

ENERGY SAVING APPARATUS FOR PRODUCING OXYHYDROGEN COMBUSTION SUPPORTING GAS AND METHOD USING THE SAME

Technical field

The invention relates to the technical field of electrolytic solution, in particular to an energy-saving apparatus for producing oxyhydrogen combustion-supporting gas by electrolyzing electrolyte containing water and a method using the same.

Background technology

By utilizing the traditional method, a negative electrode and a positive electrode are arranged in water of the electrolytic cell, and then are respectively connected with direct-current power for electrolyzing the water, so that hydrogen is produced on the negative electrode and oxygen is produced on the positive electrode. But in fact, in the process, similarly, gas called 'Brown gas' by us is produced, and as a composition of hydrogen and oxygen, the gas can be used as a gas fuel. In addition, in Chinese patents 200480040719.2 and 200710109954.6, a combustible gas called HHO is further disclosed, the combustible gas is produced by an electrolysis unit through electrolyzing water, and can improve the heat content and the environmental quality of these fuels when being combined to the gas fuel and liquid fuel. The gas is mainly characterized in that bound atom pairs can be formed and the gas consists of clusters formed by hydrogen atoms and oxygen atoms according to the general formula H_mO_n , but the atomic clusters limits the combustion capability of the gas. Simultaneously, we note that in all the prior electrolysis technologies, all the negative electrode plates and the positive electrode plates of the electrolytic electrode plate are directly connected into the direct-current power supply, which limits the size of current passing through the electrolytic cell.

In fact, many people have applied the gas fuel or combustion-supporting gas on automobiles, they generally stores the gas produced by electrolyzing water in a space or a container, then the gas is introduced to the air suction port of the automobile engine, so as to enter the combustion chamber of the engine and be mixed with the fuel for combustion, and therefore, the combustion efficiency is increased.

Summary of the invention

The invention has the purposes of further improving the combustion-supporting capability of the oxyhydrogen gas, increasing combustion rate, saving energy, reducing emissions of combustion and protecting the environment.

In order to achieve the purposes, the invention adopts the following technical scheme:

An energy-saving apparatus for producing oxyhydrogen combustion-supporting gas, comprising an electrolytic cell, electrolyte containing water and an electronic drive unit, wherein:

the electrolytic cell of the apparatus comprises a plurality of negative electrode plates, positive electrode plates and neutral electrode plates; said negative electrode plates, positive electrode plates and neutral electrode plates do not mutually contact, and are adjacently or alternately arranged to form an electrolytic electrode plate, and the two electrode plates positioned at the outermost of the electrolytic electrode plate are neutral electrode plates; said electrolytic electrode plate is wholly or partially immersed in the electrolyte;

the electronic driving device is a pulse-width modulator with adjustable frequency and pulsed

square wave, the input end of said modulator is connected with a direct-current power supply, and the output end of said modulator is respectively connected with said negative electrode plates and said positive electrode plates of the electrolytic cell.

The electrolyte electrode plate is arranged in one of the following manners:

‘neutral electrode plate - positive electrode plate - negative electrode plate - positive electrode plate - negative electrode plate - positive electrode plate - neutral electrode plate’ or

‘neutral electrode plate - positive electrode plate - negative electrode plate - neutral electrode plate - positive electrode plate - negative electrode plate - neutral electrode plate’.

The electrolytic cell comprises an electrolyte container, the electrolytic electrode plate arranged in the electrolyte container, electrode wiring terminals connected with the electrolytic electrode plate, and a gas output port, an electrolyte filling port and a safety valve arranged on the electrolyte container.

The spacing between any two of the negative electrode plates, or the positive electrode plates or the neutral electrode plates is 4mm.

The working frequency range of the pulse-width modulator is from 400Hz to 42400Hz.

The pulse-width modulator is connected with an ammeter.

The input ends of the pulse-width modulator are connected onto an electrode of 12V direct-current power or an automobile engine.

The gas output port of the electrolytic cell is connected onto a vacuum suction port or an air suction port of the internal combustion engine or the engine.

The internal combustion engine or the engine is provided with an air/fuel ratio controller.

The electrolytic cell is provided with an automatic electrolyte sensor which is connected to an automatic electrolyte filling system.

The method for producing oxyhydrogen combustion-supporting gas by using the energy-saving apparatus comprises the following steps:

1) inject the electrolyte solution into the electrolyte container so that the electrolytic electrode plate in the electrolytic cell is wholly or partially immersed in the electrolyte, and electrify the pulse-width modulator which is connected with the electrolytic cell.

2) adjust the frequency and the load/dewll rate of the pulse-width modulator, and the electrolyte containing water is electrolyzed by the input pulse current of the electrolytic cell so as to produce oxyhydrogen gas.

3) through the gas output port of the electrolytic cell, the oxyhydrogen gas is conveyed to the space where it is used without storage.

The working frequency range of the pulse-width modulator is from 400Hz to 42400Hz.

The input pulse current of the electrolytic cell is between 5A and 20A

The oxyhydrogen gas comprises monoatomic hydrogen and monoatomic oxygen, and the monoatomic form exists only for 5-10 seconds.

The oxyhydrogen gas releases more energy by 2.5-3 levels compared with the common diatomic gas.

The oxyhydrogen gas is mixed with air in a combustion chamber of the internal combustion engine or the engine so as to combust the fuel more completely.

The invention has the advantages that the oxyhydrogen gas can be produced with high efficiency, the gas can influence the combustion process of any internal combustion engine, so that all fossil

fuels, such as gasoline, diesel, petroleum gas and biofuel and the like, can be fully combusted, a large amount of energy extracted from the usable fuel is transformed into mechanical energy, so that the internal combustion engine or the engine obtains considerable and definite performance improvement, the fuel is saved, the discharge of waste gas such as carbon monoxide, carbon dioxide, nitrous oxide and sulfur dioxide and the like or dust, is greatly reduced, and therefore, the environment is protected.

Experiments prove that due to use of the invention, the operation of the automobile engine is smoother and quieter, the fuel oil can be saved by 50%, the discharge of waste gas can be reduced by 90%, and the device of the invention is easy for disassembly and assembly and is convenient to be installed on any automobile.

Description of figures

FIG. 1 is a section structure diagram of the side view of the electrolytic cell of the invention;

FIG. 2 is a section structure diagram of the rear view of the electrolytic cell of the invention;

FIG. 3 is a plan view of the electrolytic cell of the invention;

FIG. 4 is a structure diagram of the electrolytic electrode plate in the electrolytic cell of the invention;

FIG. 5 is a specification size diagram of the electrolytic electrode plate in the electrolytic cell of the invention;

FIG. 6 is a connection diagram of the invention and the automobile engine.

In the figures:

1 is electrolyte container;

2 is electrolytic electrode plate;

3 is electrode wiring terminals;

4 is gas output port;

5 is electrolyte filling port;

6 is fixed bolts;

7 is nuts;

8 is gaskets;

9 is thread sealing screw cover;

10 is safety valve;

11 is gas flow adjusting knob;

12 is neutral electrode plates;

41 is negative electrode plates;

42 is positive electrode plates;

61 is automobile engine;

62 is automobile instrument board;

63 is automobile ignition device;

64 is air/fuel ratio controller;

65 is automobile steering wheel;

66 is ammeter of the energy-saving apparatus of the invention;

67 is gas output hose of the energy-saving apparatus of the invention;

68 is safety device;

69 is adjustable pulse-width modulator of the energy-saving apparatus of the invention;

70 is relay;

71 is electrolytic cell of the energy-saving apparatus of the invention;

72 is fuse;

73 is storage battery.

Next, further description will be made for the embodiment of the invention by reference of the figures:

Detailed description of the preferred embodiments

The connection mode of the embodiment is as follows: the electronic drive unit is a pulse-width modulator with adjustable frequency and pulse square wave, and the input ends of the modulator are connected with the direct-current power supply, and the output ends of the modulator are respectively connected with the negative electrode wiring terminal and the positive electrode wiring terminal of the electrolytic cell; and the negative electrode wiring terminal and the positive electrode wiring terminal are also respectively connected with the negative electrode plates and the positive electrode plates. The negative electrode plates, the positive electrode plates and the neutral electrode plates in the electrolytic cell do not mutually contact and are adjacently or alternately arranged, and both the two electrode plates at the outermost are neutral electrode plates; the electrolytic electrode plate is wholly or partially immersed in the electrolyte containing water.

Shown as FIG. 1, FIG. 2 and FIG. 3, the electrolytic cell of the invention comprises an electrolyte container 1, an electrolysis electrode plate 2, electrode wiring terminals 3, a gas output port 4, an electrolyte filling port 5, a safety valve 10 and the like. The electrolysis electrode plate is formed by arranging 2-3 negative electrode plates, 2-3 positive electrode plates and 2-3 neutral electrode plates, and is arranged in one of the following manners: 'neutral electrode plate - positive electrode plate - negative electrode plate - positive electrode plate - negative electrode plate - positive electrode plate - neutral electrode plate' or 'neutral electrode plate - positive electrode plate - negative electrode plate - neutral electrode plate - positive electrode plate - negative electrode plate - neutral electrode plate'; FIG. 4 is one of the arrangement modes, namely, two neutral electrode plates 12 are arranged at the two outer sides of the electrolysis electrode plate, while three positive electrode plates 42 and two negative electrode plates 41 are adjacently arranged in the electrolysis electrode plate. Wherein, the positive electrode plates 42 are connected with the positive electrode wiring terminal by fixed bolts 6 and nuts 7; the positive electrode wiring terminals are connected with the positive electrode of the output ends of the pulse-width modulator; the negative electrode plates 41 are connected with the negative electrode wiring terminal by the fixed bolts 6 and the nuts 7; the negative electrode wiring terminals are connected with the negative electrode of the output ends of the pulse-width modulator; the neutral electrode plates 12 are not connected with electricity; the two neutral electrode plates 12 are arranged at the two sides of the peripheries of the negative electrode plates and the positive electrode plates all the time, with the purposes of blocking voltage leakage and loss and guiding the energy generated by the electrolysis electrode plate to the internal electrode plates. We also can install a third neutral electrode, which has the functions of the electrode without energization, at the middle position of the electrolysis electrode plate, and when the output of the gas obtained by electrolysis is not coordinative, the third neutral electrode can improve the performance of the electrolytic cell. The negative electrode plates, or the positive electrode plates or the neutral electrode plates can be all

made of stainless steel with the thickness of 1.2mm, the electrode plates are spaced by the gaskets 8, the spacing distance is about 4mm, and if the spacing distance is too close or too far, the efficiency of producing oxyhydrogen gas may be reduced.

The electrode wiring terminals 3 are a negative electrode wiring terminal and a positive electrode wiring terminal respectively, and the negative electrode wiring terminal is connected with the negative electrode plates 41, and penetrates through the thread sealing screw cover 9 to be fixed above the electrolytic cell; the positive electrode wiring terminal is connected with the positive electrode plate 42, and penetrates through the thread sealing screw cover 9 to be fixed above the electrolytic cell.

The electrolyte filling port 5 in the electrolytic cell is used for manual or automatic filling of the electrolyte. The electrolyte can be consumed, and an automatic sensor is arranged in the electrolytic cell, which can control an automatic electrolyte filling system to lead the electrolyte cell to be filled fully and automatically.

A safety valve 10 needs to be arranged in the electrolytic cell, and plays a role in preventing the gas pressure in the electrolytic cell from being overlarge and is used for one-way release of the gas in the electrolytic cell.

FIG. 5 is the specification size diagram of the electrolysis electrode plate in the electrolytic cell of the invention. The specification size is designed for adapting to a specific electrolytic cell, here, the length and the width of each neutral electrode plate 12 is 155mm and 50mm respectively. The lengths and the widths of the negative electrode plates 31 and the positive electrode plates 32 are substantially equivalent to those of the neutral electrode plates, but one ends of the electrode plates are provided with convex wiring parts, wherein L1 is equal to 30mm, L2 is equal to 38mm, L3 is equal to 20mm, L4 is equal to 12mm, and the diameters of all the small holes for installing the electrode plates or being wired with the negative electrode wiring terminal and the positive electrode wiring terminal are all 6.5mm. Such a specification size of the electrolysis electrode plate is applicable to the automobile engine with the discharge capacity below 5 litres. Certainly, other specification sizes also can be designed so as to adapt to the engine with larger discharge capacity.

The working principle of the invention is as follows: the direct-current power supply inputs 12V direct-current power into the adjustable pulse-width modulator (hereinafter referred to as PWM), where the working principle of a TASER stun gun or a riot gun is utilized, i.e., when in high frequency, 1.5-3V direct-current power is transformed into about 100,000V voltage; so, by pulse modulation of the PWM, namely, adjustment of pulse frequency and load/dwell rate, pulse current, which is much larger than input direct current of the PWM, is provided for the electrolytic cell at the output ends; after the electrolytic cell receives large enough pulse current, electrolysis process is carried out on the aqueous solution by the electrolysis electrode plate, so that brand-new-category oxyhydrogen gas called monoatomic HHO is produced; the form of the oxyhydrogen gas has essential difference compared with that of the 'Brown gas', diatomic HHO gas or H_mO_n gas in the prior art, and compared with the normal diatomic form, the monoatomic HHO has a monoatomic temporary state. Since the atoms in the gas are in monoatomic form, so that the single hydrogen atom and oxygen atom can not form the atomic cluster, and the combustion capability of the atoms is much larger than that in the atomic cluster state; under monoatomic state, the atoms can release more energy by 2.5-3 levels, therefore, the monoatomic HHO oxyhydrogen gas has the energy which is 2-3 times of that of the Brown gas or the diatomic

HHO gas; and simultaneously, the oxyhydrogen gas is monoatomic or single and non-bound atoms, has the characteristic of temporary existence, and can be transformed into the normal diatomic form after temporary time about 5-10 seconds. Therefore, once being produced, the oxyhydrogen gas must be used up, and can not be required and also impossible to be stored.

We connect the gas output port of the electrolytic cell to the air suction port of the automobile engine, when in need, the electrolysis apparatus is started, and the pulse frequency and the load/dwell rate of the PWM are adjusted; generally, the preferable working frequency is 400Hz to 1900Hz, so that the PWM can output sufficient current which is about 5-20A, and then aqueous solution is electrolyzed to produce monoatomic HHO oxyhydrogen gas which enters the combustion chamber of the engine immediately after passing through the air suction port of the automobile engine; the hydrogen atoms and the oxygen atoms with brand-new form would not form the atomic clusters, and they are only in a single atom state so as to be ideally dispersed in the engine for combustion, and release energy 2.5-3 levels higher than that of the Brown gas or the diatomic HHO gas; due to transience of the atom state of the oxyhydrogen gas, the oxyhydrogen gas has the characteristic of faster combustion; as a combustion enhancing agent of the engine, the oxyhydrogen gas can be utilized immediately, and the engine can work under the condition of reducing overwork, and can release more energy and transform the energy into usable mechanical energy; and therefore, the engine can obtain considerable increase of running mileage; also due to complete combustion, the monoatomic HHO oxyhydrogen gas also can be seen as an effective cooling agent of the engine, so that the energy can not become hot and toxic waste gas and smoke to be discharged and wasted, and the discharged waste gas can be greatly reduced.

The pulse current of the electrolytic cell is controlled by adjusting the frequency and the load/dwell rate of the PWM. Generally, the frequency of the PWM is adjusted to be between 400Hz and 1900Hz. When the temperature of the electrolyte is lower, the current outputted by the PWM is about 5A, therefore, an internal environment can be made, so as to enable the electrolytic cell to operate at lower temperature which favors the production of the monoatomic HHO oxyhydrogen gas; with the increase of the temperature of the electrolyte, the pulse current can be increased to be between 12A and 20A, so that the electrolytic cell obtains ideal output of the monoatomic HHO oxyhydrogen gas, overwork of a power system of the engine is reduced and the 'heat runaway' is avoided. In order to better control the amperage inputted into the electrolytic cell, an ammeter can be connected on the PWM so as to monitor the output current of the PWM in real time, and further an operator can keep the best state of the electrolytic cell. Due to the use of the PWM, the power consumption of the invention must be lower than that of most other electrolytic cells directly extracting power from batteries or generators, and in the whole process, the overwork and loss of an accumulator and the power system of the engine are reduced, which not only save energy, but also prolong the service lives of the engine and the power system.

The adjustable pulse-width modulator (PWM) used here is an electronic device which obtains needed waveform shapes and amplitudes equivalently by modulating the frequency and the width of a series of pulses. This is a mature prior art and no elaboration is given here.

In practical application, the oxyhydrogen gas produced by electrolyzing aqueous solution is generally stored in one space or a container, and then is introduced into the combustion chamber of the automobile engine to be mixed with the fuel for combustion. In fact, the storage is extremely dangerous, because two portions of hydrogen and one portion of oxygen is a combination with easy explosion, simultaneously the storage of the gas also is harmful for power

output, and the gas can exist only for very short time in monoatomic state and can be transformed into normal diatomic state quickly. While the invention is a system with instant needs for hydrogen fundamentally, and does not need to store any gas, which is the main safety characteristics of the invention. And when in need, monoatomic HHO oxyhydrogen gas can be produced; before entering the combustion of the engine to be combusted completely with the fossil fuels, the gas exists only for several seconds in the system; compared with the 'Brown gas', diatomic HHO gas or H_mO_n gas and monoatomic HHO oxyhydrogen gas, the gas can obtain more energy by 2-3 levels, because both the required need and the extra energy can be obtained, and can be transformed into mechanical energy immediately; and the combustion of the gas is sudden, only extremely-low heat residues are produced, and the problem of metallic hydrogen embrittlement of the engine also can be avoided.

When the invention is used for the internal combustion engine or the engine, we must adjust and control the ratio of air and fuel again to lead the engine to obtain performance improvement. Under normal conditions, the reduction of the content of the fuel in the air/fuel ratio, or the shortage of the mixture of the air and the fuel can damage the engine. But, the monoatomic HHO oxyhydrogen gas produced by the electrolytic cell using the PWM has monoatomic properties, and in the thorough combustion process of the gas and the fuel, large amount of energy extracted from the usable fuels is transformed into mechanical energy, and damage can not be caused to the engine. Therefore, it is necessary to install the air/fuel ratio controller or an engine management system in the internal combustion engine or the engine. For example, the automobile is provided with an electronic control unit (ECU), the device can control the air/fuel mixing ratio. We can correct the input voltage of the ECU by a variable resistor, and purposefully adjust air/fuel mixing ratio to be more suitable for mixing combustion with monoatomic HHO oxyhydrogen gas, so that the extra energy released by the fossil fuels is acquired, and also larger fuel performance can be obtained by the engine.

FIG. 6 is the embodiment applied on the automobile engine of the invention. 65 is an automobile steering wheel, and the ammeter 66 and the air/fuel ratio controller 64 of the energy-saving apparatus of the invention are all installed on an automobile instrument board 62. The input ends of the adjustable pulse-width modulator (PWM) 69 of the energy-saving apparatus of the invention are connected to the positive electrode and the negative electrode of the storage battery 73 by in-series connection with an automobile ignition device 63, the ammeter 66, a relay 70 and a fuse 72; while the output ends of the adjustable pulse-width modulator (PWM) 69 are connected with the negative electrode wiring terminal and the positive electrode wiring terminal of the electrolytic cell 71, the gas output hose 67 of the electrolytic cell 71 is connected to a carburetor or a fuel/air suction interface of the engine 61 after passing through a safety device 68.

The working principle of the embodiment shown as FIG. 6 is as follows: when the automobile engine is started, the automobile ignition device 63 is closed, the relay 70 is closed, the input ends of the adjustable pulse-width modulator (PWM) 69 are connected with the direct-current power, the PWM outputs the pulse current to the electrolytic cell 71, and the current value can be monitored by the ammeter 66; and at the moment, the water in the electrolytic cell 71 is electrolyzed to produce monoatomic HHO oxyhydrogen gas, and the gas produced passes through the output hose 67 and the safety device 68, then is introduced into the carburetor or the fuel/air suction port of the engine 61, and enters the combustion chamber of the engine 61 for mixing combustion with the fuel and the air.

The safety device here is actually a container filled with water, and the monoatomic HHO oxyhydrogen gas is guided into the bottom of the container by the output hose 67, then goes towards the top of the container and finally is discharged from the output hose 67 at the top of the container. The design aims at leading the flame to be isolated by water and further avoiding from damaging the electrolytic cell in case that the monoatomic HHO oxyhydrogen gas causes small explosion at the top of the container.

The air/fuel ratio controller 64 is used for controlling the proportion of the air and the fuel entering the combustion chamber of the engine 61, generally, two gears are set, one is used for leading the automobile to run slowly in urban areas, and the other one is used for leading the automobile to run at a high speed on highways.

The above description is only a specific embodiment of the invention, the invention is not limited only in the above figures or the described method, and the claims will cover the spirit and all modified schemes in the scope of the invention.

Claims

1. An energy-saving apparatus for producing oxyhydrogen combustion-supporting gas, comprising an electrolytic cell, electrolyte containing water and an electronic drive unit, wherein:

the electrolytic cell of the apparatus comprises a plurality of negative electrode plates, positive electrode plates and neutral electrode plates; said negative electrode plates, positive electrode plates and neutral electrode plates do not mutually contact, and are adjacently or alternately arranged to form an electrolytic electrode plate, and the two electrode plates positioned at the outermost of the electrolytic electrode plate are neutral electrode plates; said electrolytic electrode plate is wholly or partially immersed in the electrolyte;

the electronic driving device is a pulse-width modulator with adjustable frequency and pulsed square wave, the input end of said modulator is connected with a direct-current power supply, and the output end of said modulator is respectively connected with said negative electrode plates and said positive electrode plates of the electrolytic cell.

2. The energy-saving apparatus for producing oxyhydrogen combustion-supporting gas according to claim 1, wherein the electrolytic electrode plate is arranged in one of the following manners:

‘neutral electrode plate-positive electrode plate-negative electrode plate-positive electrode plate-negative electrode plate-positive electrode plate-neutral electrode plate’ or

‘neutral electrode plate-positive electrode plate-negative electrode plate-neutral electrode plate-positive electrode plate-negative electrode plate-neutral electrode plate’.

3. The energy-saving apparatus for producing oxyhydrogen combustion-supporting gas according to claim 1, wherein the electrolytic cell comprises an electrolyte container, the electrolytic electrode plate arranged in the electrolyte container, electrode wiring terminals connected with the electrolytic electrode plate, and a gas output port, an electrolyte filling port and a safety valve arranged on the electrolyte container.

4. The energy-saving apparatus for producing oxyhydrogen combustion-supporting gas according to claim 1, wherein the spacing between any two of the negative electrode plates, or the positive electrode plates or the neutral electrode plates is 4mm.

5. The energy-saving apparatus for producing oxyhydrogen combustion-supporting gas according to claim 1, wherein the working frequency range of the pulse-width modulator is from 400Hz to 42400Hz.

6. The energy-saving apparatus for producing oxyhydrogen combustion-supporting gas according to claim 1, wherein the pulse-width modulator is connected with an ammeter.

7. The energy-saving apparatus for producing oxyhydrogen combustion-supporting gas according to claim 1, wherein the input end of the pulse-width modulator is connected onto an electrode of 12V direct-current power or an automobile engine.

8. The energy-saving apparatus for producing oxyhydrogen combustion-supporting gas according

to claim 1, wherein the gas output port of the electrolytic cell is connected onto a vacuum suction port or an air suction port of the internal combustion engine or the engine.

9. The energy-saving apparatus for producing oxyhydrogen combustion-supporting gas according to claim 8, wherein the internal combustion engine or the engine is provided with an air/fuel ratio controller.

10. The energy-saving apparatus for producing oxyhydrogen combustion-supporting gas according to claim 1, wherein the electrolytic cell is provided with an automatic electrolyte sensor which is connected to an automatic electrolyte filling system.

11. The method for producing oxyhydrogen combustion-supporting gas by using the energy-saving apparatus of claim 1, comprising the following steps:

1) inject the electrolyte solution into the electrolyte container so that the electrolytic electrode plate in the electrolytic cell is wholly or partially immersed in the electrolyte, and electrify the pulse-width modulator which is connected with the electrolytic cell.

2) adjust the frequency and the load/dewll rate of the pulse-width modulator, and the electrolyte containing water is electrolyzed by the input pulse current of the electrolytic cell so as to produce oxyhydrogen gas.

3) through the gas output port of the electrolytic cell, the oxyhydrogen gas is conveyed to the space where it is used without storage.

12. The method for producing oxyhydrogen combustion-supporting gas according to claim 11, wherein the working frequency range of the pulse-width modulator is from 400Hz to 42400Hz.

13. The method for producing oxyhydrogen combustion-supporting gas according to claim 11, wherein the input pulse current of the electrolytic cell is between 5A-20A

14. The method for producing oxyhydrogen combustion-supporting gas according to claim 11, wherein the oxyhydrogen gas comprises mono-atomic hydrogen and mono-atomic oxygen, and the mono-atomic form exists only for 5-10 seconds.

15. The method for producing oxyhydrogen combustion-supporting gas according to claim 11, wherein the oxyhydrogen gas releases more energy by 2.5-3 levels compared with the common diatomic gas.

16. The method for producing oxyhydrogen combustion-supporting gas according to claim 11, wherein the oxyhydrogen gas is mixed with air in a combustion chamber of the internal combustion engine or the engine so as to burn the fuel more completely.