

DEVICE FOR GENERATING ELECTRICITY USING EXHAUST GASSES

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Abstract

The proposed invention relates to a device for generating electric power by using exhaust gasses, comprising a storage unit installed in the device that stores the cold liquid, and a housing comprising primary flow passage connected to outlet of power plant turbine that allows the passage of the hot temperature gasses, a secondary flow passage attached to the storage unit that allows the passage of the boiler feed liquid, a battery connected to the module to store the generated electric current, and multiple peltier module that generates electric energy.

Keywords: electricity, peltier module, cold liquid, storage unit, battery.

1. Introduction

Electricity is basically flow of electric charge. It can be generated by several methods, such as coal power generation, thermal power generation, nuclear power generation, hydropower generation, geothermal power generation, battery power generation, and wave power generation etc. The thermal power generation is process of generating electrical-energy by converting thermal energy to rotational energy, which is further used to generate electric energy using electrical generator (i.e. dynamo)[1]. Conventionally, the electrical energy is generated by thermal power plant by using fossil fuel or solar energy as source of heat energy[2]. The generated heat energy is used to heat water present inside a boiler to convert the water content in to gasses. The generated gasses are pumped into the gas turbines, due to which the turbine rotates[3]. A generator is attached to the turbine by rotating shaft, as the turbine spins the generator also spins and generates electricity. After the generation of electricity, the exhaust gasses are passed through a cooling tower for getting cooled[4]. But in this cycle, the heat energy of exhaust gas is wasted. In order harness the heat of exhaust gasses, there is need to develop a device that

utilizes the heat of exhaust gasses that are liberated out from the gas turbines to generate electricity[5].

2. Experiment

The proposed invention relates to a device for generating electric power using exhaust gasses, thereby minimizing the loss of heat energy liberated during the conversion of thermal energy to mechanical energy [6]. The device is assembled to generate the electric power from the exhaust gasses emitted from the turbine during the conversion of mechanical energy to electrical energy. The storage unit is installed in the device that stores liquid, wherein the liquid is preferably water [7]. The housing is basically an outer converting of the device which is attached to the outlet of the power plant turbine. The primary flow passage having hollow cylindrical configuration is installed in the housing that allows the passage of high temperature exhaust gasses emitted from the outlet of the power plant turbine to a lower end of the primary flow passage, wherein the gasses are collected from an upper end of the flow passage [8]. The gasses are maintained at the temperature range of -60 degree Celsius \pm 500 degree Celsius to 600 degree Celsius. The secondary flow passage having rectangular configuration is attached to the storage unit that allows the passage of the boiler feed liquid from upper end of the secondary flow passage which are collected from the lower end of the same passage. It is maintained at the temperature range of -60 degree Celsius \pm 250 degree Celsius to 270 degree Celsius in the passage. The primary flow passage is preferably a gas flow passage and the secondary flow passage is preferably a boiler liquid flow passage. The peltier module having a stair helical configuration is associated inside the housing that generates electric energy from the temperature difference between the gasses and the liquid. It works on both see-back effect and peltier effect. The module consists of two side, such as a hot side and a cold side. A piece of a metal is taken, then one end of the metal is heated and simultaneously another end of the metal is cooled. The aluminums sink is used to maximize the surface area in contact with cooling medium. It is cost-effective and flimsy in nature. The electrons surrounding metal atoms at the hot end is having higher energy than that of electrons present on the cold side. Due to which the hot electrons moved from the hot side to the cold side at a faster rate as compared to the movement of the electrons from the cold end to the hot side, which means that the cold side becomes more negatively charged and the hot side becomes the positively charged. This process creates

temperature difference between the both sides, such as hot side and cold side which leads to the generation of electric energy. The temperature difference between the hot side and the cold side is referred to as ΔT_{max} , which is preferably around 70 degree Celsius. The battery is connected to the module that stores the amount of electric energy generated by the peltier module from the temperature difference between the high temperature and reduced pressure gasses and the boiler feed liquid.

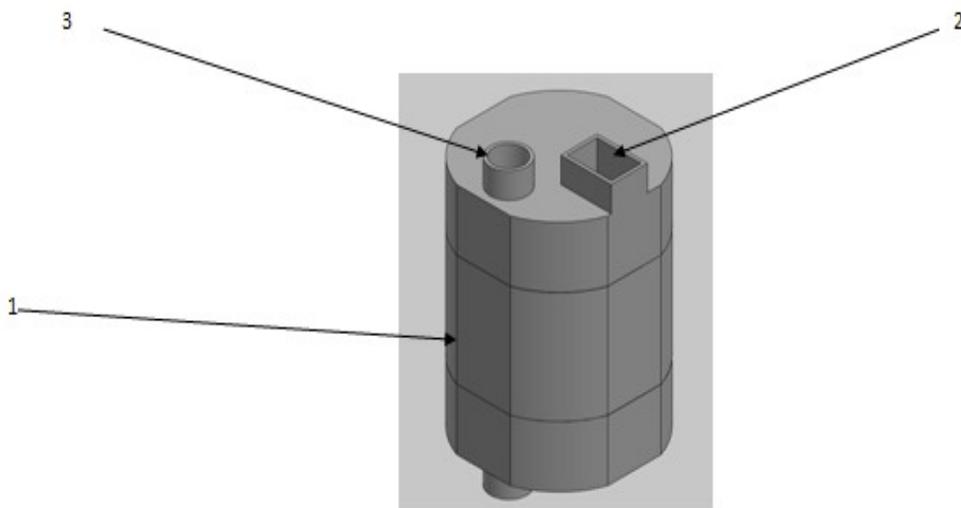


Figure 1

3. Result and conclusion

The device is fabricated to convert the exhaust gasses liberated from the turbine to electric energy by passing the same through the peltier module. It is environment friendly in nature and also minimizes the loss of heat energy. In the peltier module both the liquid and exhaust gasses are not in direct contact to each other, they are separated to each other by the pelteir surface. The arrangement of exhaust gasses passage and liquid passage are used to create temperature difference so as to generate electric energy.

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