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Water Filling Container By Using Thermocouple

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ABSTRACT

In many countries like India it is difficult to obtain water resources for irrigation or other purposes, especially in the arid regions. The problem of water scarcity is also observed in other places of the world due to lack of rainfall. However, in highly humid areas such as places close to the sea, water can be obtained by condensing the water vapour present in air. In our project, we present the method to develop a water condensation system based on thermoelectric cooler. The system consists of cooling elements, heat exchange unit and air circulation unit. The electricity drives the cooling elements through a controlling circuit. Atmospheric Water Generator is a device that can convert atmospheric moisture directly into usable and even drinkable water. It is such a device which uses the principle of latent heat to convert molecules of water vapour into water droplets. This system efficiently operates in ambient temperatures between 21-32 degrees with water humidity in the air ranging between 40 and 100 percent.

Keywords: Water condensation, Thermoelectric peltier, Dew condensation (latent heat).

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I. INTRODUCTION

In recent time the state has faced tremendous issues regarding the water shortages. We cannot have a method that can produce water very easily. A relatively new method to cool warm air and condensate its contents of moisture is to use thermoelectric (TE) devices when two dissimilar materials form a junction. If a voltage is applied, heat will flow from one end of the junction to the other, resulting in one side becoming colder and the other side warmer, what is called Peltier effect and electron hole theory. Peltier coolers consist of a Peltier element and a powerful heat sink/fan combination to cool the thermoelectric cooler.

Simply condensation of the humidity that is contained in the air. You always have a certain percentage of humidity in the air, it doesn't matter where you are even in the desert. That means you would always potentially be able to extract that humidity from the air

II. OBJECTIVE

Global warming and changing climatic condition has increased scarcity of water in major parts of world. .Atmosphere contains large amount of water in the form of vapour, moisture etc. There is no such system that can retrieve this water from atmospheric humidity at small scale. Also, the global consumption of potable water has increased six fold over the past century and available resources aren’t enough to fulfil this need.

Water available in water bodies is not potable and requires to go through various stage of filtration.in our project we want to make use of a thermocouple effect and thus trap maximum moisture in air and thus produce water. This can be done by use of peltier effect that is similar to the requirements of our project. We can make use of a container or any water storing device from water bottles to vessels to storage water tanks.

III. LITERATURE REVIEW

[1] Alexander Bolonkin

Author offers and researches a new, cheap method for the extraction of freshwater from the Earth's atmosphere. This new method may be used at any point in the Earth except Polar Zones. The author's method has two working versions. The first variant the warm (hot) atmospheric air is lifted by the inflatable tube in a high altitude and atmospheric steam is condensed into freshwater in the second version, the warm air is pumped 20-30 meters under the sea-surface. In the first version, wind and solar heating of air are used for causing air flow. In version 2 wind and propeller are used for causing air movement. The first method does not need energy, the second needs a small amount. Moreover, in variant the freshwater has a high pressure (>30 or more atm.) and can be used for production of energy such as electricity and in that way the freshwater cost is lower.

[2] Aditya Nandy, Sharmi Saha, Souradeep Ganguly, Sharmistha Chattopadhyay-

Applying this system in a highly humid region almost 1 Litre of condensed water can be produced per hour during the day light, this is a promising result; then a more enhanced system can be designed that encounters higher power solar cells and also has the adroitness to store the excess energy during the day light that is to be used at night; indeed the economical advantage of this kind of system is a bit obscure due to the relatively high installation cost.

This idea can be extended further in future –

1) For large scale implementation, RO and UV water filter can be used for producing such water that meets the standard of WHO and BIS easily. 2) Peltier device has many types of models which are much efficient than TEC1. Those can be used. 3) As the project aims at producing water from atmosphere and keeping this device handy, large sized scrubbers are not used for better air filtration. Scrubbers can remove all the oxides from the air. For large implementation it can be handled. 4) The concept of this project can also be used as a better alternative in refrigeration science against conventional systems.

[3] Raghied Mohammed Atta:

In this paper we build water condensation system based on thermoelectric cooler. The system consists of cooling elements, heat exchange unit and air circulation unit. A solar cell panel unit with a relevant high current output drives the cooling elements though a controlling circuit. A relatively new method to cool warm air and condensate its contents of moisture is to use thermoelectric (TE) devices when two dissimilar materials form a junction. If a voltage is applied, heat will flow from one end of the junction to the other, resulting in one side becoming colder and the other side warmer.

The system is self powered and can be used in isolated and desert areas to condensate water from the surrounding humid air. Applying the system in high humidity see area produced 1L of water per hour which can be used mainly for irrigation. The economical advantage of this kind of system is still obscure due to the relatively high installation cost. This system would be a long-term cost saving system since the energy source is free and the solar sub-system generally requires little maintenance. The development and production of such equipment is a future business possibility.

[4] Kiran Pawar, V. S. Shinde

The Prime objective of this study is to present renewable portable solar based thermo-electric system to dehumidify air and produce water. TEC1207 module powered by 140 W Solar Photovoltaic cells is used. Vertical and Inclined plate with the face upward on which TEC12706 array is mounted with heat sink of 0.0945 m2 area for high efficient condensation rate. Total condensation surface area is 1.0278 m2. The experimental setup is to produce the moderate quantity of water as compared with other methods. Water condensation is achieved by lowering the surface temperature below the dew point temperature of ambient air. Ambient Temperature and Relative humidity are the factor on which condensation depends. The experiment is conducted for various ambient temperature and humidity values in the months of May at Pune location. It is found that there is an inverse relation between the wind velocity and water productivity. Hence the optimized value of wind velocity is determined by trailing on different speed of inlet fan. For better insulation and water resistivity Nitrile foam with aluminium foil is used for air tight chamber to maintain cooling effect for condensation.

The experimental setup was tested during the month of May 2015, At Pune location. The following data are measured on a daily basis; ambient air temperature, relative humidity, air velocity, air mass flow rate, power produced by solar panels, and the volume of water collected hourly. An experimental autonomous active dew condenser based on the thermo-electric effect and powered by solar photovoltaic energy has been designed and tested. We obtained the 2.67 Litres of water in eight hours of working at minimum power consumption. The desired outcome of the system is to maximize the volume of condensed water while energy consumption remains at a minimum. We compared the result of condensation on inclined and vertical plate TEC12706 array. We got high condensation rate on an inclined plate at optimized 5.2 m/s wind speed.

IV. CONCLUSION

We have to make a device which will not only making farming independent of rainfall shortage but also provide pure drinking water for people in regions where draught conditions are faced frequently. The morning hours between 5 AM and 8AM were found to the best period of day for collecting water. Water condensation in the experimental system developed is not practical for air relative humidity lower than 20% (even in the morning).

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