A Practical Guide to 'Free Energy' Devices

Part 19: Last updated: 28th January 2006 Author: Patrick J. Kelly

Please note that this is a re-worded excerpt from this patent. It describes one method for using hydrogen and oxygen gases to fuel a standard vehicle engine.

United States Patent 4,389,981 28th June 1983 Inventor: Stanley A. Meyer

HYDROGEN GAS INJECTOR SYSTEM FOR INTERNAL COMBUSTION ENGINES

ABSTRACT:

System and apparatus for the controlled intermixing of a volatile hydrogen gas with oxygen and other non-combustible gasses in a combustion system. In a preferred arrangement the source of volatile gas is a hydrogen source, and the non-combustible gasses are the exhaust gasses of the combustion system in a closed loop arrangement. Specific structure for the controlled mixing of the gasses, the fuel flow control, and safety are disclosed.

CROSS REFERENCES AND BACKGROUND:

There is disclosed in my co-pending U.S. patent application Serial No. 802,807 filed Sept. 16, 1981 for a Hydrogen-Generator, a generating system converting water into hydrogen and oxygen gasses. In that system and method the hydrogen atoms are dissociated from a water molecule by the application of a non-regulated, non-filtered, low-power, direct current voltage electrical potential applied to two non-oxidising similar metal plates having water passing between them. The sub-atomic action is enhanced by pulsing this DC voltage. The apparatus comprises structural configurations in alternative embodiments for segregating the generated hydrogen gas from the oxygen gas.

In my co-pending patent application filed May 5, 1981, U.S. Serial No. 262,744 now abandoned for Hydrogen-Airdation Processor, non-volatile and non-combustible gasses are controlled in a mixing stage with a volatile gas. The hydrogen airdation processor system utilises a rotational mechanical gas displacement system to transfer, meter, mix, and pressurise the various gasses. In the gas transformation process, ambient air is passed through an open flame gas-burner system to eliminate gasses and other substances present. After that, the non-combustible gas-mixture is cooled, filtered to remove impurities, and mechanically mixed with a pre-determined amount of hydrogen gas. This results in a new synthetic gas.

This synthetic gas-formation stage also measures the volume and determines the proper gas-mixing ratio for establishing the desired burn-rate of hydrogen gas. The rotational mechanical gas displacement system in that process determines the volume of synthetic gas to be produced.

The above-noted hydrogen airdation processor, of my co-pending application, is a multi-stage system suited to special applications. Whereas the hydrogen generator system of my other mentioned co-pending application does disclose a very simple and unique hydrogen generator.

In my co-pending patent application Serial No. 315,945, filed Oct. 18, 1981 there is disclosed a combustion system incorporating a mechanical drive system. In one instance, this is designed to drive a piston in an automotive device. There is shown a hydrogen generator for developing hydrogen gas, and perhaps other non-volatile gasses such as oxygen and nitrogen. The hydrogen gas with the attendant non-volatile gasses is fed via a line to a controlled air intake system. The combined hydrogen, non-volatile gasses, and the air, after inter-mixing, are fed to a combustion chamber where they are ignited. The exhaust gasses of the combustion chamber are returned in a closed loop arrangement to the mixing chamber to be used again as the non-combustible gas component. Particular applications and structural embodiments of the system are disclosed.

SUMMARY OF INVENTION:

The system of the present invention in its most preferred embodiment is for a combustion system utilising hydrogen gas; particularly to drive the pistons in an car engine. The system utilises a hydrogen generator for developing hydrogen gas. The hydrogen gas and other non-volatile gasses are then fed, along with oxygen, to a mixing chamber. The mixture is controlled in such a way as to lower the temperature of the combustion to bring it in line with that of the currently existing commercial fuels. The hydrogen gas feed line to the combustion chamber includes a fine linear control gas flow valve. An air intake is the source of oxygen and it also includes a variable valve. The exhaust gasses from the combustion chamber are utilised in a controlled manner as the non-combustible gasses.

The hydrogen generator is improved by the inclusion of a holding tank which provides a source of start-up fuel. Also, the hydrogen gas generator includes a pressure-controlled safety switch on the combustion chamber which disconnects the input power if the gas pressure rises above the required level. The simplified structure includes a series of one-way valves, safety valves, and quenching apparatus. The result is an apparatus which comprises the complete assembly for converting a standard car engine from petrol (or other fuels) to use a hydrogen/gas mixture.

OBJECTS:

It is accordingly a principal object of the present invention to provide a combustion system of gasses combined from a source of hydrogen and non-combustible gasses.

Another object of the invention is to provide such a combustion system that intermixes the hydrogen and non-combustible gasses in a controlled manner and thereby control the combustion temperature.

A further object of the invention is to provide such a combustion system that controls the fuel flow to the combustion chamber in s system and apparatus particularly adapted to hydrogen gas.

Still other objects and features of the present invention will become apparent from the following detailed description when taken in conjunction with the drawings in which:

BRIEF DESCRIPTION OF DRAWINGS:

Fig.1 is a mechanical schematic illustration partly in block form of the present invention in its most preferred embodiment.

FIG. 1.

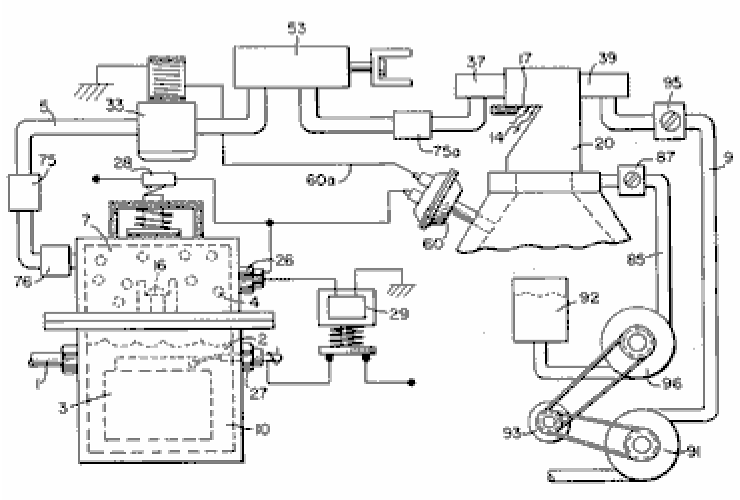


Fig.2 is a block schematic illustration of the preferred embodiment of the hydrogen injector system shown in Fig.1.

FIG. 2.

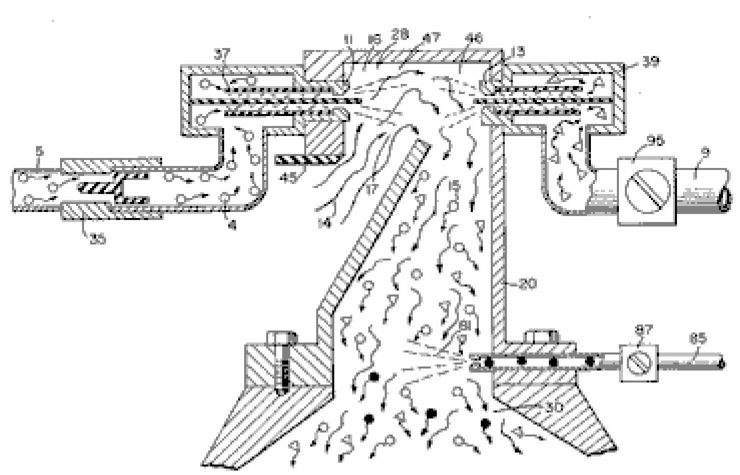


Fig.3 is the fine linear fuel flow control shown in Fig.1.

FIG. 3.

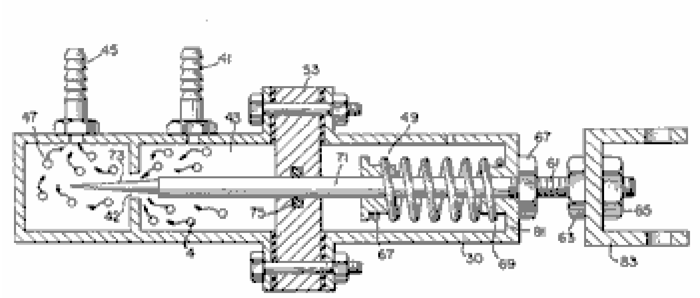


Fig.4 is cross-sectional illustration of the complete fuel injector system in an car utilising the concepts of the present invention.

FIG. 4.

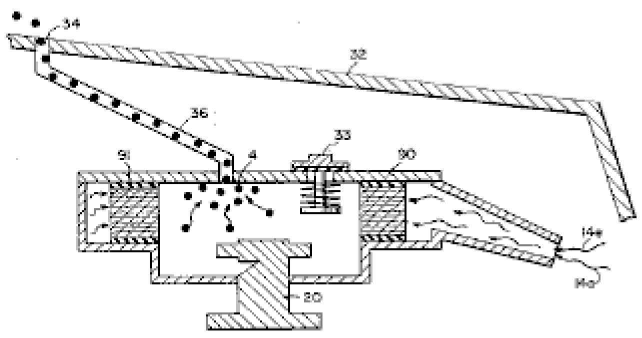


Fig.5 is a schematic drawing in a top view of the fuel injector system utilised in the preferred embodiment.

FIG. 5.

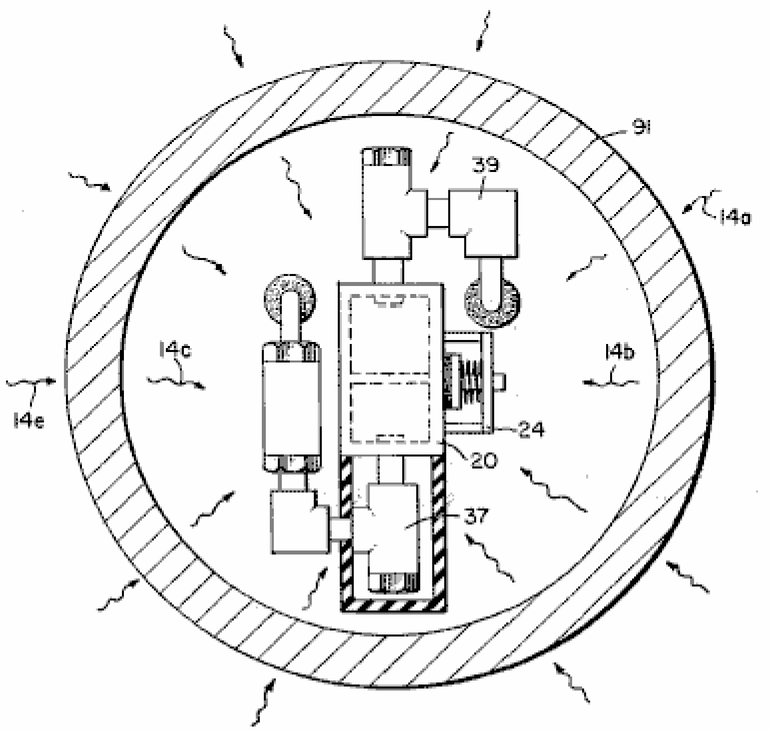


Fig.6 is a cross-sectional side view of the fuel injector system in the present invention.

FIG. 6.

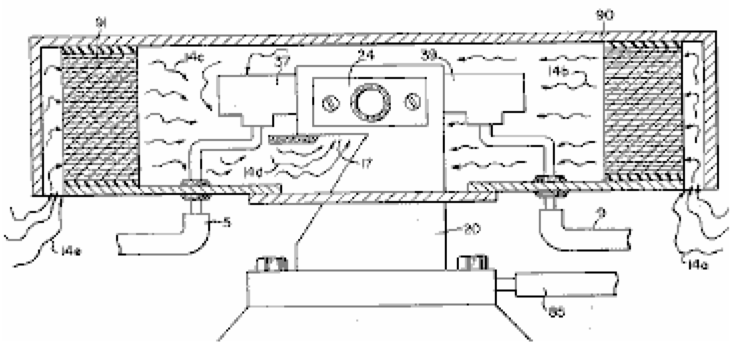


Fig.7 is a side view of the fuel mixing chamber.

FIG. 7.

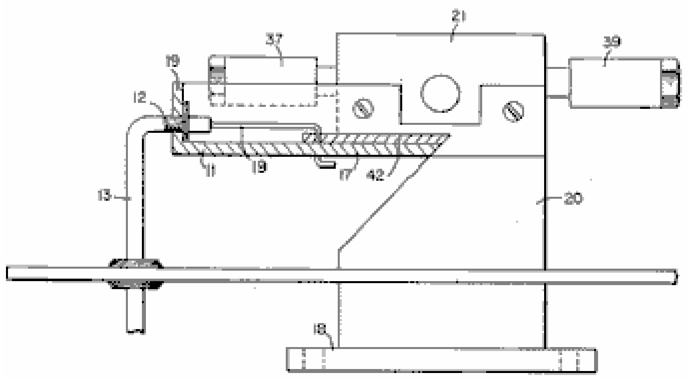


Fig.8 is a top view of the air intake valve to fuel mixing chamber.

FIG. 8.

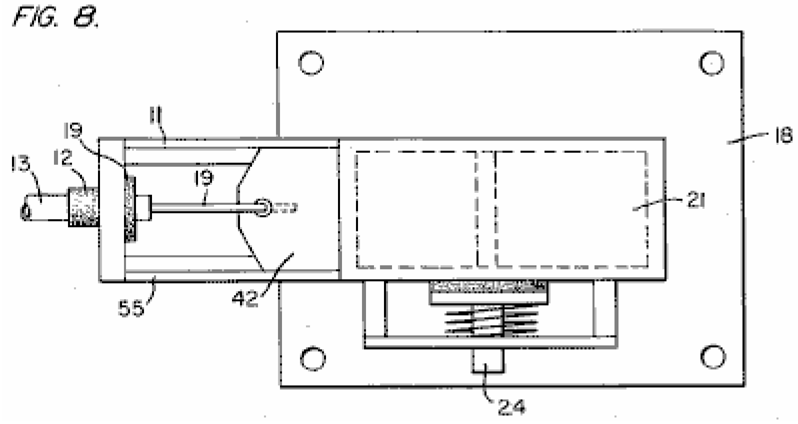
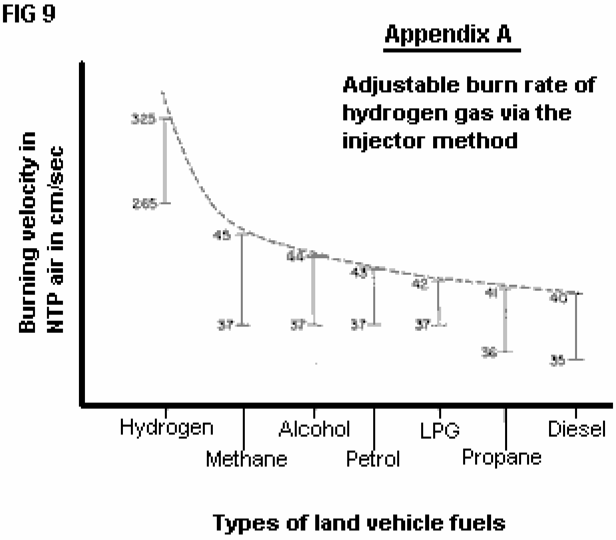


Fig.9 is a comparison of the burning velocity of hydrogen with respect to other fuels.

FIG 9



DETAILED DESCRIPTION OF INVENTION TAKEN WITH DRAWINGS:

Referring to **Fig.1** the complete overall gas mixing and fuel flow system is illustrated together for utilisation in a combustion engine, particularly an engine in a car. With specific reference to **Fig.1**, the hydrogen source **10** is the hydrogen generator disclosed and described in my co-pending application, supra. The container **10** is an enclosure for a water bath **2**. Immersed in the water **2** is an array of plates **3** as further described in my co-pending application, supra. Applied to plates **3** is a source of direct current potential via electrical inlet **27**. The upper portion **7** of the container **10** is a hydrogen storage area maintaining a predetermined amount of pressure. In this way, there will be an immediate flow of hydrogen gas at start-up.

To replenish the expended water, the generator provides a continuous water source **1**. Thereafter, the generator is operable as described in the aforesaid patent application. The safety valve **28** is designed to rupture should there be an excessive build-up of gas. Switch **26** is a gas-pressure switch included to maintain a predetermined gas pressure level about a regulated low-volume.

The generated hydrogen gas **4** is fed from the one-way check valve **16** via pipe **5** to a gas-mixing chamber **20**, where the hydrogen gas is mixed with non-combustible gasses via pipe **9** from a source described later.

If the one-way valve **75** failed, there could be a return spark which could ignite the hydrogen gas **4** in the storage area **7** of the hydrogen generator **10**. To prevent this, the quenching assembly **76** has been included to prevent just such an ignition.

With particular reference to **Fig.2,** the hydrogen gas (via pipe **5**) and non-combustible gasses (via pipe **9**), are fed to a carburettor (air-mixture) system **20** also having an air intake **14** for ambient air.

The hydrogen gas **4** is fed via line **5** through nozzle **11** in a spray **16** in to the trap area **46** of the mixing chamber **20**. Nozzle **11** has an opening smaller than the plate openings in the quenching assembly **37**, thereby preventing flash-back in the event of sparking. The non-volatile gasses are injected into mixing chamber **20** trap area **47** in a jet spray **17** via nozzle **13**. Quenching assembly **39** is operable much in the same manner as quenching assembly **37**.

In the preferred arrangement, the ambient air is the source of oxygen necessary for the combustion of the hydrogen gas. Further, as disclosed in the aforesaid co-pending application, the non-volatile gasses are in fact, the exhaust gasses passed back via a closed loop system. It is to be understood that the oxygen and/or the non-combustible gasses might also be provided from an independent source.

With continued reference to **Fig.2** the gas trap area **47** is a predetermined size. As hydrogen is lighter than air, the hydrogen will rise and become trapped in area **47**. Area **47** is large enough to contain enough hydrogen gas to allow instant ignition upon the subsequent start-up of the combustion engine.

It will be noted that the hydrogen gas is injected in the uppermost region of the trap area **47**. Hydrogen rises at a much greater rate than oxygen or the non-combustible gasses; perhaps three times or greater. Therefore, if the hydrogen gas entered the trap area **47** (mixing area) at its lowermost region the hydrogen gas would rise so rapidly that the air could not mix with the oxygen. With the trap area **47** shown in **Fig.2**, the hydrogen is forced downwards into the air intake **15**. That is, the hydrogen gas is forced downwards into the upwardly forced air and this causes adequate mixing of the gasses.

The ratio of the ambient air (oxygen) **14** and the non-combustible gas via line **9** is a controlled ratio which is tailored to the particular engine. Once the proper combustion rate has been determined by the adjustment of valve **95** (for varying the amount of the non-combustible gas) and the adjustment of valve **45** (for varying the amount of the ambient air), the ratio is maintained thereafter.

In a system where the non-combustible gasses are the exhaust gasses of the engine itself, passed back through a closed loop-arrangement, and where the air intake is controlled by the engine, the flow velocity and hence the air/non-combustible mixture, is maintained by the acceleration of the engine.

The mixture of air with non-combustible gasses becomes the carrier for the hydrogen gas. That is, the hydrogen gas is mixed with the air/non-combustible gas mixture. By varying the amount of hydrogen gas added to the air/non-combustible mixture, the engine speed is controlled.

Reference is made to **Fig.3** which shows in a side view cross-section, the fine linear fuel flow control **53**. The hydrogen gas **4** enters chamber **43** via gas inlet **41**. The hydrogen gas passes from chamber **43** to chamber **47** via port or opening **42**. The amount of gas passing form chamber **43** to chamber **47** is dictated by the setting of the port opening **42**.

The port opening is controlled by inserting the linearly tapered pin **73** into it. The blunt end of pin **73** is fixed to rod **71**. Rod **71** is passed, (via supporting O-ring **75**), through opening **81** in housing **30**, to the manual adjustment mechanism **83**.

Spring **49** retains the rod **71** in a fixed position relative to pin **73** and opening **42**. When mechanism **83** is operated, pin **73** moves back from the opening **42**. As pin **73** is tapered, this backward movement increases the free area of opening **42**, thereby increasing the amount of gas passing from chamber **43** to chamber **47**.

The stops **67** and **69** maintain spring **49** in its stable position. The nuts **63** and **67** on threaded rod **61** are used to set the minimum open area of opening **42** by the correct positioning of pin **73**. This minimum opening setting, controls the idle speed of the engine, so pin **73** is locked in its correct position by nuts **63** and **67**. This adjustment controls the minimum rate of gas flow from chamber **43** to chamber **47** which will allow continuous operation of the combustion engine.

Referring now to **Fig.8** which illustrates the air adjustment control for manipulating the amount of air passing into the mixing chamber **20**. The closure **21** mounted on plate **18** has an opening **17** on end **11**. A plate-control **42** is mounted so as to slide over opening **17**. The position of this plate, relative to opening **17**, is controlled by the position of the control rod **19** which passes through grommet **12** to control line **13**. Release valve **24** is designed to rupture should any malfunction occur which causes the combustion of the gasses in mixing chamber **20**.

With reference now to **Fig.4**, if hydrogen gas **4** were to accumulate in mixing chamber **20** and reach an excessive pressure, the escape tube **36** which is connected to port **34** (located on the car bonnet **32**), permits the excess hydrogen gas to escape safely to the atmosphere. In the event of a malfunction which causes the combustion of the gasses in mixing chamber **20**, the pressure relief valve **33** will rupture, expelling the hydrogen gas without combustion.

In the constructed arrangement of **Fig.1**, there is illustrated a gas control system which may be fitted to an existing car's internal combustion engine without changing or modifying the car's design parameters or characteristics. The flow of the volatile hydrogen gas is, of course, critical; therefore, there is incorporated in line **5** a gas-flow valve **53**, and this is used to adjust the hydrogen flow. This gas-flow valve is shown in detail in **Fig.3**.

The intake air **14** may be in a carburettor arrangement with an intake adjustment **55** which adjusts the plate **42** opening. This is shown more fully in **Fig.8**. To maintain constant pressure in hydrogen gas storage **7** in the on-off operation of the engine, the gas flow control valve is responsive to the electrical shut-off control **33**. The constant pressure permits an abundant supply of gas on start-up and during certain periods of running time in re-supply.

The switch **33** is in turn responsive to the vacuum control switch **60**. During running of the engine vacuum will be built up which in turn leaves switch **33** open by contact with vacuum switch **60** through lead **60a**. When the engine is not running the vacuum will decrease to zero and through switch **60** will cause electrical switch **33** to shut off cutting off the flow of hydrogen gas to the control valve **53**.

As low-voltage direct current is applied to safety valve **28**, solenoid **29** is activated. The solenoid applies a control voltage to the hydrogen generator exciter **3** via terminal **27** through pressure switch **26**. As the electrical power activates solenoid **29**, hydrogen gas is caused to pass through flow adjustment valve **16** and then outlet pipe **5** for utilisation. The pressure differential hydrogen gas output to gas mixing chamber **20** is for example 30 lbs. to 15 lbs. Once hydrogen generator **10** reaches an optimum gas pressure level, pressure switch **26** shuts off the electrical power to the hydrogen excitors. If the chamber pressure exceeds a predetermined level, the safety release valve **28** is activated disconnecting the electrical current and thereby shutting down the entire system for safety inspection.

With particular reference now to **Fig.6** which illustrates the fuel injector system in a side cross-sectional view and to **Fig.5** the top view. The structural apparatus incorporated in the preferred embodiment comprises housing **90** which has air intakes **14a** and **14e**. The air passes through filter **91** around the components **14b** and **14c** and then to intake **14d** of the mixing chamber **20**. The hydrogen enters via line **5** via quenching plates **37** and into the mixing chamber **20**. The non-volatile gasses pass via line **9** to the quenching plates **39** and into the mixing chamber **20**.

Fig.7 illustrates the mechanical arrangement of the components which make up the overall structure of mixing chamber **20** (shown independently in the other figures).

Returning to **Fig.1** there is illustrated the non-volatile gas line **9** passing through mixture pump **91** by engine pulley **93**. Valve **95** controls the rate of flow. Also driven by pulley **93** is pump **96** having line **85** connected to an oil reservoir **92** and valve **87** and finally to mixing chamber **20**. As a practical matter, such as in a non-oil lubricated engine, lubricating fluid such as oil **81** is sprayed in the chamber **20**, via oil supply line **85** for lubrication.

There have been several publications in the past year or so, delving into the properties of Hydrogen gas, its potential use, generating systems, and safety. One such publication is "Selected Properties of Hydrogen" (Engineering Design Data) issued February 1981 by the National Bureau of Standards.

These publications are primarily concerned with the elaborate and costly processes for generating hydrogen. Equally so, they are concerned with the very limited use of hydrogen gas because of its extremely high burning velocities. This in turn reflects the danger in the practical use of hydrogen.

With reference to the graph of the Appendix A, it is seen that the burning velocities of alcohol, propane, methane, petrol, Liquid Petroleum Gas, and diesel oil are in the range of minimum 35 to maximum 45. Further, the graph illustrates that the burning velocity of hydrogen gas is in the range of 265 minimum to 325 maximum. In simple terms, the burning velocity of hydrogen is of the order of 7.5 times the burning velocity of ordinary commercial fuels.

Because of the unusually high burning velocity of hydrogen gas, it has been ruled out as a substitute fuel, by these prior investigators. Further, even if an engine could be designed to accommodate such high burning velocities, the danger of explosion would eliminate any thoughts of commercial use.

The present invention, as above described, has resolved the above-noted criteria for the use of hydrogen gas in a standard commercial engine. Primarily, the cost in the generation of hydrogen gas, as noted in the aforementioned co-pending patent applications, is minimal. Water with no chemicals or metals is used. Also, as noted in the aforementioned co-pending patent applications, the reduction in the hydrogen gas burn velocity has been achieved. These co-pending applications not only teach the reduction in velocity, but teach the control of the velocity of the hydrogen gas.

In the preferred embodiment, practical apparatus adapting the hydrogen generator to a combustion engine is described. The apparatus linearly controls the hydrogen gas flow to a mixing chamber mixing with a controlled amount of non-combustible gas oxygen, hence, the reduction in the hydrogen gas velocity. The reduction in the hydrogen gas velocity makes the use of hydrogen as safe as other fuels.

In more practical terms the ordinary internal combustion engine of any size or type of fuel, is retrofitted to be operable with only water as a fuel source. Hydrogen gas is generated from the water without the use of chemicals or metals and at a very low voltage. The burning velocity of the hydrogen gas has been reduced to that of conventional fuels. Finally, every component or step in the process has one or more safety valves or features thereby making the hydrogen gas system safer than that of conventional cars.

In the above description the terms ‘non-volatile’ and ‘non-combustible’ were used. It is to be understood they are intended to be the same; that is, simply, gas which will not burn.

Again, the term ‘storage’ has been used, primarily with respect to the hydrogen storage area 7. It is not intended that the term ‘storage’ be taken literally - in fact, it is not storage, but a temporary holding area. With respect to area 7, this area retains a sufficient amount of hydrogen for immediate start-up.

Other terms, features, apparatus, and the such have been described with reference to a preferred embodiment. It is to be understood modifications and alternatives can be had without departing from the spirit and scope of the invention.