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Water Extractor and Dehumidifier using Peltier Module

(Water Generation)

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***Abstract*—The relative humidity in the coastal areas is quite high around 70 to 80%. Therefore, the air in coastal areas can be utilized to fulfil the water required for the people by using a dehumidifier unit. In coastal areas even the solar insolation is also considerably high round the year. Hence this solar insolation can be used to generate the required power to run the dehumidifier unit. This project aims to solve the drinking water problem in the coastal areas from the atmosphere by harnessing solar energy. Such a device is called water extractor and dehumidifier.**

I. INTRODUCTION

The main objective of this work is to build a portable device that can be used to fulfill the water requirements of a coastal households. This device will first condense the water present in the atmosphere and then purify it so that it can be used for drinking.

The atmospheric water generator is designed to ensure the effectiveness of the final project with the following three requirements.

They are-

- Portability of Water – The quality of water produced must fit in to the World Health Organization (WHO) drinking water standards.
- Simplicity of Use – The design must be feasible to operate by persons even with unskilled person.
- Safety – The design of the device must not cause a hazard to users during its regular operation.

The developed model able to meet the several goals. Such as-

- Utilization of multiple power sources like solar, wind, traditional power grid etc.,
- Maximization of water production per unit energy consumption.
- Low water production cost of both capital and production costs.

The method by which water vapour in air or humidity is extracted from air maintaining the dry bulb temperature persistent is called dehumidification. The machine that is capable of carrying out this process is called as a "Dehumidifier".

This method is characterized by a vertical line on the psychrometric chart beginning from the first value of relative humidity, ranging downwards and terminating at the final value of the relative humidity. Like for the pure humidification process, in real condition the pure dehumidification is not possible, since the dehumidification is always escorted by cooling or heating of the air". The method in which the air is cooled reasonably and at the same time the water is extracted from it is called cooling dehumidification. Cooling dehumidification is acquired when the air at the particular dry bulb temperature is cooled to a lower point than the dew point temperature.

The method in which the air is heated and at the same time water is extracted from it is called heating dehumidification. This is obtained by passing the air over some chemicals like alumina and molecular sieves. These elements have an intrinsic property due to which they go on discharging the heat and also have the property to captivate the moisture. Those types of chemicals are known as the hygroscopic chemicals"

II. COMPONENTS

A. Peltier Module

It is electronic devices designed for cooling objects to below the ambient temperature. Peltier unit consists of two types of semiconductor elements arranged in tandem sandwiched between copper substrates. When electricity is passed through the unit, electrons move in one element and positive holes move in the other element, this is called the "Peltier effect." This allows one side of the substrate to absorb heat and the other to radiate heat, so the hot and cold sides to be switched depending on the current direction. It can also be used as a thermoelectric power generation module using the "Seebeck effect" in which a current flow by applying a temperature difference on both sides of the Peltier module. In this project TEC1-12715, TEC1-12706 is used, it says that itwhich runs with maximum voltage of 12V and max current of 20A.

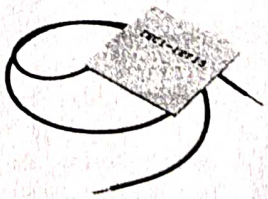

Figure 1: Peltier Module

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