

A Review on working of Compressor Less Refrigerator

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I. Abstract:

The impact of on-going progress in Science and Technology has created a variety of systems that can be used in the generation of power from Renewable Sources of energy and one of these is Solar Energy. The project which we have prepared utilizes either solar energy with the use of Thermoelectric Module and Photovoltaic Module for generation of energy or simply direct electricity which we further use for cooling and heating effect. It is basically a portable cooler which is mainly designed for the convenience of the travelling people and the militaries. The most important utilization of this portable cooler is for the preservation of insulin in extreme conditions. A Thermoelectric module (TEM) is used instead of compressor so that it become portable, as it is based on the principles of peltier effect. The use of peltier effect is to create a heating side and a cooling side and also to maintain effectiveness.

Keywords: Peltier effect, Thermo-electric module, photovoltaic module

II. Introduction:

Evaporative cooling in refrigeration is an old idea but due to its dependency on outside environment (relative humidity, dry bulb temperature) it is limited to certain parts of world. Some of the examples for evaporative cooling are, clay pots used in India for cooling the drinking water. In Mexico, fishermen use freezer to produce ice for storing fish. In Australia, Cool gardie safe are used

for refrigeration purpose. In this project we have tried to minimize the effect of outside environment. With time many techniques, laws and methods have been discovered by scientists. The Seebeck and Peltier Effect account to be one of them. When a closed circuit of two dissimilar metals and two junctions is formed, a current will flow between the junctions or the circuit. This phenomenon is known as the Seebeck effect. The effect takes place

when the temperature between the junctions shows difference. The greater the temperature difference, the more will be the electric current between the junctions. This is the fundamental principle used in the thermocouple. The combinations of metals or semiconductors affect the flow of current. Jean.C.Peltier, a French watchmaker and an amateur scientist discovered a reverse effect of the Seebeck. He discovered that using joined dissimilar metals heat pump can be made. He found that by the use of two dissimilar metals if current is passed between the junctions, the two junctions will create a temperature difference between them. One junction becomes hot and the other becomes cool. This is the basis on which our project works. **The Peltier effect is the heat liberation at one junction of thermocouple and heat absorption at the other, when an electric current flows into it.** This effect is used in thermal analysis and also for heat flow compensation. With time many researches were conducted, many new theories and with them many new devices were put forth. Air Conditioner, Refrigerator etc. are few of them, where by the use of electricity, cooling is obtained. But in these devices cooling does not just

takes place totally due to electricity (here for efficiency and fast rate of cooling Refrigerants), compressors are used.

III. LITERATURE REVIEW

The prototype compressor less refrigerator was designed and developed for monitoring its performance in Indian climate and evaluates the economic feasibility and affordability in domestic, commercial and industrial applications. In this method, this prototype refrigeration system, refrigerator either used the photovoltaic power or direct electricity for performing its operations. This system was designed with battery storage for enhancing the performance of the refrigerator. This was different from conventional refrigeration systems, thermo-electric refrigeration. It was mainly based on the Peltier effect and it does not require any compressor, expansion valves, absorbers, condensers or solution pumps. In this system electrons were used as a heat carrier instead of the refrigerants. They have made a new refrigeration cum heating utilizing 3 thermo-electric (TEC) modules mounted around a load cabinet. The performance of this method was evaluated with an aluminium cabinet. The cabinet attained a temperature of about 8°C

(min) till 200°C (max). It was observed in this experiment that the life span of thermo-electric heater cum refrigeration was more than twice the life span of existing conventional refrigeration (or) heater system. S. Haidar *et al* [1] described the conversion of thermal energy into electrical energy (Seebeck effect) or electrical energy into thermal energy (Peltier effect) takes place with the help of thermo-electric devices. The electromotive force was generated when heating between two dissimilar metals takes place. In this the reverse operation was also possible. The transformation of heat from one side to another side was made possible by passing electric current with the development of semiconductors. In this Peltier cells were used as a heat pump. That was used for cooling the small refrigerator, CPU coolers, and electronic component.

IV. EXISTING SYSTEM

In recent years the price of thermoplastic materials is declining, so the cost of semiconductor and refrigeration production will decrease, and its performance has improved, which greatly contribute to the promotion of the technology of semiconductor refrigeration. In contrast, semiconductor refrigeration

has more obvious advantages [2]. It does not use refrigerants without environment pollution and complicated transmission pipeline. It can only cool a special device or a specific area. The cooling box has small size and light weight, and it can save the construction area significantly. No mechanical rotation, so the cooling box is reliable and the maintenance was easy without noise and wear. It can achieve the two different purposes of cooling and heating by changing the direction of current. The cooling was quick and it can be controlled by regulating the work of power, so the control is very convenient. In this case, the product was designed by combining the two advantages. The system includes solar cells, controllers, batteries, semiconductor refrigeration part, and so on. Since solar energy is not continuous, in order to ensure that the refrigerator can be worked continuously at night and cloudy days, generally the system was equipped with a Single mode phase supply system (SMPS) which work on electric power and convert 250V into 12V.

V. FUTURE SCOPE

To build a real time system with,

1. High efficiency for the domestic purpose.
2. To reduce the size of the panel as much as possible.

With recent development taking place in field of thermoelectric and Nano science different thermoelectric material with high temperature difference to be explored this will further help to reduce the temperature, current below and can also perform better at higher ambient conditions.

VI. CONCLUSION

In this paper, the Peltier module is used for the purpose of heating and cooling. The minimum temperature achieved was found to be 20°C for cooling and the maximum temperature was 60°C for heating in this experiment. The cost of solar panels is high, so the size of solar panel must be reduced in order to reduce the cost.

VII. REFERENCES

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