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Research and Analysis for Carbon Capture

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***Abstract*: Carbon capture is an essential requirement for the entire world. Burning of fossil fuel creates carbon in the atmosphere and causes harmful effects in the environment. Author, researcher has done lot of analysis for the various methods of carbon capture. Author has given new concepts of inorganic fuel line creating power generation from waste aluminium powder is new idea itself. With this research paper definitely maritime fraternity and industrialist can get benefits by adopting to new generation fuels.**

***Keywords*: power generation by hydrogen, power generation by ammonia, power generation by aluminium compound, power generation by hydro power, power generation by gas turbine.**

1. Introduction

A. Power Supply by Hydrogen gas

Hydrogen gas is a wonderful gas by which entire globe can fetch green energy. Power generated is so green that it does not create any kind of Nitrogen oxide, Sulphur oxide, carbon di oxide, carbon mono oxide or any other harmful gases. H2O generates H2 and H2 by redox reaction again changes to H2O. It is a miracle gas or in other word it is a boon and gift of nature to human being.

The process of hydrogen synthesis from the water or other sources:

Water electrolysis reaction gives hydrogen gas, which is to be fed into Gas-Turbine designed for running prime mover by hydrogen combustion.

H2O -Electrolysis=output H2 gas

H2 gas again burned with pure oxygen in gas turbine to rotate the shaft fed to Electric generator. Electric generator produces electricity by Dynamo effect. Power generated to be stored into the batteries / Grid.

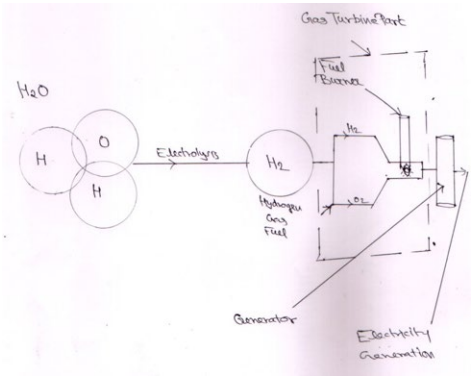

Fig. 1. Power generation by hydrogen gas

Above diagram is showing the process of hydrogen generating power by use of gas turbine. Flash back problem in fuel nozzle can be eliminated by the new generation advanced fuel nozzles.

See the diagram of Gas Turbine block

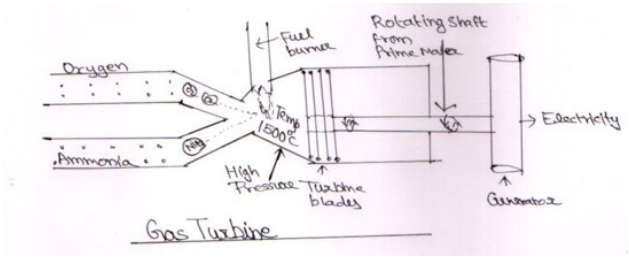

Fig. 2. Power generation through gas energy (Use of ammonia/hydrogen)

Above gas turbine block shows the process of rotating prime mover shaft of generation mechanism. Oxygen enters into Internal combustion engine with hydrogen or Ammonia and fuel burner gives fire to combustible gas, required combustion temperature is also provided with heater and cycle takes off. Output is generation of gases at high temperature of about 1500 degree Celsius and also generation of high pressure.

Second method to generate power from the Hydrogen gas is by use of steam turbine to rotate prime mover generator shaft.

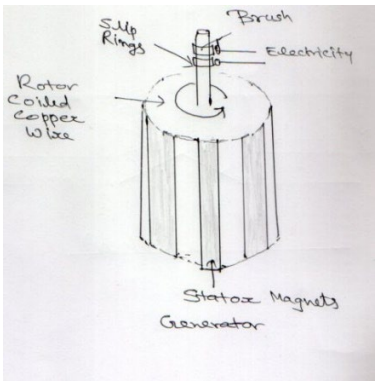

Fig. 3. Schematic generator

Here the process is boiler or steam generator can be fed to steam turbine, which is a prime mover for rotating generator shaft. Generator by dynamo effect produces electricity which should be stored either in batteries or in grid.

Another method of Hydrogen gas synthesis is by the chemical reaction of dilute sulphuric acid to zinc powder.

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H2SO4 +Zinc Powder=H2 + ...

Rest power generation technique remains same as stated above.

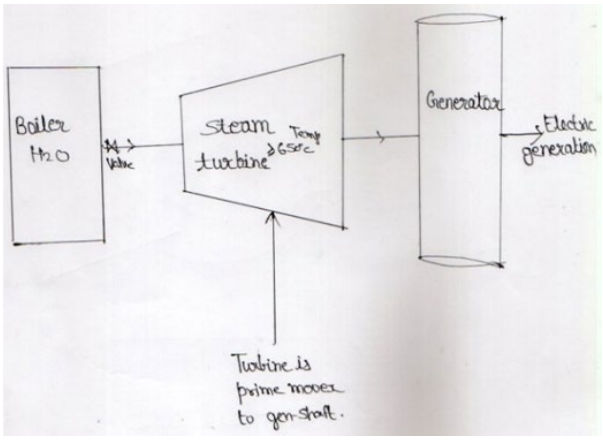

Fig. 4. Power generation by steam turbine

B. Power Generation by Ammonia Fuel

Ammonia has molecular formula of NH3

Here three atoms of hydrogen are associated with one atom of Nitrogen gas.

In above description author has elaborated that Hydrogen gas can be used in gas or steam turbine. NH3 gas same way can be used inside gas turbine. Comparative analysis between hydrogen gas and Ammonia gas proves that Ammonia combustion might produce some unwanted Nitrogen oxide which can be washed using scrubber unit.

NH3+O2 =NH2 +H2O

NH3+radical R=NH2+RH

Hydrogen and Ammonia fuel can be used in Marine engines, IC engines, Spark engines etc. without any problems.

C. Power Generation by Aluminium Fuel

Author has invented and researched that waste or fine product any type Aluminium power gas be used to successfully generate heat cycle and to produce gases for rotating prime mover shaft of generator. Aluminium powder can burn with oxygen in rapid way producing thermal energy (Gas, temperature, pressure) to produce power supply.

4Al + 3O2 =2Al2O3+ Heat energy

D. Power Generation by Hydro-Turbine

It is famous old traditional technique by which power is generated by making Dams in rivers and using it for running hydro-turbine.

E. Power Generation by Solar PV Cell

Power generation by Solar PV cell was invented by scientist Alexandre E B, Bell Lab, Daryl Chapin, Calvin Fuller etc, who contributed in invention and advancement of Solar cell.

Author gives full credit to scientist who invented methods of power generation of Solar power.

Solar Photovoltaic cell can use light photon rays of sun to produce electrical energy.

Above second diagram is for the concentrated solar power panels which can store infrared thermal energy and it can be used by the latent heat turbine generator or by the steam turbine.

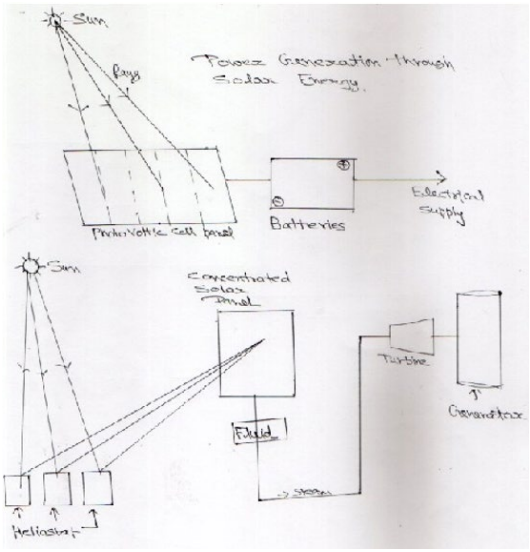

Fig. 5. Power generation by concentrated solar panel

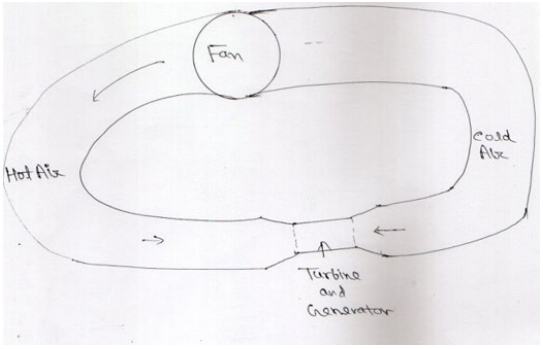

Fig. 6. Latent heat turbine cycle

When cold air and extremely hot air meets at turbine point it produces hurricane speeds and rotates turbine, hence producing electricity.

F. Power Generation by Air-turbine

Wind/Air turbine can produce electricity and it can be stored in batteries or in Grid.

Thanks to Scientist who invented this Mr. Charles F, Brush etc.

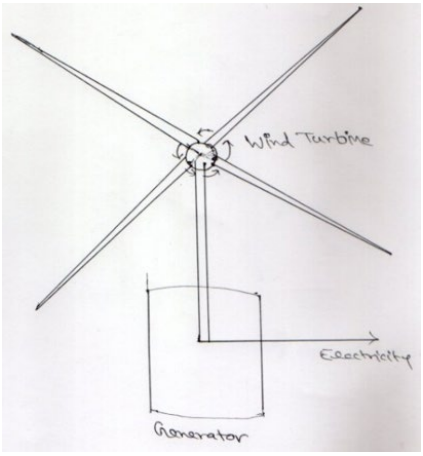

Fig. 7. Power generation through wind energy

G. Power Generation by Fall water

Power can be generated by the fall-water.

In many places we have rivers making fall or mountain making water-fall. This water dynamic energy can produce the electrical power supply.

Below is image of Special turbine which can use fall water.

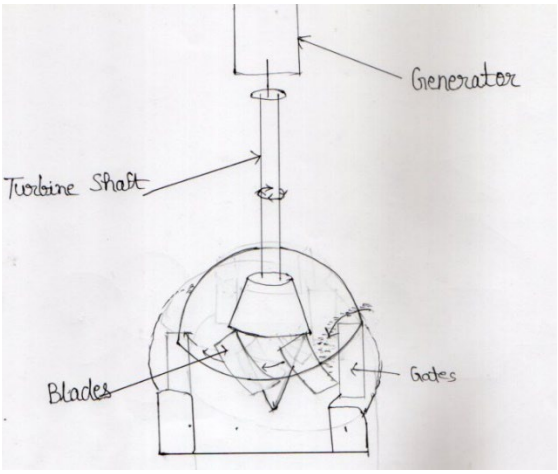

Fig. 8. Special turbine

As in diagram when water flows and does paddling effect in the turbine blades it rotates to shaft hence dynamo effect inside generator and production of electricity takes place.

Thanks to scientist who invented turbines and also to scientist who again modified it for fall water turbine.

H. Use of Electric Car

Thanks to scientist Robert Anderson, Anyos Jedlik, etc who used Mr. Faraday and other scientists' electrical principles and designed electrical vehicles.

Below is block diagram of electrical vehicle power system.

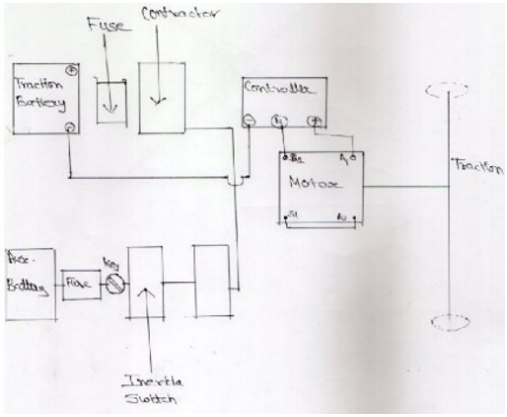

Fig. 9. Basic block diagram of electric vehicle

I. Power Generation by Nuclear Power Plant

Electrical power also can be generated by the nuclear power plant. In India Homi Bhabha had done lot of work in this field. Also control in nuclear radiation is a challenge in this system.

J. Power Generation by Sea-Wave

Beyond doubt sea wave (currents) can generate power generation. As rapid dynamic water moves the hydro-turbine can be a source of prime mover and it can produce electricity.

K. Power Generation by the Tidal Wave

Strong tidal wave where change of height tide is 5meters or more can be used to generate tidal power. Vertical dynamics of water creates the rotation in turbine hence dynamo effect inside generator and production of electricity.

L. Bio Fuel Power Generation

Bio fuel means CH4 production from the Manure, vegetable, fruit peel off etc. Fermentation of Manure semi liquid produces Methane gas. It may not qualify for carbon free fuel but still it is a source of power generation. With use of available techniques even carbon component can be washed off.

M. Piezo Electric Generator

Piezo crystal, Quartz crystal can oscillate by the Vehicular movement in roads, or by various movement activities of human being which can generate the nano / macro size power generation.

N. Power Generation by Frictional Energy

Frictional energy also surely can generate the power source in Nano / Macro level.

2. Conclusion

Author has elaborated and given various ways some of them traditional and power generation by Aluminium Inorganic fuel as new research. Overall, it is very useful to entire globe.

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