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Efficency Increasing Kit For IC Engine

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Abstract - Today the world is facing three critical problems: high fuel prices, climatic changes, and air pollution. Experts suggest that current oil and gas reserves would suffice to last only a few more decades. Bio renewable liquids are the main substitutes to petroleum-based gasoline and diesel fuel. These fuels are important because they replace petroleum fuels; however, some still include a small amount of petroleum in the mixture. There are four alternate fuels that can be relatively easily used in conventional diesel engines: vegetable oil, biodiesel, Fischer-Tropic liquids, and dimethyl ether. The main alternate fuels include (m) ethanol, liquefied petroleum gas, compressed natural gas, hydrogen, and electricity for operating gasoline-type vehicles. Bioethanol is an alternate fuel that is produced almost entirely from food crops. The primary feedstock of this fuel is corn. Bio hydrogen is an environmentally friendly alternative automotive fuel that can be used in an internal combustion engine.

Keywords – IC Engine, Petroleum, Compressed natural Gas, Fuel Price.

I. INTRODUCTION

There is a lot of concern nowadays about the efficiency of the internal combustion engine (ICE), and a lot of research is being done to improve it. But what exactly is the efficiency of the internal combustion engine and how do we measure it? The efficiency of any engine is simply calculated from the energy of the fuel supplied per unit time to do work and the output at the shaft of the engine after subtracting all losses. The input power of the fuel can be obtained from the mass of the fuel and its calorific value. The shaft output can be measured from a brake dynamometer. Simply put efficiency is Output/Input. The average ICE has an efficiency between 20 to 30%, which is very low.

If we see a heat balance sheet of the internal combustion engines for a spark ignition or gasoline engine we find that the brake load efficiency is between 21 to 28%, whereas loss to cooling water is between 12 to 27%, loss to exhaust is between 30 to 55 %, and loss due to incomplete combustion is between 0 to 45%.

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 the surface of the electrolytic solution, to allow the electrolytic solution to be used up without exposing the electrodes. 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 preferably 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.

Around the world, this gas powers more than 5 million vehicles, and just over 150,000 of these are in the American usage is growing at a dramatic rate. On top of these benefits, this kit has also greatly improved on the original design, managing to achieve consistently higher mileage. The basic impact that the HHO gas (brown gas as it is also called) has on the gasoline is that it reduces drastically the size of the fuel droplets.

II. LITERATURE REVIEW

1) Dezhi Zhou, Wenming Yang et.,al(2016) is research on Low temperature combustion (LTC) has been considered as a promising combustion technology in internal combustion engine due to its higher thermal efficiency and lower emission than the conventional combustion engines. Among LTC engines, reactivity controlled compression ignition(RCCI) engine draws tremendous attention of engines researchers because of its super high efficiency and near-zero emissions.

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2) Varun, Paramvir Singh et.,al (2016) is studied the Biodiesel is one of the most rapidly emerging fuels that promise to replace diesel in the near future. However, there are a number of challenges that lay ahead, both in terms of technical aspects as well as economic and replacement policies. If it is used in a regular engine, biodiesel does not give the same performance as diesel. This follows the fact that some alterations are to be incorporated into the engine.

3) ***Xudong Zhen, Yang Wang (2015)*** is work on the Methanol is an alternative, renewable, environmentally and economically attractive fuel; it is cons dared to be one of the most favorable fuels for conventional fossil-based fuels. Methanol has been recently used as an alternative to conventional fuels for internal combustion (IC) engines in order to satisfy some environmental and economic concerns.

4) ***Peter Van Balbriggan Britannica entail (2012)*** is studied the In this manuscript, research on hydrogen internal combustion engines is discussed. The objective of this project is to provide a means of renewable hydrogen based fuel utilization. The development of a high efficiency, low emissions electrical generator will lead to establishing a path for renewable hydrogen based fuel utilization.

5) ***Rituparn Singh, Naresh Kumar et.,al (2015)*** is study about the The rapid growth of society in all sectors of life is responsible for ever increasing the requirement for energy needs. The biggest consumer of energy is the transport sector and it is primarily based on diesel. But, the fossil fuel reserves are limited, even to the extent that they are being projected to last only for a few decades [1–4]. Diesel engines are growing in application because of their higher efficiency as compared to gasoline engines. So, the critical situations have stimulated scientists to look out for the alternative fuel options that would be suitable for diesel engines.

III. PROPOSED SYSTEM

Air pollution

Internal combustion engines such as reciprocating internal combustion engines produce air pollution emissions, due to incomplete combustion of carbonaceous fuel. The main derivatives of the process are carbon dioxide CO2, water and some soot — also called particulate matter (PM). The effects of inhaling particulate matter have been studied in humans and animals and include asthma, lung cancer, cardiovascular issues, and premature death. There are, however, some additional products of the combustion process that include nitrogen oxides and sulphur and some un combusted hydrocarbons, depending on the operating conditions and the fuel-air ratio.

Not all of the fuel is completely consumed by the combustion process; a small amount of fuel is present after combustion, and some of it reacts to form oxygenates, such as formaldehyde or acetaldehyde, or hydrocarbons not originally present in the input fuel mixture. Incomplete combustion usually results from insufficient oxygen to achieve the perfect stoichiometric ratio.

Noise pollution

Significant contributions to noise pollution are made by internal combustion engines. Automobile and truck traffic operating on highways and street systems produce noise, as do aircraft flights due to jet noise, particularly supersonic-capable aircraft. Rocket engines create the most intense noise

The magnetic fuel saver basically consist of neodymium iron boron magnets strategically placed over the copper fuel line. The copper fuel line replaces the convention rubber or plastic tube. By applying a magnetic field, to ionizing fuel to be feed to the combustion device we can ensure more complete combustion obtaining a maximization of the fuel economy, improving the fuel efficiency and reducing polluting emissions.

A fuel magnet is a device that is strapped to the fuel line in your vehicle (or each injector line on a diesel engine) and makes the fuel more receptive to oxygen, thus producing a linear combustion with less exhaust waste. The magnetic field strength must be a higher gauss level i.e. 500 gauss since it may be demagnetized to some extent before reaching the combustion chamber.

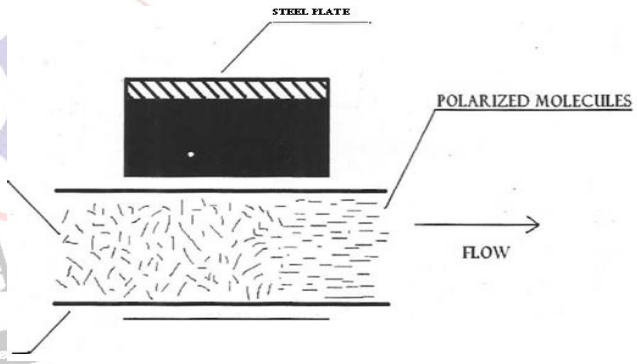

Fig. 1 Polarised molecule in Magnetic fuel saver

The combustion conditions are improved by applying magnetization to fuel according to these devices in the following ways:

- The flame becomes brighter and turns from red to white orange.
- The flame is reduced in vertical length and extended laterally.
- Spark in the flame is reduced or eliminated.
- This increases power output, save fuel, and reduce emissions. Most of Currently regulated gas emissions from motor vehicles are unburned hydrocarbon (HC), carbon monoxide (CO), and oxides of nitrogen (NOx).
- Unturned HC and NOx react in the atmosphere to form photochemical smog. Smog is highly oxidizing in the environment and is the prime cause of eye and throat irritation, bad odor, plant damage, and decreased visibility.

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- Oxides of Nitrogen are also toxic. CO impairs blood capability to carry oxygen to the brain, resulting in slower reaction times and impaired judgment.
- **2.1 MAGNETIC FUEL SAVER:**
- Applying a magnetic field to ionizing fuel to be fed to combustion devices we can ensure more complete combustion, obtaining a maximization of the fuel economy, improving the fuel efficiency and reducing polluting emissions.
- The fuel is subject to the lines of forces from permanent magnets mounted on fuel inlet lines. The magnet for producing the magnetic field is oriented so that its South pole (red) is located adjacent the fuel line and its North pole (blue) is located spaced apart from the fuel line.
- The magnetic field strength must be at a higher Gauss level (500 Gauss) since it may be demagnetized to some extent before reaching the combustion chamber.

IV. PROPOSE SYSTEM VS EXISTING SYSTEM

An electrical power source is connected to two electrodes, or two plates (typically made from some inert metal such as platinum, stainless steel or iridium) which are placed in the water. Hydrogen will appear at the cathode (the negatively charged electrode, where electrons enter the water), and oxygen will appear at the anode (the positively charged electrode). Hydrogen kit works on the principle of electrolysis of water. Where hydrogen gas produced is used to combust the petrol in the engine and hence increases the fuel efficiency of the vehicle.

The electrolysis of water is considered a well-known principle to produce oxygen and hydrogen gas. In Fig.1 a schematic of an electrochemical cell is presented. The core of an electrolysis unit is an electrochemical cell, which is filled with pure water and has two electrodes connected with an external power supply. At a certain voltage, which is called critical voltage, between both electrodes, the electrodes start to produce hydrogen gas at the negatively biased electrode and oxygen gas at the positively biased electrode. The amount of gases produced per unit time is directly related to the current that passes through the electrochemical cell. In water, there is always a certain percentage found as ionic species; H+ and OH- represented by the equilibrium equation:

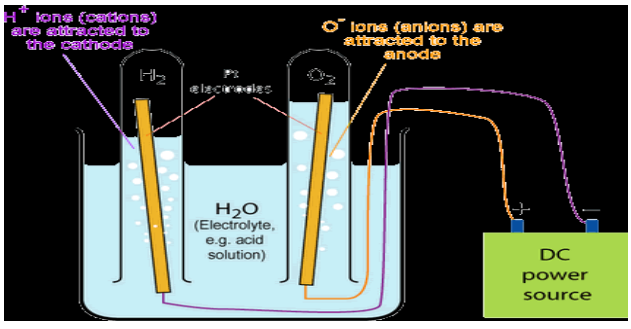

Fig.2 Layout of an electrochemical cell

The technology involved is based on the concept that the orientation of the molecules in a fluid can be changed by applying a polarized magnetic field. A permanent magnet is a magnet that is permanent, in contrast to an electromagnet, which only behaves like a magnet when an electric current is flowing through it. Permanent magnets are made out of substances like magnetite (Fe_3O_4), the most magnetic naturally occurring mineral, or neodymium, a powerfully magnetic synthetic substance. The Earth itself is a huge permanent magnet, though its magnetic field is quite weak relative to its size. Humans have used the magnetic field of the Earth for navigation since the compass was invented in ancient China.

Even the most powerful permanent magnet is not as strong as the stronger electromagnets, so their applications are limited, but they still have many uses. The most mundane would be use as refrigerator magnets, but magnets can be found everywhere, including your hard disk, ATM and credit cards, speakers and microphones, electric motors, and toys. Electric motors work through an interaction between an electromagnet and a permanent magnet.

The tiny molecular charge makes the molecules rotate in the alignment with the applied field and they then hold that position for short time due to the matching alignment of their neighbouring molecules. This alignment can be disrupted by turbulence in the liquid and the molecules will gradually return to a disorganized alignment state.

The liquid flows through the pipe past the magnet and as it does so its randomly oriented molecules are aligned by the strong unipolar magnetic field and retain their polarized state as they leave the vicinity of the magnets. The tube should be non ferrous to avoid reducing the level of magnetic field applied to the liquid. And a metal plate should be applied to the back of the magnet to increase the strength of the field on the pipe side. Polarity of the magnet is not really important.

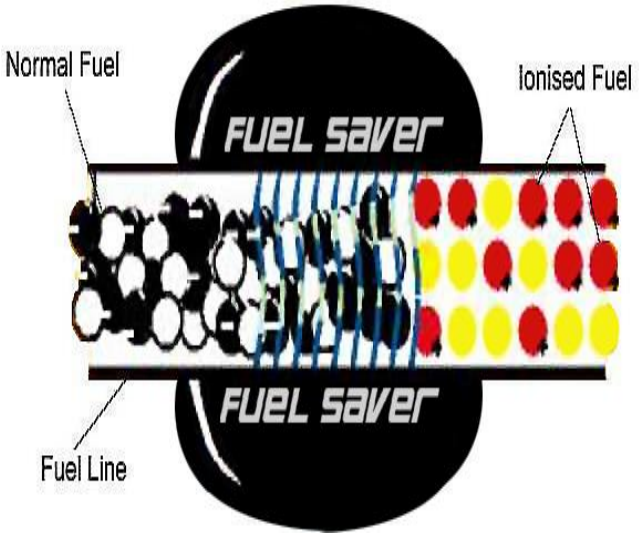

Fig. 3 Ionised fuel

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Fuel mainly consists of hydrocarbons. Groupings of hydrocarbons when flowing through NIBM field change their orientation of magnetization in a direction opposite to that of NIBM field.

The molecules of hydrocarbons change their configuration at the same time intermolecular force is considerably reduced or depressed. In addition, hydrogen ions in fuel and oxygen ions in air or steam are magnetized to form magnetic domains, which are believed to assist in atomizing fuel into finer particles.

Thus the resultant conditioned fuel/air mixture re-oriented in opposite polarities burns more completely, producing higher engine output, better fuel economy, more power and most importantly reduces the amount of hydro-carbons (HC), carbon monoxide (CO) and oxides of nitrogen (NOx) in the exhaust.

Another benefit is that re-oriented fuel and air molecules with opposite polarities dissolve carbon buildup in carburetor jets, fuel injectors, and combustion chambers help to clean up the engine and maintain the clean condition.

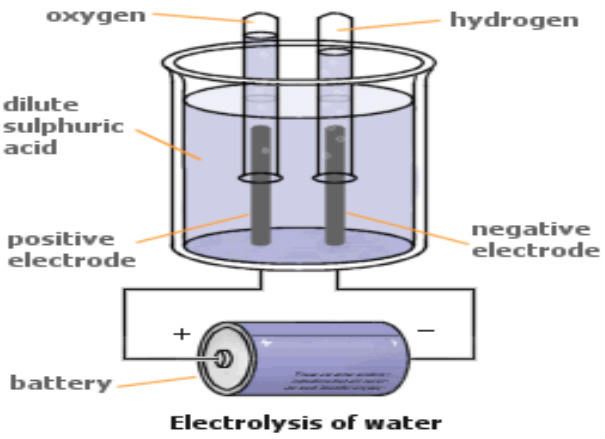

Fig. 4 Electrolysis of Water

V. WORKING OF SYATEM

Methods of hydrogen production through water electrolysis. Despite the fact that the discovery of electrolytical water decomposing was first observed in acidic water, in industrial plants the alkaline medium is preferred, because corrosion is more easily controlled and cheaper construction materials can be used compared to acidic electrolysis technology. Other methods of hydrogen production, such as proton exchange membrane electrolysis, steam electrolysis have been developed in recent years. Hydrogen could also be generated as a by product.

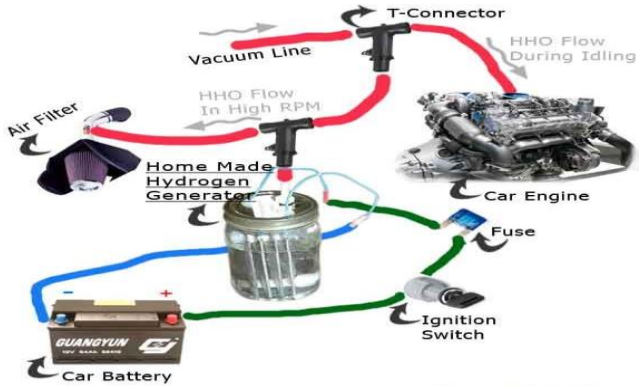

Fig. 5 General layout of system

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.

This kit is a helpful agent in reducing the fuel consumption and increasing the efficiency of the engine without any adverse effect on the performance of the vehicle.

The HHO kit separates Oxygen and Hydrogen from the water and hence hydrgoen gas is used as the fuel to propel the vehicle causing less use of fuel. The Oxygen helps in buring the fuel and hydrogen burns itself thus having full control on the fuel consumption. The HHO kit automatically manages the injection of fuel into the engine. The oxygen is released into the environment and hence it is environment friendly.

Reduce your fuel spendings up to 20%. This is valid for both highway and town (city) driving conditions. Increases the power and performance in your car. The more fuel you burn, the more the engine gets rattled up and wrecked. Once you switch to supplemental hydrogen, it will enhance power and performance in you car. Reduces the CO2 emissions. Eliminating pollution and other harmful residues that our car engines produce. What´s wrong with doing also something good for the environment besides saving money? Reduces the temperature in the engine. Also improves engine life-span since its burning fuel at a much cooler state. Removes the carbon residues inside your engine and prevent future carbon deposits. Lower noise and vibrations in the engine. Hydrogen effect in the combustion cycle. The engine will sound much quieter than it was before. This is due to higher

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combustion eficiency in your car. Increases the life span of your engine.The price of the petrol, diesel, gas and other fuel products are inflated in India and a normal has to think twice before going to have a vehicle out of his home. The prices have touched the sky in the recent past. Everyone thinks and raises a question **"Can it be possible to cut down the fuel prices?"**, the other meaning of the question is whether it would be possible to run the vehicle with less fuel and more mileage.

Fig. 6 Installation of kit

In advanced stage HHO burns too fast by itself and actually works better if it is "slowed down" by the gasoline, diesel, CNG, LPG, or biodiesel fuel etc. which makes it perfect in a gas saving application, where it can burn the fossil fuels faster, extracting more energy out of it inside the engine, instead of having to filter or convert it. Our HHO kits are comprised of a robust, on demand hydrogen generator, an external water/electrolyte reservoir, and a bubbler/filter mechanism. The kit does not need a tank to compress or save the gases in, but uses them as they are made ("on demand"). It operates on the available extra energy of the car alternator, and generally uses less than 500 watts of energy to operate (less than one horespower The HHO kit separates Oxygen and Hydrogen from the water and hence hydrgoen gas is used as the fuel to propel the vehicle causing less use of fuel. The Oxygen helps in buring the fuel and hydrogen burns itself thus having full control on the fuel consumption. The HHO kit automatically manages the injection of fuel into the engine. The oxygen is released into the environment and hence it is environment friendly. Reduce your fuel spending up to 20%. This is valid for both highway and town (city) driving conditions. Increases the power and performance in your car. The more fuel you burn, the more the engine gets rattled up and wrecked. Once you switch to supplemental hydrogen, it will enhance power and performance in your car. Reduces the CO2 emissions. Eliminating pollution and other harmful residues that our car engines produce. What´s wrong with doing also something good for the environment besides saving money? Reduces the temperature in the engine. Also improves engine life-span since its burning fuel at a much cooler state. Removes the carbon residues inside your engine and prevent future carbon deposits. Lower noise and vibrations in the engine. Hydrogen effect in the combustion cycle. The engine will sound much quieter than it was before. This is due to higher combustion efficiency in your car. Increases the life span of your engine.

VI. CONCLUSION

In this manuscript, research on hydrogen internal combustion engines is discussed. The objective of this project is to provide a means of renewable hydrogen based fuel utilization. The development of a high efficiency, low emissions electrical generator will lead to establishing a path for renewable hydrogen based fuel utilization. A full-scale prototype will be produced in collaboration with commercial manufacturers. The electrical generator is based on developed internal combustion engine technology. It is able to operate on many hydrogen-containing fuels. The efficiency and emissions are comparable to fuel cells (50% fuel to electricity, ~ 0 NOx). This electrical generator is applicable to both stationary power and hybrid vehicles. It also allows specific markets to utilize hydrogen economically and painlessly.

Decarbonisation of fossil fuels with subsequent CO2 sequestration to reduce or eliminate our CO2 atmospheric emissions provides a transition strategy to a renewable, sustainable, carbonless society. However, this requires hydrogen as an energy carrier. The objectives of this program for the year 2000 are to continue to design, build, and test the advanced electrical generator components, research hydrogen based renewable fuels, and develop industrial partnerships. The rationale behind the continuation of designing, building, and testing generator components is to produce a research prototype for demonstration in two years. Similarly, researching hydrogen based renewable fuels will provide utilization components for the largest possible application. Finally, developing industrial partnerships can lead to the transfer of technology to the commercial sector as rapidly as possible. This year work is being done on the linear alternator, two-stroke cycle scavenging system, electromagnetic/combustion/dynamic modeling, and fuel research. The Sandia alternator design and prototype will be finished, and the Sandia and Magnequench designs will be tested. Woron the scavenging system consists of learning to use KIVA-3V, and designing the scavenging experiment.

Thermodynamic properties, and chemical species concentration were included. He found that even as the compression ratio is increased to 300:1, the thermal efficiency still increases for all of the fuels investigated. At this extreme operating for instance, the cycle efficiency for isooctane fuel at stoichiometric ratio is over 80%. Indeed it appears that no fundamental limit exists to achieving high efficiency from an internal combustion engine cycle. However, many engineering challenges are involved in approaching ideal Otto cycle performance in real systems, especially where high compression ratios are utilized.

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HCCI operation is unconventional, but is not new. As early as 1957 Alperstein et al. (1958) experimented with premixed charges of hexane and air, and n-heptane and air in a Diesel engine. They found that under certain operating conditions their single cylinder engine would run quite well in a premixed mode with no fuel injection whatsoever.

An additional benefit is that the mechanical friction can be reduced relative to crankshaft driven geometries since there is only one moving engine part and no piston side loads. Also, combustion seems to be faster than in conventional slider-crank configurations. Further, the unique piston dynamics (characteristically non-sinusoidal) seem to improve the engine fuel economy and NOx emissions by limiting the time that the combustion gases spend at top dead centre (TDC) (thereby reducing engine heat transfer and limiting the NOx kinetics).

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