MINIATURE THERMAL POWER PLANT USING TEP TRANSDUCER FOR DOMESTIC AND INDUSTRIAL APPLICATIONS

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Abstract

Man has needed and used energy at an increasing rate for his sustenance and wellbeing ever since he came on the earth a few million years ago. Due to this a lot of energy resources have been exhausted and wasted. Proposal for the utilization of waste energy of foot power with human locomotion is very much relevant and important for highly populated countries like India and China where the roads, railway stations, bus stands, temples, etc. are all over crowded and millions of people move around the clock. This whole human/ bio-energy being wasted if can be made possible for utilization it will be great invention and crowd energy farms will be very useful energy sources in crowded countries. In this project we are generating electrical power as non-conventional method by heat energy .Non-conventional energy systems very essential at this time to our nation.

Keywords: Peltier plate, Polarity converter, Battery, Charging circuit, Inverter, AC and DC loads.

1. Introduction.

Electric energy availability has become of primordial importance in modern societies. In fact, it is so important that its fail can stop a whole city: modern trains, hospitals and industries, for example, would stop without electric energy.There are several ways of producing electric energy (for example, through hydroelectric, thermoelectric or wind power plants. Thermoelectric power plants have several environmental issues [3], but they are heavily used around the world.

This paper describes the working principle of thermal power plants and presents a miniature thermal power plant made with
Peltier plate.

Peltier Modules provide voltages using nothing but the heat emitted from various sources such as wood burning, candle flames, latent heat from industries, or the heat produced from the residential areas while cooking. The temperature difference created between the hot side and the cold side generates electricity. It can be highly useful in forest and mountain areas as well as in homes in case of power outages and in this situations we can use candle flames or wood as heating source for hot side and chilled water or ice as cooling source for the cold side also we can use heat sink on the cold side to increase and improve the speed of process. The core of the device is a significant number of Peltier modules and for general needs around ten Peltier modules are sufficient. They work by essentially moving heat from one side to the other side when heat is applied and the other side is kept cool with a heat sink or chilled water and ice. This generation of
electricity is caused by the temperature difference between two dissimilar semiconductors causes voltage difference. A metal tray is also needed to hold the cooling source in case it is water or ice and if the heat sink is used then they are attached to the cold side of the Peltier module and they are large enough to accommodate all the Peltier plates on the base with its printed text being upwards. Thermally conductive glue is used to join them strongly with the base of the cooling source. In the case of using metal tray to store the cooling source, outside

walls of the tray are covered by the plastic tapes to prevent shorting and other harms and modules are fixed at the bottom.

2. LITERATURE SURVEY

Ivan Sunit Rout et al have discussed in details the losses in steam turbine. The steam turbine is not a perfect heat engine. Energy losses tend to decrease the efficiency and work output of a turbine. This inefficiency can be attributed to the following causes. The velocity of the steam that leaves the turbine must have certain absolute value. The energy loss due to absolute exit velocity of steam is proportional. This type of loss can be reduced by using multistage turbine. In real thermodynamic systems or in real heat engines, a part of the overall cycle inefficiency is due to the frictional losses by the individual components (e.g. nozzles or turbine blades). The turbine rotor and the casing cannot be perfectly insulated. Some amount of steam leaks from the chamber without doing useful work. Each turbine rotor is mounted on two bearings, i.e. there are double bearings between each turbine module.

Vedavalli G. Krishnan et al have given a basic information and working of Tesla turbines. The Tesla turbine is a bladeless centripetal flow turbine patented by Nikola Tesla in 1913. It is referred to as a bladeless turbine. The Tesla turbine is also
known as the boundary layer turbine, cohesion-type turbine, and Prandtl layer turbine (after Ludwig Prandtl) because it uses the boundary layer effect and not a fluid impinging upon the blades as in a conventional turbine. Bioengineering researchers have referred to it as a multiple disk centrifugal pump. One of Tesla's desires for implementation of this turbine was for geothermal power, which was described in Our Future Motive Power.

Thermodynamic analysis of the steam power plant has been undertaken to enhance the efficiency and reliability of steam power plants by Anjali T H et al. In the presented work, most of the electricity produced throughout the world is from steam power plants. The present work deals with the comparison of energy and energy analysis of thermal power plant stimulated by coal. Generally, it is predicted that even a small improvement in any part of the plant will result in a significant improvement in the plant efficiency. Factors affecting efficiency of the Thermal Power Plant have been identified and analyzed for improved working of thermal power plant.

3. Implementation:

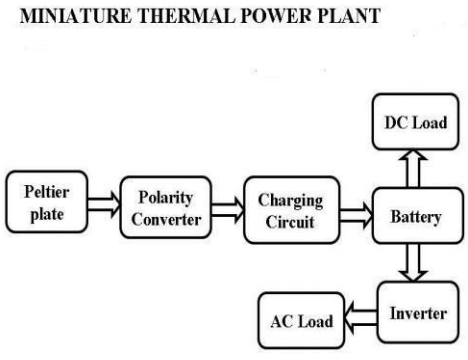

Fig.1 block diagram of the project

In this project the conversion of the Heat energy in to electrical energy. By using this energy fan will operates and the
energy is stored in a battery. The control mechanism carries the battery supply will pass to the inverter and it is used to drive AC/DC loads. The battery is connected to the inverter. This inverter is used to convert the 12 Volt D.C to the 230 Volt A.C. This 230 Volt A.C voltage is

used to activate the loads. We are using conventional battery charging unit also for giving supply to the circuitry.

In this project we are using TEP Transducer. Transducer is a device which converts one form of energy in to another form of energy. This includes electrical, mechanical, light and heat energy also. While the term transducer commonly implies the use of sensors/detector any device which converts energy considered as Transducer.

4. Related Work:

The brief introduction of different modules used in this project is discussed below:

THERMOELECTRIC PLATE:

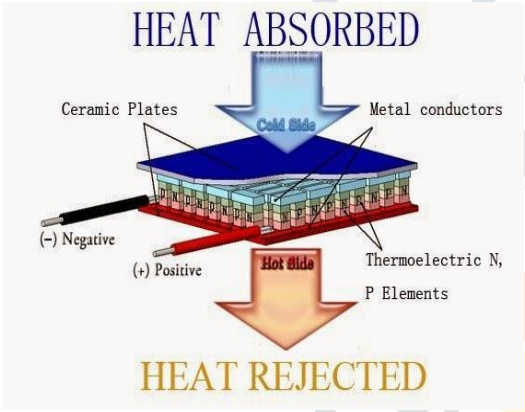

Fig.2 Peltier plate

PRINCIPLES OF OPERATION

Peltier effect is the basis of thermoelectric module operating principle. In peltier effect, on applying the voltage between two electrodes connected to sample of semiconductor material, temperature difference is created. A thermoelectric cooling (TEC) module is a semiconductor-based electronic part that breaking points as a little warmth pump. By applying DC control source to a TEC, warmth will be exchanged beginning with one side of the module then onto the following. It makes a cool and hot side.

They are comprehensively used as a piece of mechanical zones, for example, PC CPU, CCDs, flexible refrigerators, therapeutic instruments, and so forth.

Rechargeable battery:

Fig.3 Rechargeable battery

A rechargeable battery, stockpiling battery, or aggregator is a kind of electrical battery. It involves at least one electrochemical cells, and is a kind of vitality collector. It is known as an optional cell since its electrochemical responses are electrically reversible. Rechargeable batteries come in various shapes and sizes, running from catch cells to megawatt frameworks associated with balance out an electrical
dispersion networSeveral distinctive blends of chemicals are generally utilized,
including: lead– corrosive, nickel cadmium (NiCd), nickel metal hydride (NiMH), lithium particle (Li-particle), and lithium particle polymer (Li-particle polymer).

Charging circuit:

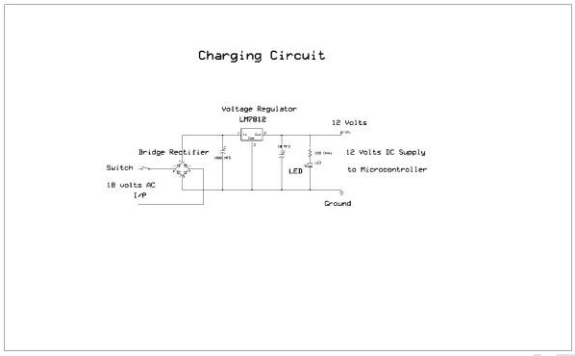

Fig.4 Battery charging circuit

From the above circuit diagram, we can see that the 12v AC is being converted to 12V pulsating DC which is in turn converted to smooth DC with the help of the Capacitor. This 12V Smooth DC is converted to 12V DC by the Voltage Regulator 7812. At the output of the regulator, we get some spikes which are not desirable. These spikes are removed with the help of another capacitor used. We can get 12V Steady DC at the output terminal which can be indicated if the LED glows.

Inverter:

Rechargeable battery which is connected to the kit via diode (to make the current unidirectional) will get charged.

12v, 20w inverter will get DC voltage from battery and it will convert it into square wave with 50Hz frequency.
This MOSFET will convert it into 12V AC and feed it to step up transformer.
The step up transformer will convert 12V ac into 230V ac So, finally the bulb will go.

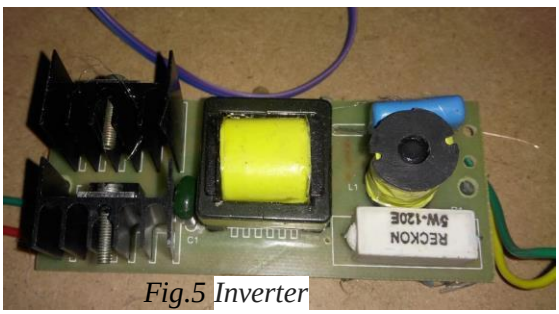

Fig.5 Inverter

4. ACKNOWLEDGEMENT

We would like to thank all the authors of different research papers referred during writing this paper. It was very knowledge gaining and helpful for the further research to be done in future.

5. Conclusion:

The project **"MINIATURE THERMAL POWER PLANT"** was designed such that the conversion of the Heat energy in to electrical energy. By using this energy fan will operates and the energy is stored in a battery. The control mechanism carries the battery supply will pass to the inverter and it is used to drive AC/DC loads. The battery is connected to the inverter. This inverter is used to convert the 12 Volt D.C to the 230 Volt A.C. This 230 Volt A.C voltage is used to activate the loads. We are using conventional battery charging unit also for giving supply to the circuitry.

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