COMPARISON OF CONVENTIONAL AND NON-CONVENTIONAL COOLER

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ABSTRACT

Coolers or other air-cooling equipment used in day-to-day life solved the cooling problems with good cooling and sufficient air conditioning, but it requires water or the present air-conditioning system produces cooling effect by refrigerants like Freon, Ammonia, etc. By using these refrigerants can get maximum output but also disadvantages and one of the major disadvantages is harmful gas emission and global warming. This problem can be overcome by using thermoelectric effect (Peltier effect, Seeback effect).It can be protecting the environment. The present paper deals with the study of thermoelectric air conditioner over conventional air conditioner. Thermoelectric cooling systems have advantages over conventional cooling devices, such as compact in size, light in weight, high reliability, no mechanical moving parts and no working fluid which makes it better alternative.

Keywords*: Analysis, investigation, research*

1. INTRODUCTION

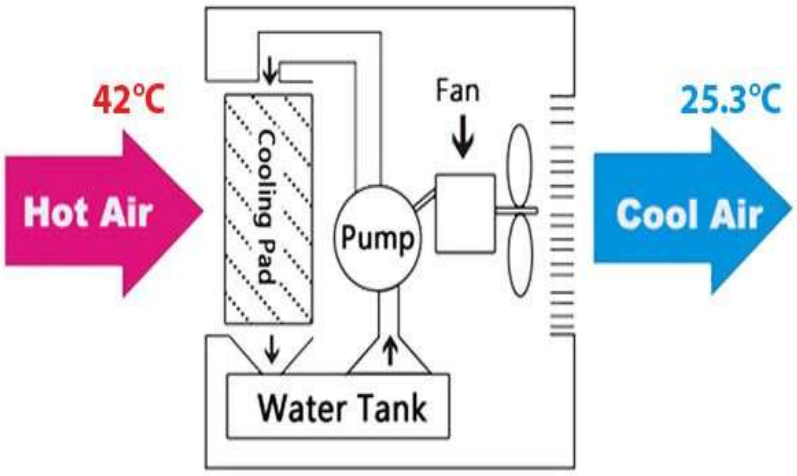
This paper focuses on the drawbacks of conventional air conditioning systems that utilize refrigerants like freon and ammonia, leading to harmful gas emissions and global warming. To mitigate these environmental concerns, the implementation of thermoelectric modules based on the Peltier effect is proposed as an alternative air conditioning solution. These water-less air coolers are semiconductor-based electronic devices that operate without the need for water, offering a more environmentally friendly cooling solution. The functioning of a water-less air cooler involves applying a low voltage dc power source to a semiconductor plate, which facilitates the transfer of heat from one side of the module to the other. Consequently, one side of the module is cooled while the opposite side is heated. By placing the semiconductor plate on an aluminum fin maintained at room temperature and connecting it to a suitable battery or dc power source, the "cold" side of the plate can reach approximately 0°c. Importantly, this phenomenon can be reversed by altering the polarity of the applied dc voltage, allowing heat to be moved in the opposite direction.

The paper emphasizes the drawbacks of current air-cooling systems that heavily rely on water or ice, leading to significant water wastage and subsequently impacting water scarcity and increased bills. Additionally, evaporative coolers face a major limitation in their dependency on a constant supply of fresh air. Without proper ventilation, the cooling effect diminishes, leading to damp air, condensation, and reduced performance. To overcome the identified limitations and ensure a sustainable and economical air-cooling solution, the development of water-less air coolers is presented. These semiconductor-based electronic coolers operate without water, eliminating the water wastage associated with traditional air coolers. By embracing this technology, we can achieve efficient cooling while protecting the environment and minimizing the harmful effects of gas emissions and global warming

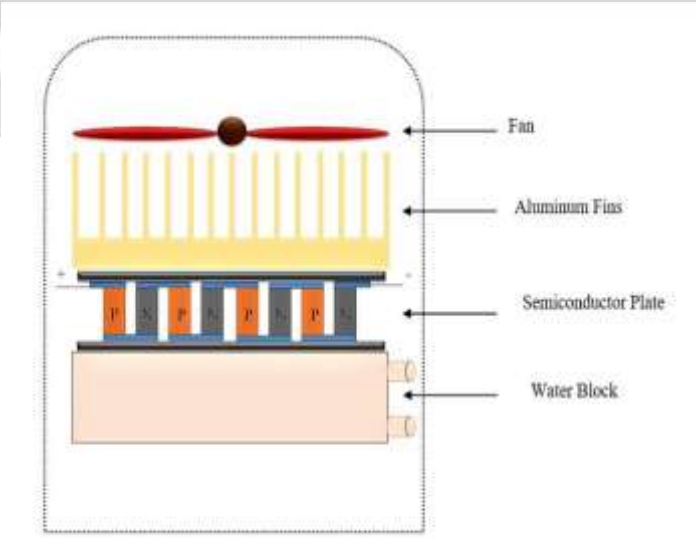
2. METHODOLOGY

- **Comparison on the basis of working Principle**

Conventional: Air coolers work on the evaporative cooling principle, where water evaporation is used to cool the air. One simple example of evaporative cooling is sweating in humans. When the sweat begins to evaporate, it draws out excess heat absorbed by the skin in the form of gas which results in the cold in the case of cold weather.



Non-Conventional: The water-less air cooler is a semiconductor-based electronic cooler which uses zero water. By applying a low voltage DC power source to a semiconductor plate, heat will be moved through the module from one side to the other. One module face, therefore, will be cooled while the opposite face simultaneously is heated. If a semiconductor Plate was placed on a heat sink that was maintained at room temperature and the Plate was then connected to a suitable battery or other DC power source, the "cold" side of the Plate would cool down to approximately 0°C. It is important to note that this phenomenon may be reversed whereby a change in the polarity of the applied DC voltage will cause heat to be moved in the opposite direction.



- **Effect on environment**

Conventional: The drawbacks of conventional air conditioning systems that utilize refrigerants like freon and

ammonia have been widely recognized for their contribution to harmful gas emissions and global warming. These refrigerants release potent greenhouse gases into the atmosphere, exacerbating the adverse effects of climate change.
Non-Conventional: Implementation of thermoelectric modules based on the Peltier effect is an alternative air conditioning solution. These modules offer a water-less cooling solution and operate as semiconductor-based electronic devices, eliminating the need for water and providing a more environmentally friendly approach to cooling.

3. CONCLUSIONS

In conclusion, we introduce a water-less air cooler that utilizes semiconductors, specifically bismuth and telluride, to achieve efficient and reliable cooling. The construction of the cooler involves placing the semiconductors thermally in parallel and electrically in series. Thermally conducting plates facilitate the transfer of cold between the aluminum fins and the surrounding environment and a fan ensures the distribution of cool air. One of the key advantages of our water-less cooling system is its independence from water-reliant evaporative cooling methods, reducing noise and eliminating water usage. The system provides uniform cool air tailored to specific requirements, achieved by precise regulation of voltage and current flowing through the semiconductor plate. Furthermore, our cooling system is highly energy-efficient, resulting in cost savings and supporting environmental sustainability. By utilizing semiconductor-based cooling technology, we offer an economical and practical solution for various cooling applications with zero water use.

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