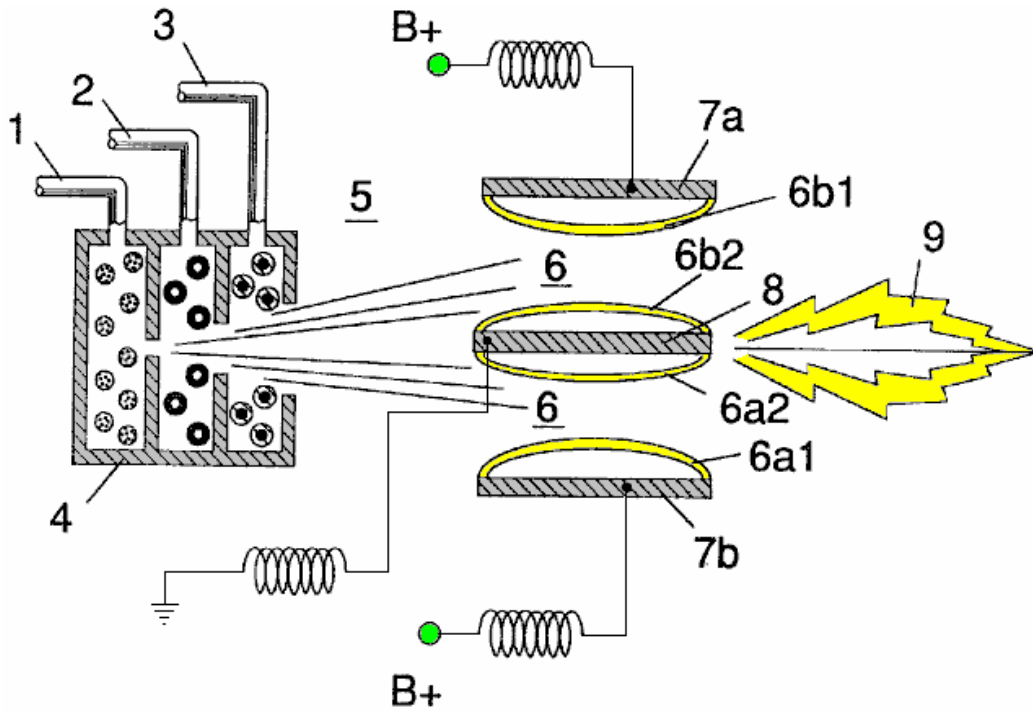


Fig.2A is a side cross-sectional view.

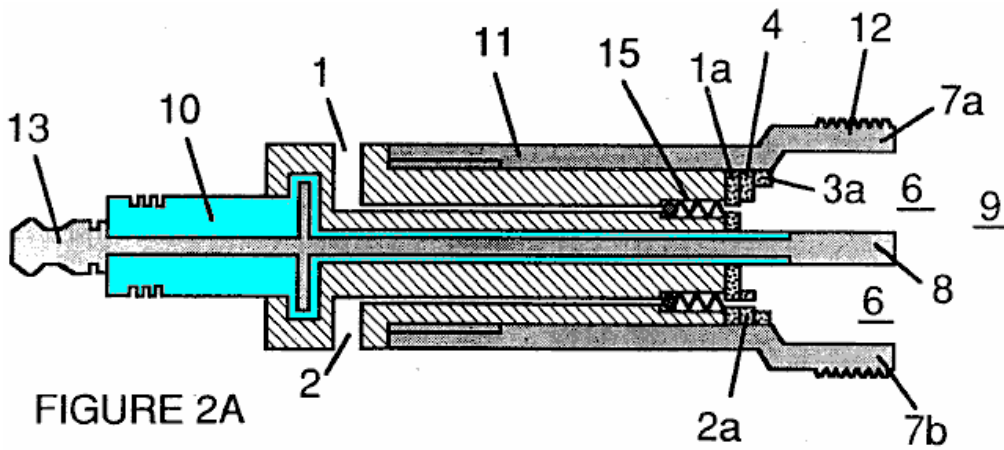


Fig.2B is a frontal view from the operative end.

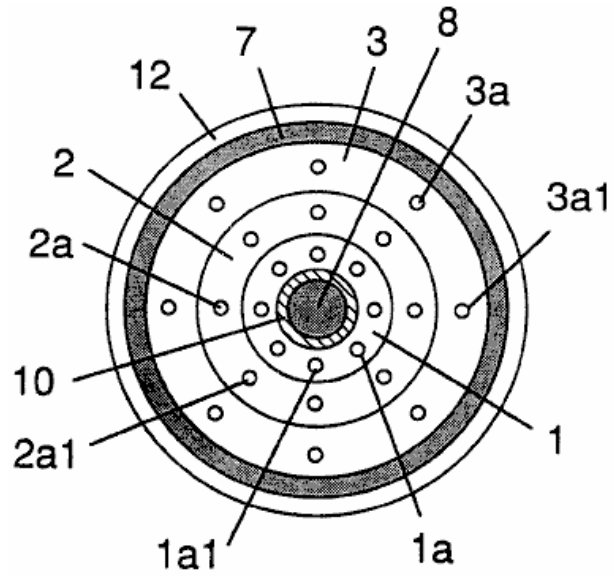


FIGURE 2B

Fig.2C is an exploded view of an individual injector.

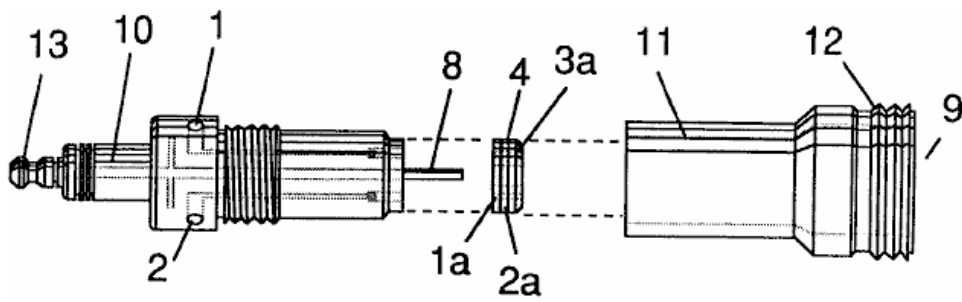


FIGURE 2C

Fig.3 and Fig.3A show the side and frontal cross-sectional views of an alternatively configured injector.

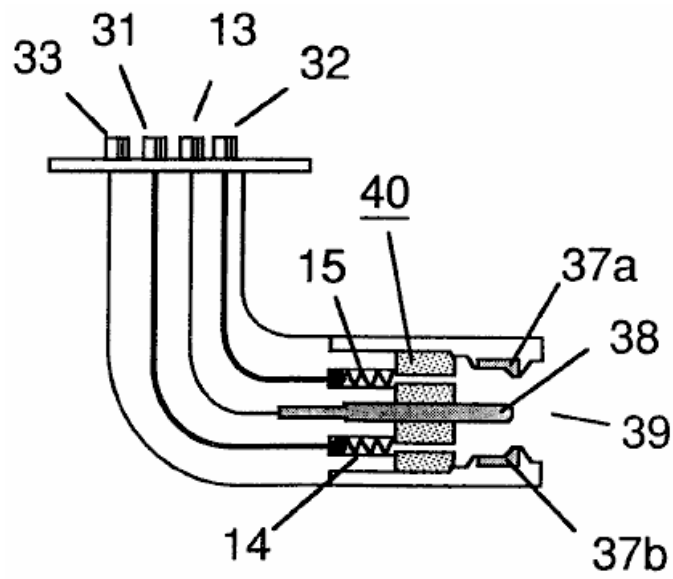


FIGURE 3

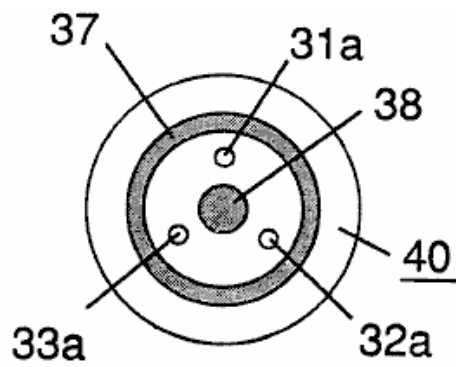


FIGURE 3A

Fig.4 shows a disk array of injectors.

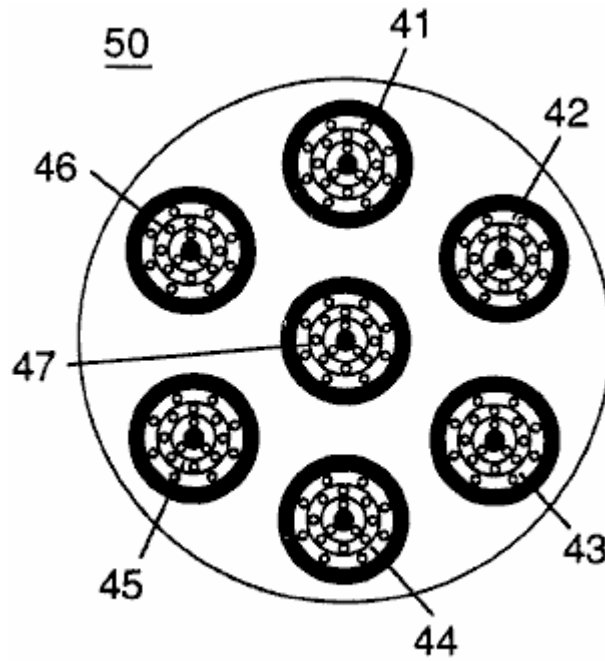


FIGURE 4

Fig.5 shows the resonance electrical circuit including the injector.

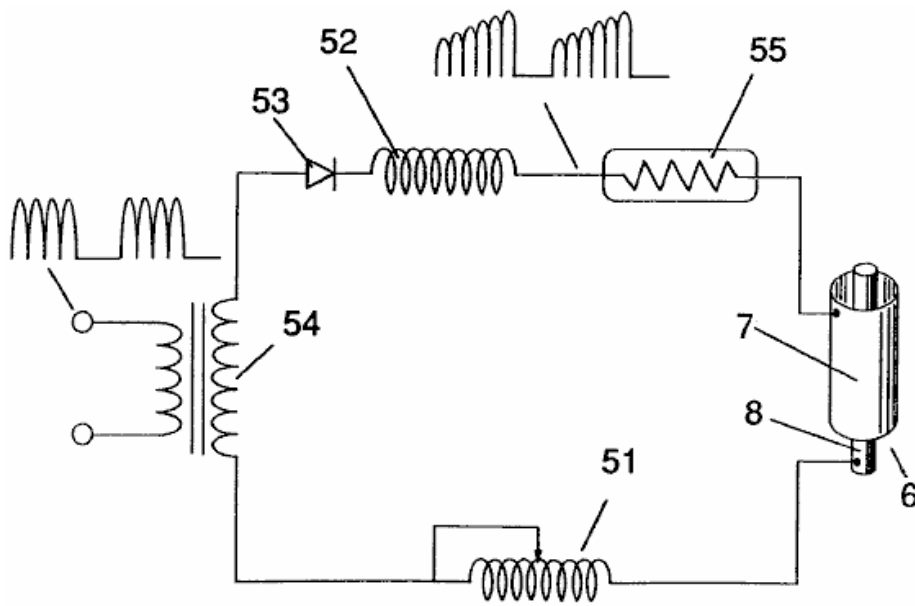
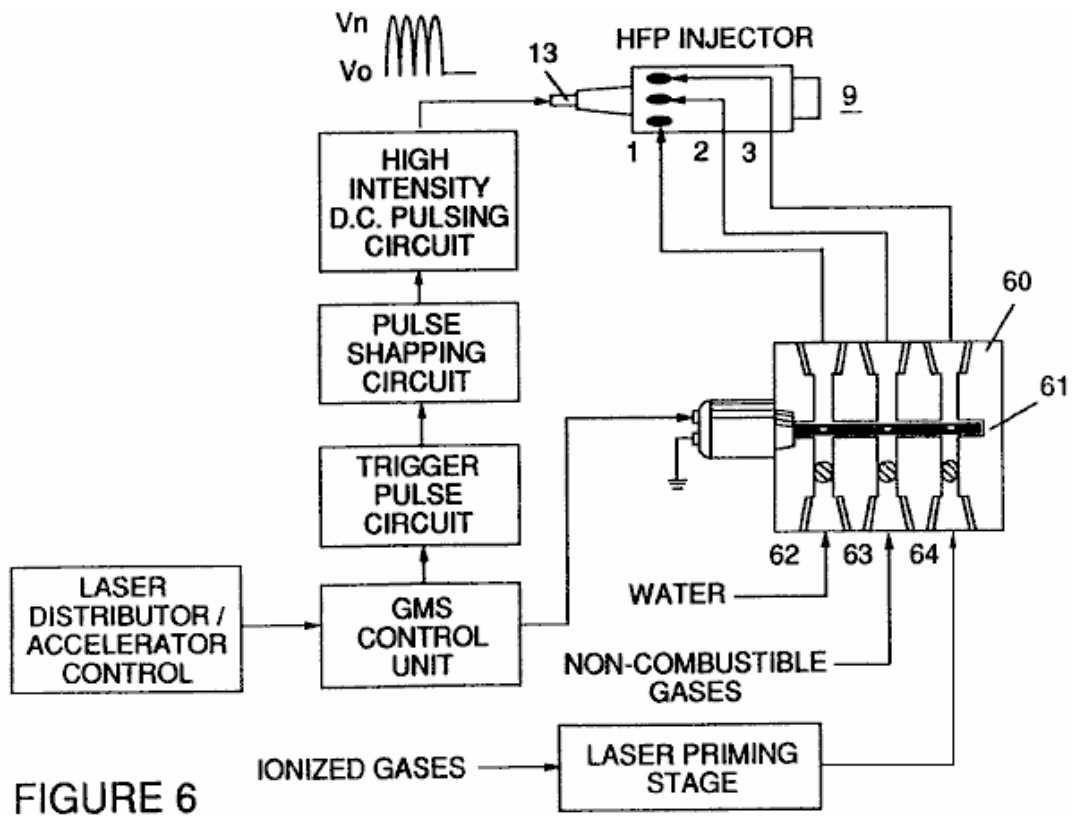
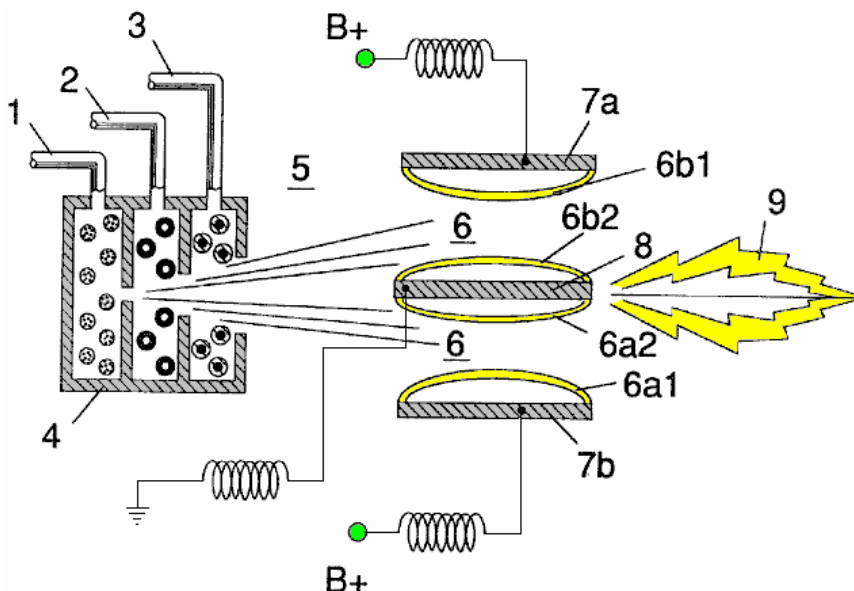


FIGURE 5

Fig.6 depicts the inter-relationship of the electrical and fuel distribution components of an injector system.



Although I refer to an "injector" in this document, the invention relates not only to the physical configuration of an injector apparatus, but also to the overall process and system parameters determined in the apparatus to achieve the release of thermal energy. In a basic outline, an injector regulates the introduction of process constituents into a combustion zone and sets up a fuel mixture condition permitting combustion. That combustion condition is triggered simultaneously with injector operation in real-time correspondence with control parameters for the process constituents.



In the fuel mixture condition which is created by the injector, water (H_2O) is atomised into a fine spray and mixed with 1 ionised ambient air gasses and 2 other non-combustible gasses such as nitrogen, argon and other rare gasses, and water vapour. (Exhaust gas produced by the combustion of hydrogen with oxygen is a non-combustible water vapour. This water vapour and other inert gasses resulting from combustion may be recycled from an exhaust outlet in the injector system, back into the input mixture of non-combustible gasses.) The fuel mix is introduced at a consistent flow rate maintained under a predetermined pressure.

In the triggering of the condition created by the injector, the conversion process described in my patent no. 4,936,961 and co-pending application serial no. 07/460,859 is set off spontaneously on a "micro" level in a predetermined reaction zone. The injector creates a mixture, under pressure in a defined zone of water, ionised gasses and non-combustible gasses. Pressure is an important factor in the maintenance of the reaction condition and causes the water/gas mixture to become intimately mixed, compressed and destabilised to produce combustion when activated under resonance conditions of ignition. In accordance with the earlier mentioned conversion process of my patent and application, when water is subjected to a resonance condition water molecules expand and distend; electrons are ejected from the water molecule and absorbed by ionised gasses and the water molecule, thus destabilised, breaks down into its elemental components of hydrogen (H₂) and oxygen (O) in the combustion zone. The hydrogen atoms released from the molecule provide the fuel source in the mixture for combustion with oxygen. The present invention is an application of that process and is outlined in Table 1:

Table 1

<u>Injector Mixture</u>	+	<u>Process conditions</u>	=	<u>Thermal Energy</u>
(1) Water Mist		(1) Release Under pressure into Combustion Zone		(1) Heat
and		and		or
(2) Ionised Gas		(2) Resonance utilising the dielectric property of water as a capacitor		(2) Internal Combustion Engine (Explosive force)
and		and		or
(3) Non-combustible Gas		(3) Unipolar pulsing at high voltage		(3) Jet Engine
				or
				(4) Other application

The process occurs as water mist and gasses under pressure are injected into, and intimately mixed in the combustion zone and an electrically polarised zone. In the electrically polarised zone, the water mixture is subjected to a unipolar pulsed direct current voltage which is tuned to achieve resonance in accordance with the electrical, mass and other characteristics of the mixture as a dielectric in the environment of the combustion zone. The resonant frequency will vary according to the injector configuration and depends upon the physical characteristics, such as the mass and volume of the water and gasses in the zone. As my prior patents and application point out, the resonant condition in the capacitive circuit is determined by the dielectric properties of water: (1) as the dielectric in a capacitor formed by adjacent conductive surfaces, and (2) as the water molecule itself is a polar dielectric material. At resonance, current flow in the resonant electrical circuit will be minimised and voltage will peak.

The injector system provides a pressurised fuel mixture for subjection to the resonant environment of the voltage combustion zone as the mixture is injected into the zone. In a preferred embodiment, the injector includes concentrically nested serial orifices, one for each of the three constituent elements of the fuel mixture. (It may be feasible to combine and process non-combustible and ionised gasses in advance of the injector. In this event, only two orifices are required, one for the water and the other for the combined gasses.) The orifices disperse the water mist and gasses under pressure into a conically shaped activation and combustion zone.

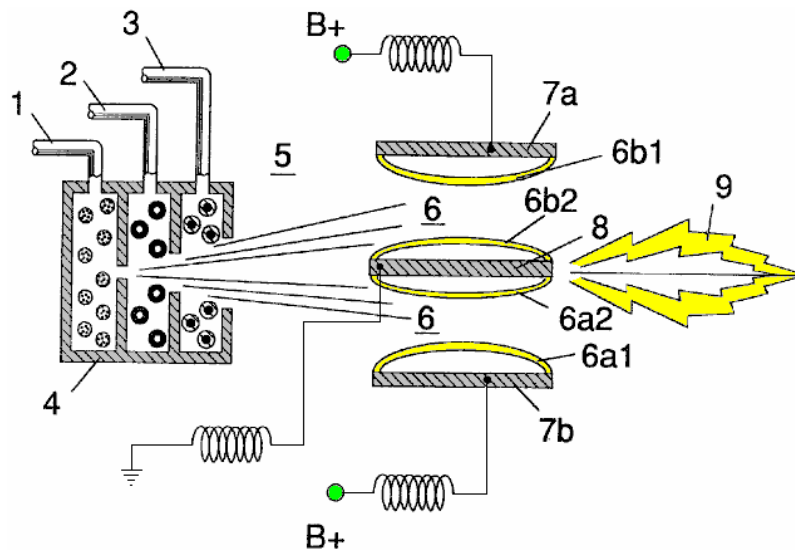
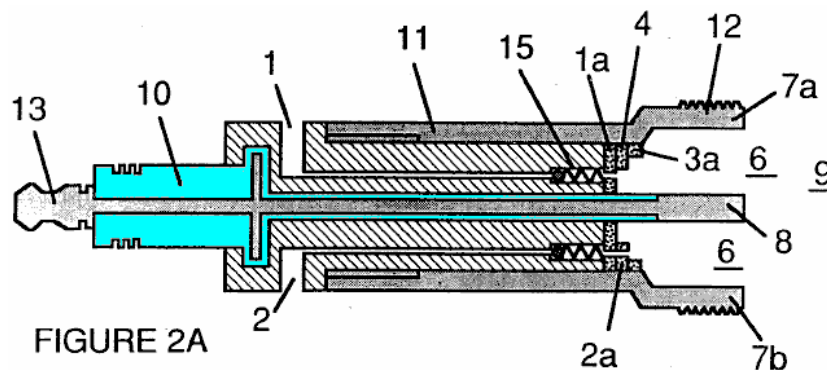


Fig1A shows a transverse cross-section of an injector, in which, supply lines for water **1**, ionised gas **2**, and non-combustible gas **3**, feed into a distribution disk assembly **4** which has concentrically nested orifices. The fuel mixture passes through a mixing zone **5**, and a voltage zone **6**, created by electrodes **7a** and **7b** (positive) and **8** (negative or ground). Electrical field lines are shown as **6a1** and **6a2** and **6b1** and **6b2**. Combustion (i.e. the oxidation of hydrogen) occurs in the zone **9**. Ignition of the hydrogen can be primed by a spark or may occur spontaneously as a result of the exceptionally high volatility of hydrogen and its presence in a high-voltage field.

Although the mixing zone, the voltage zone and the combustion zone are mentioned separately in this explanation, they are not in fact physically separated, as can be seen from **Fig.1**. In the zone(s), there is produced an “excited” mixture of vaporised water mist, ionised gasses and other non-combustible gasses, all of which have been instantaneously released from under high pressure. Simultaneously, the released mixture in the zone, is exposed to a pulsed voltage at a frequency corresponding to electrical resonance. Under these conditions, outer-shell electrons of atoms in the water molecule are de-stabilised and molecular time-share is interrupted. Thus, the gas mixture in the injector zone is subjected to physical, electrical and chemical interactive forces which cause a breakdown of the atomic bonding forces of the water molecule.



Process parameters are determined, based on the size of a particular injector. In an injector sized appropriately for use to provide a fuel mixture to a conventional cylinder in a passenger vehicle car engine, the injector may resemble a conventional spark plug. In such an injector, the water orifice is 0.1 to 0.15 inch in diameter; the ionised gas orifice is 0.15 to 0.2 inch in diameter, and the non-combustible gas orifice is 0.2 to 0.25 inch in diameter. In such a configuration, the serial orifices increase in size from the innermost orifice, as appropriate in a concentric configuration. As noted above, it is desirable to maintain the introduction of the fuel components at a constant rate. Maintaining a back-pressure of about 125 pounds per square inch for each of the three fuel gas constituents appears to be satisfactory for a “spark-plug” injector. In the pressurised environment of the injector, spring-loaded one-way check valves in each supply line, such as **14** and **15**, maintain pressure during pulse off times.

Voltage zone **6** surrounds the pressurised fuel mixture and provides an electrically charged environment of pulsed direct current in the range from about 500 to 20,000 volts and more, at a frequency tuned into the

resonant characteristic of the mixture. this frequency will typically lie within the range from about 20 KHz to about 50 KHz, dependent, as noted above, on the mass flow of the mixture from the injector and the dielectric property of the mixture. In a spark-plug sized injector, the voltage zone will typically extend longitudinally about 0.25 to 1.0 inch to permit sufficient dwell time of the water mist and gas mixture between the conductive surfaces **7** and **8** which form a capacitor so that resonance occurs at a high-voltage pulsed frequency, and combustion is triggered. In the zone, an energy wave which is related to the resonant pulse frequency, is formed. The wave continues to pulse through the flame in the combustion zone. The thermal energy produced is released as heat energy. In a confined zone such as a piston/cylinder engine, gas detonation under resonant conditions, produces explosive physical power.

In the voltage zone, the time-share ratio of the hydrogen and oxygen atoms comprising the individual water molecules in the water mist, is upset in accordance with the process explained in my patent no. 4,936,961 and application serial no. 07/460,859. Namely, the water molecule, which is itself a polar structure, is distended or distorted in shape by being subjected to the polar electric field in the voltage zone. The resonant condition induced in the molecule by the unipolar pulses, upsets the molecular bonding of shell electrons such that the water molecule, at resonance, breaks apart into its constituent atoms. In the voltage zone, the water molecules are excited into an ionised state, and the pre-ionised gas component of the fuel mixture, captures the electrons released from the water molecule. In this manner, at the resonant condition, the water molecule is destabilised and the constituent atomic elements of the molecule 2H and O, are released and the released hydrogen atoms are available for combustion. the non-combustible gasses in the fuel mixture, reduce the burn rate of hydrogen to that of a hydrocarbon fuel such as gasoline (petrol) or kerosene (paraffin), from its normal burn rate which is about 2.5 times that of gasoline. Hence the presence of non-combustible gasses in the fuel mixture, moderates the energy release and the rate at which the free hydrogen and oxygen molecules combine in the combustion process.

The combustion process does not occur spontaneously so the conditions in the zone must be fine-tuned carefully to achieve an optimum input flow rate for water and the gasses corresponding to the maintenance of a resonant condition. The input water mist and gasses may likewise be injected into the zone in a physically pulsed (on/off) manner corresponding to the resonance achieved. In an internal combustion engine, the resonance of the electrical circuit and the physical pulsing of the input mixture may be required to be related to the combustion cycle of the reciprocating engine. In this regard, one or two conventional spark plugs may require a spark cycle tuned in correspondence to the conversion cycle resonance, so that combustion of the mixture will occur. Thus, the input flow, conversion rate and combustion rate are interrelated and optimally, each should be tuned in accordance with the circuit resonance at which conversion occurs.

The injection system of the present invention is suited to retrofit applications in conventionally fuelled gasoline and diesel internal combustion engines and conventionally fuelled jet aircraft engines.

Example 1

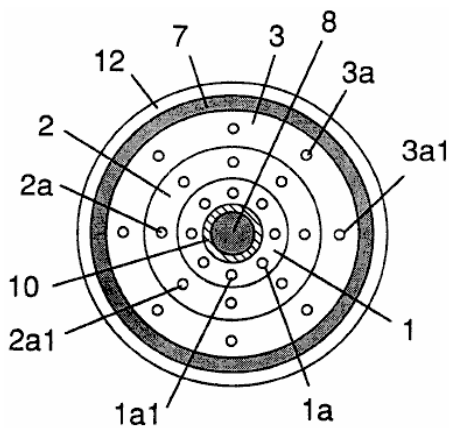


FIGURE 2B

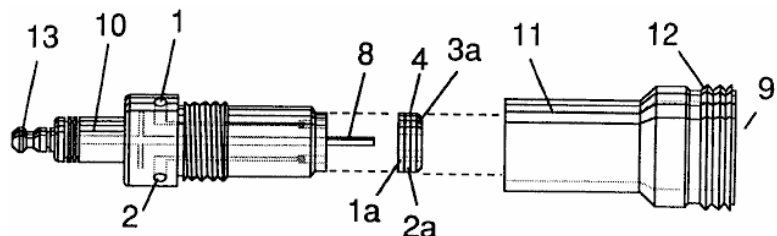


FIGURE 2C

Figs 2A, 2B and 2C illustrate a type of injector useful, among other things, as a fuel source for a conventional internal combustion engine. In the cross-section of **Fig.2A**, reference numerals corresponding to the identifying numerals used in **Fig.1** show a supply line for water **1**, leading to first distribution disc **1a** and supply line for ionised gas **2**, leading to second distribution disc **2a**. In the cross-section, the supply line

for non-combustible gas **3** leading to distribution disc **3a**, is not illustrated, however, its location as a third line should be self evident. The three discs comprise distribution disc assembly **4**. The supply lines are formed in an electrically insulating body **10**, surrounded by electrically conductive sheath/housing **11** having a threaded end segment **12**.

A central electrode **8**, extends the length of the injector. Conductive elements **7a** and **7b** (**7a** and **7b** depict opposite sides of the diameter in the cross-section of a circular body), adjacent threaded section **12** and electrode **8**, form the electrical polarisation zone **6** adjacent to combustion zone **9**. An electrical connector **13** may be provided at the other end of the injector. (In this document, the term "electrode" refers to the conductive surface of an element forming one side of a capacitor.) In the frontal view of **Fig.2B**, it is seen that each disc making up the distribution disc assembly **9**, includes a plurality of micro-nozzles **1a1**, **2a1**, **3a1**, etc. for the injection of the water and gasses into the polarisation/voltage and combustion zones. The exploded view of **Fig.2C** shows another view of the injector and additionally depicts two supply line inlets **1** and **2**, the third not being shown because of the inability of representing the uniform 120° separation of three lines in a two-dimensional drawing.

In the injector, water mist (forming droplets in the range, for example, of from 10 to 250 microns and above, with size being related to voltage intensity) is injected into the fuel-mixing and polarising zone by way of water spray nozzles **1a1**. The tendency of water to form a "bead" or droplet is a parameter related to droplet mist size and voltage intensity. Ionised air gasses and non-combustible gasses, introduced through nozzles **2a1** and **3a1**, are intermixed with the expelling water mist to form a fuel-mixture which enters into voltage zone **6** where the mixture is exposed to a pulsating, unipolar, high-intensity voltage field (typically 20,000 volts at 50 Hz or above, at the resonant condition in which current flow in the circuit (amps) is reduced to a minimum) created between electrodes **7** and **8**.

Laser energy prevents discharge of the ionised gasses and provides additional energy input into the molecular destabilisation process which occurs at resonance. It is preferable that the ionised gasses be subjected to laser (photonic energy) activation prior to their introduction into the zone(s); although, for example, a fibre optic conduit may be useful to channel photonic energy directly into the zone. However, heat generated in the zone may affect the operability of such an alternate configuration. The electrical polarisation of the water molecule and a resonant condition occurs to destabilise the molecular bonding of the hydrogen and oxygen atoms. Combustion energy is then released by spark ignition.

To ensure proper flame projection and subsequent flame stability, pumps for the ambient air, non-combustible gas and water, introduce these components to the injector under static pressure up to and beyond 125 pounds per square inch.

Flame temperature is regulated by controlling the volume flow-rate of each fluid-media in direct relationship to applied voltage intensity. To elevate flame temperature, fluid displacement is increased while the volume flow rate of non-combustible gasses is maintained or reduced and the applied voltage amplitude is increased. To lower flame temperature, the fluid flow rate of non-combustible gasses is increased and pulse voltage amplitude is lowered. To establish a predetermined flame temperature, the fluid media and applied voltage are adjusted independently. The flame-pattern is further maintained as the ignited, compressed, and moving gasses are projected under pressure from the nozzle ports in distribution disc assembly **4** and the gas expands in the zone and is ignited.

In the voltage zone, several functions occur simultaneously to initiate and trigger thermal energy yield. Water mist droplets are exposed to high intensity pulsating voltage fields in accordance with an electrical polarisation process which separates the atoms of the water molecule and causes the atoms to experience electron ejection. The polar nature of the water molecule which facilitates the formation of minute droplets in the mist, appears to cause a relationship between the droplet size and the voltage required to effect the process, i.e. the greater the droplet size, the higher the voltage required. The liberated atoms of the water molecule interact with laser-primed ionised ambient air gasses to cause a highly energised and destabilised mass of combustible gas atoms to ignite thermally. Incoming ambient air gasses are laser primed and ionised when passing through a gas processor, and an electron extraction circuit (**Fig.5**) captures and consumes in sink **55**, ejected electrons, and prevents electron flow into the resonant circuit.

In terms of performance, reliability and safety, ionised air gasses and water fuel liquid do not become volatile until the fuel mixture reaches the voltage and combustion zones. Injected non-combustible gasses retard and control the combustion rate of hydrogen during gas ignition.

In alternate applications, laser-primed ionised liquid oxygen and laser-primed liquid hydrogen stored in separate fuel tanks, can be used in place of the fuel mixture, or liquefied ambient air gasses alone with water can be substituted as a fuel source.

The injector assembly is design variable and is retro-fittable to fossil fuel injector ports conventionally used in jet/rocket engines, grain dryers, blast furnaces, heating systems, internal combustion engines and the like.

Example 2

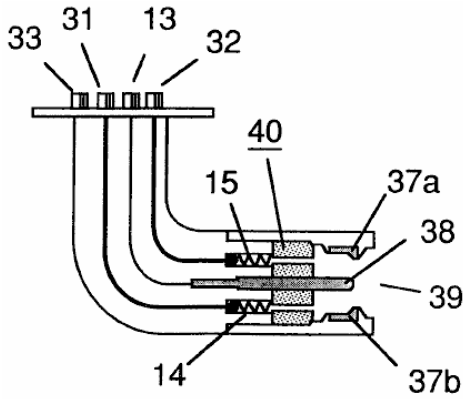


FIGURE 3

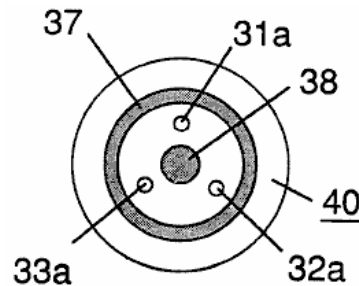


FIGURE 3A

A flange-mounted injector is shown in cross-section in **Fig.3** which shows the fuel mixture inlets and illustrates an alternative three-nozzle configuration leading to the polarisation (voltage) and combustion zones in which one nozzle **31a**, **32a** and **33a** is provided for each of the three gas mixtures, and connected to supply lines **31** and **32** (**33** is not shown). Electrical polarisation zone **36** is formed between electrode **38** and surrounding conductive shell **37**. The capacitive element of the resonant circuit is formed when the fuel mixture, acting as a dielectric, is introduced between the conductive surfaces of **37** and **38**. **Fig.3A** is a frontal view of the operative end of the injector.

Example 3

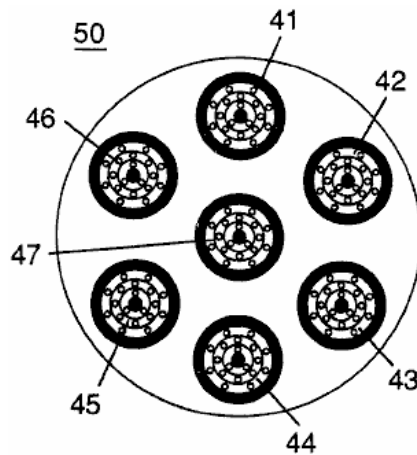


FIGURE 4

Multiple injectors may be arranged in a gang as shown in **Fig.4** in which injectors **40**, **41**, **42**, **43**, **44**, **45**, **46**, **47**, **48** and **49** are arranged concentrically in an assembly **50**. Such a ganged array is useful in applications having intensive energy requirements such as jet aircraft engines and blast furnaces.

Example 4

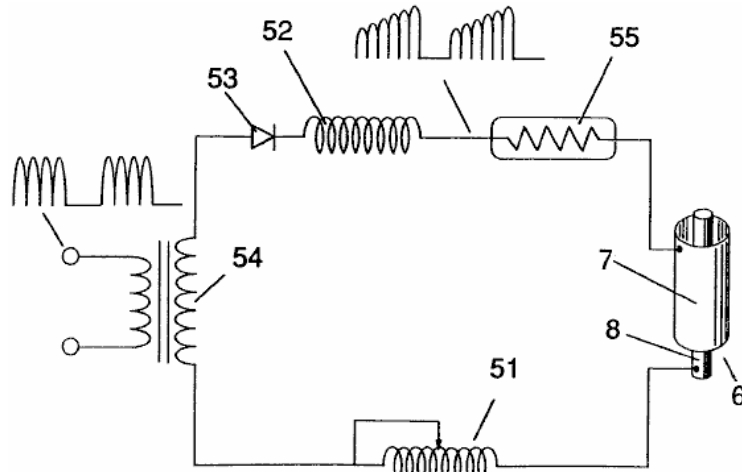


FIGURE 5

The basic electrical system utilised in the invention is depicted in **Fig.5** showing the electrical polarisation zone **6** which receives and processes the water and gas mixture as a capacitive circuit element in a resonant charging circuit formed by inductors **51** and **52** connected in series with diode **53**, pulsed voltage source **54**, electron sink **55** and zone **6** formed from conductive elements **7** and **8**. In this manner, electrodes **7** and **8** in the injector, form a capacitor which has electrical characteristics dependent on the dielectric media (e.g. the water mist, ionised gasses and non-combustible gasses) introduced between the conductive elements. Within the macro-dielectric media, however, the water molecules themselves, because of their polar nature, can be considered micro-capacitors.

Example 5

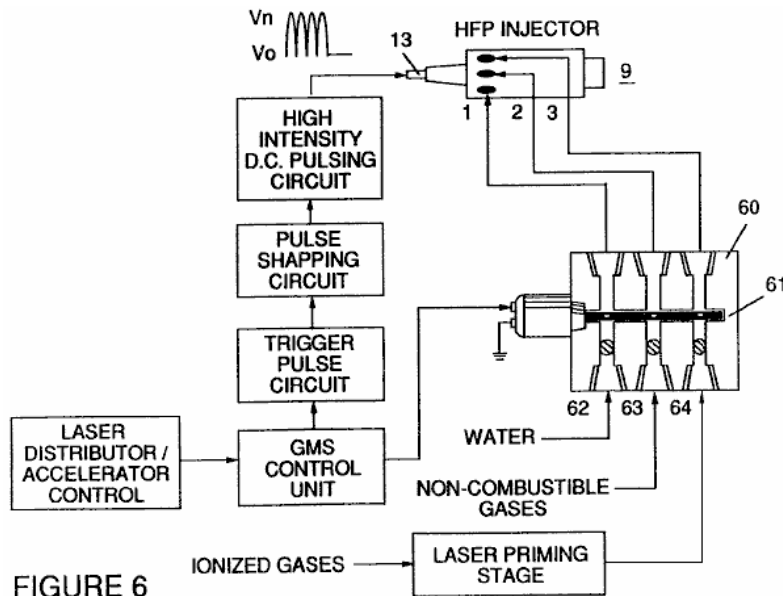


FIGURE 6

Fuel distribution and management systems useful with the injector of this application are described in my co-pending applications for patent; PCT/US90/6513 and PCT/US90/6407.

A distribution block for the assembly is shown in **Fig.6**. In **Fig.6** the distribution block pulses and synchronises the input of the fuel components in sequence with the electrical pulsing circuit. The fuel components are injected into the injector ports in synchronisation with the resonant frequency, to enhance the energy wave pulse extending from the voltage zone through the flame. In the configuration of **Fig.6**, the electrical system is interrelated to distribution block **60**, gate valve **61** and separate passageways **62**, **63** and **64** for fuel components. The distributor produces a trigger pulse which activates a pulse-shaping circuit that

forms a pulse having a width and amplitude determined by resonance of the mixture and establishes a dwell time for the mixture in the zone to produce combustion..

As in my referenced application regarding control and management and distribution systems for a hydrogen-containing fuel gas produced from water, the production of hydrogen gas is related to pulse frequency on/off time. In the system shown in **Fig.6**, the distributor block pulses the fluid media introduced to the injector in relationship to the resonant pulse frequency of the circuit and to the operational on/off gate pulse frequency. In this manner, the rate of water conversion (i.e. the rate of fuel produced by the injector) can be regulated and the pattern of resonance in the flame controlled.