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SOLAR POWERED ATMOSPHERIC WATER GENRATOR BY USING TEC

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ABSTRACT

We introduce an Atmospheric Water Generator which works on the principle of Thermo-Electric Couple (TEC) Device. According to the Previous Research papers we had studied that we can extract water from atmospheric air. We noticed that the water can be produce from highly relative humidity air with moderate atmospheric temp. It is highly applicable in desert area, in sea, rural area, etc. Many people in the world do not have access to clean fresh water. Also, drought has plagued many regions in the world, devastating crops and brought societies to the brink of collapse (Such as the severe drought in the city of Cape Town in South Africa right now). The UN has projected that the demand for fresh water will exceed the supply by 40%, so it is time for engineers to step in and find sustainable solution to the water crisis. Our project is trying to address the water shortage problem. Huge amount of water vapor is present in humid atmosphere, especially in Al Khobar where the humidity reaches high percentage, so it is imperative to design atmospheric water extraction and collection system. We will use solar cells and thermoelectric materials to design innovative, simple and inexpensive atmospheric water generator. This water generator could be used in homes to provide people with fresh water or can be used in farms for irrigation purposes. Fresh water supply is one of the most limiting conditions for the populations of arid regions. A concept of extracting water from humid air has proven to offer a viable solution for such regions in world energy scenario. Limits of water production from atmospheric water vapour are investigated for cases where fresh hot humid air is cooled over evaporator coils of refrigeration machines and then directed to open localized areas. This application may be considered as a source of limited amounts of potable water at a free cost since the water is a by-product of the climate conditioning process. For high air velocities, water yield was found to diminish due to insufficient evaporator capacity. On the other hand frosting effect was found to bind the vapour condensation process due to coolant starvation. A working chart was developed for quick prediction of water yield for any combination of atmospheric air temperature in the range (25 < Ta < 40°C).

INTRODUCTION

Petroleum is the foremost and mainstay of modern civilization. It is one of the nature's rare and valuable creation. Its formation takes millions of years which insist proper utilization of the resource.

In present scenario, fuel stations are operated manually which consist a controlling unit to perform various tasks. The present manual fuel stations consume more time and requires substantial man power.

Moreover, it is prone to malpractices and higher probability of human initiated errors. These limitations restrict installation of fuel stations in distant areas.

The main aim of this project is to deal with all stated problems by developing an automated petrol

LITERATURE SURVEY

Matthieu Cosnier (2008) presented an experimental & nume rical study of thermoelectric air-cooling & air-heating system. They have reached a cooling power of 50W per module, with a COP between 1.5 to 2 by supplying an electrical intensity of 4A maintaining the 5 degree Celsius temperature difference between the hot & cold sides. P. Ancey, M. Gshwind (1995) presented New Concept of Integrated Peltier cooling device for the Preventive Detection of Water Condensation Mr. Swapnil B. Patond , Miss. Priti G. Bhadake (2015) presented an Experimental analysis of solar powered Thermo-electric Heating & Cooling System Prof. Pushkarny B.H. (2016) presented Solar Refrigeration using Peltier Effect. Prof. Vivek R. Gandhewar, Mr. Mukesh P. Mangtani (2013) , “Fabrication of solar operated heating & cooling system using thermo-electric couple”. AIM & OBJECTIVE Our main aim is to extract water from atmosphere using peltier effect. The main objective of this project is to create a product that is able to produce safe & clean drinking water while only consuming air & energy. From this we can extract water without compressor & condenser. The project is an attempt to provide drinking water to the people where there is shortage of pure and fresh drinking water. CONSTRUCTION The construction setup of the AWG is as follows, a) Solar Panel b) Heat Pipe & Exhaust Fan c) Peltier Module (TEC1-12706) d) Battery e) Stainless Steel Cone f) Water Collector A) Solar Panel:- In the construction solar cell is located at the top of the model which

direct converts solar energy into electrical energy by conversion of light or other electro-magnetic radiation into electricity. B) Battery:- The direct supply of solar cell is to the battery for charging an main purpose of the battery is to provide electric supply for peltier plate and heat pipe exhaust fan. C) Heat Pipe & Exhaust Fan:- Exhaust fan is attached to heat pipe and it is used for transfer the heat from hot side of peltier plate to the atmosphere and it located on the hot side of peltier module. D) Peltier Module:- In construction we have used TEC1-12706 solid state peltier module and it is located below the heat pipe in which hot plate is at upper side and cold plate is at bottom side. E) Stainless Steel Cone :- The main purpose of stainless steel cone is to collect the moisture, droplets of water in the container and it's located below the cold side of peltier plate. F) Water Collector :- It is used to collect the water droplets from stainless steel cone. Solar Powered Atmospheric Water Generator By Using Thermo-Electric Couple Nikhil Bhatt1 , Shubham Lot2 , Roshan Dalvi3 , Mehul Kasbe4 1Mechanical Engineering, Dilkap College & Institute, Neral , India , bhattnikhil32@gmail.com 2Mechanical Engineering, Dilkap College & Institute, Neral, India , shubhamlot1@gmail.com 3Mechanical Engineering, Dilkap College & Institute, Neral , India , dalviroshan92@gmail.com 4Mechanical Engineering, Dilkap College & Institute, Neral , India , mehulkas777@gmail.com International Journal of Scientific & Engineering Research Volume 10, Issue 5, May-2019 ISSN 2229-5518 54 IJSER © 2019

METHODOLOGY

1Insted using compressor here we used TEC.

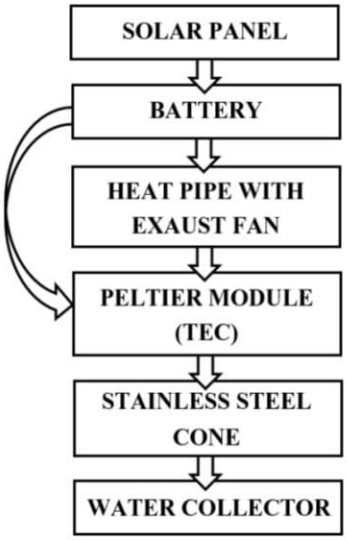
2 Here we use solar energy which is the renewable energy source.

3.Fast operation by using TEC module.

4.No moving parts is used so the maintances is frequently required.

PROJECT MODULE

FLOWCHARTs



FUTURE WORK and CONCLUSION

The tests were done in Rourkela which is a region with low humidity. And based on our calculation the humidity of a region must remain above 50% for proper functioning of the device. So we expect that the water output may increase if the device is tested in coastal areas where the humidity is high. 2. As such the cold surface area of the Peltier device is very less (4cm*4cm). So we used a copper plate in contact with the cooling surface of the Peltier device because of its high conductivity expecting that the cold surface area will increase thereby increasing the condensation area. But finally in the prototype when we used the copper plate proper thermal contact between the cold Peltier surface and

the copper plate could not be achieved. This maybe the possible reason for low efficiency. 3. On running the device, initially condensation started and water droplets were formed on the cold surface of the Peltier device. But subsequently due to the deposition of these water droplets the thermal conductivity of the region decreased as water is not a good thermal conductor. Hence the condensation process slowed down subsequently. In order to increase the output in the future, a wiping mechanism may be incorporated in the device so as to increase the condensation rate. 4. Presently, we have used only two Peltier devices in the prototype. In the future the prototype may incorporate another two Peltier devices so as to increase the water output. 5. For giving the prototype an environmental friendly flavour it may include a solar power source (solar panel) in place of the present AC power source without much modifications in

REFERENCE

1) Brown, D.R., Fernandez N., Dirks J.A., Stout T.B. "The Prospects of Alternatives to Vapor Compression Technology for Space Cooling and Food Refrigeration Applications". Pacific Northwest National Laboratory (PNL). U.S. Department of Energy, 2010

2) Prashant Mehta, Centre for Waste Recycling & Remediation Technologies National Law University, Jodhpur ,Scholars Research Library Archives of Applied Science Research, 2012, 4 (1):497-507 Impending water crisis in India and comparing clean water standards among developing and developed nations

3) J.C. Swart, School of Electrical Engineering at the Cape Technician, “Solar Refrigeration Using the Peltier Effect”.

4) Greg McPheters; Naomi Blackburn; Michael Armedion, "Environmental assessment of air to water machines-triangulation to manage scope uncertainity", Springer-Vsuccumbed Berlin Ileidelberg 2013, vol 18, pp. 1149-1157, 27 March, 2013.

5) Robert A. Taylor By Comprehensive Optimization for Thermoelectric Refrigeration Devices.