Generation of Water From Air

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Abstract-.Theoretical World frantically needs elective "water development" strategies and delivering water from air .The absence of reasonable, drinkable water for individuals around the world is turning into an intense issue, and later distributed stories address the worries from researchers around the world.This innovation has capacity to meet and fill the developing interest for practical, sheltered, extraordinary tasting savoring water a perfect drinking water is to well being and health.We have planned and built up a model framework for expelling clean (convenient) drinking water from air.Utilize a customary power matrix to produce power; use power to cool air bringing about buildup of water; catch water vapor from air that gathers into water to get 99% unadulterated and safe drinking water from the dampness noticeable all around.

Keywords: Compressor, Condensor, Water development

1.INTRODUCTION

An environmental water generator is a gadget that removes water content from muggy air. Water vapor noticeable all around is dense by cooling the air beneath its dew point. AWGs are helpful in areas where unadulterated drinking water is troublesome or difficult to acquire, as there is quite often a little measure of water in the air.The point of the task is to make a compact gadget that can be utilized to meet the water prerequisites for household use. The gadget will initially consolidate water present in the air and after that purge it with the goal that it tends to be utilized for drinking.

2.LITERATURE REVIEW

Shweta,P.Nerlekar (January 2017) "Have considered that refrigeration strategy having higher profitability when relative moistness is high and drying up technique can improve the efficiency of model when relative dampness is low. In the underlying stage we have effectively gotten one to two liters of water in 1 hour with relative mugginess of 70%.Within this period, it expended 1 kilowatt-long stretches of vitality per liter of water produced utilizing refrigeration process. Our point would extricate moistness from the air and after that cleaning it into the most noteworthy quality drinking water by sending the gathered buildup through a progression of ultra-amazing channels that slaughters all germs, microscopic organisms and infections that could be available in the water. The final product is the cleanest, most flawless water. The water is

totally unadulterated, sheltered and clean, just as extraordinary tasting.[1]

Kabeela et.al. (2014) In his paper "Sun powered based climatic water generator use of a new water recuperation: A numerical report" has done thermodynamic investigation for a Peltier gadget which is utilized to build up a gadget that utilizes the standard of dormant warmth to change over atoms of water vapor into water beads called the Atmospheric Water Generator. It has been presented a bit previously, however it isn't normal in India and some different nations. It has an incredible application remaining on such period of innovation where we as a whole are running behind sustainable sources. Here, the objective is to get that particular temperature, called the dew point temperature, for all intents and purposes or tentatively to consolidate water from barometrical muggy air with the assistance of thermoelectric Peltier (TEC) couple.[2]

Niewenhuis et.al., (2012), They have said that it is conceivable to pack sticky air so much that it will begin consolidating at the surrounding temperature itself. As weight expands the dew point rises; in this way, enough pressure will constrain the dew point over the encompassing temperature bringing about unconstrained buildup we saw that despite the fact that dehumidification by fluid desiccant technique is new and have a ton of potential hypothetically however when the analysts made a model and tried it the outcomes were not acceptable. The gadget could deliver just 72.1 mL of water per kW-hr[3]

Anbarasu and Pavithra (2011), we construe that despite the fact that dehumidifying unit utilizing vapor pressure refrigeration framework is more powerful than the Peltier framework yet it needs as in it isn't convenient and it creates a great deal of sound. And furthermore this framework is all the more expensive. Along these lines, this kind of Atmospheric Water Generator is the gadget which can be actualized in extraordinary circumstances like amid floods or in desert and rustic territories. It has incredible points of interest as it works like a sustainable wellspring of air water and needn't bother with a substantial power source. Applying this framework in a profoundly muggy district right around 1 Liter of consolidated water can be created every hour amid the light, which is a very promising.[4]

3.DESIGN OF PARTS

Following different parts we have designed as the part of planning the project before manufacturing.

- Design of compressor
- Design of angle

3.1 Design of compressor:-

Compression process:-

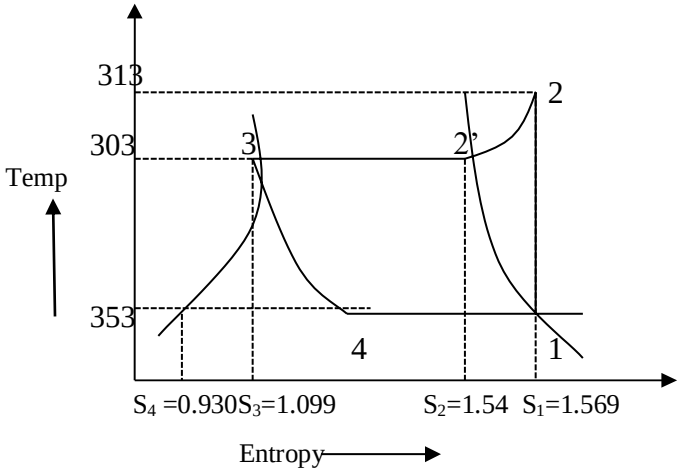

Fig 3.1 Compression Process

Process 1-2 takes place in compressor.
From table of Freon-12,
T1= -20 + 273 = 3530 K , P1 = 0.15101 Mpa or 1.5101 bar
h1 = 343.39 Kj/Kg S1= 1.5696 kj/kg0k
entropy at 1 = entropy at 2
S1 = S2
S1 = S2' + Cp log T2 /T2'
Also
S2' = 1.5481 kj/kg0k
from table at 300 C or 3030 K
Cp = 0.65 kj/kg0k
Therefore
= 1.5696 = 1.5481 + 0.65 log T2 /303
T2 = 313.160k or 400C
Enthalphy at point 2 is given by
h2 = h2'+ Cp (40 –30)
h2' = 364.96kj/kg
h2 = 364.96 + 6.5 = 371.46 KJ/Kg
Therefore compressor work is given by
Wc = (h2 – h1) = 28.07 KJ/Kg
The capacity of mechanical equipment is generally given in HP and electrical equipment in KW similarly the capacity of refrigeration unit is given in tons of refrigeration .
In SI system the one ton of refrigeration is the amount of heat removed from one ton of water supplied at 00C to form ice at00C within 24 hours period. This accounts for the latent heat of water from ice.
Q (removed) = 1000 x L (latent heat in kj / kg)
= 1000 x 334.5 kj / hr
= (1000 x 334.5) / (24 x 3600)
= 38.7 kj / sec
But for all practical purpose, it is taken as 35 kJ/sec
The performance of a mechanical power developing system is measured by a factor known as efficiency . similarly the performance of a refrigeration system is measured by a factor known as coefficient of performance (C.O.P) . The C.O.P of a refrigeration system is a ratio of heat removed from a system to the work supplied to achieve the heat removal.
C.O.P = Q / W
Where Q = Heat removed in kJ per unit
W = Work supplied in kJ per unit time.
C.O.P OF SYSTEM = 35 / 28.07
= 1.35
E.R.P. (Energy Performance Ratio) = 1 + Q/W
= 1 + C.O.P
= 1 + 1.35
= 2.35

3.2 Design of angles :-

Due to the load, the angle-link may buckle in two planes at right angle to each other. For buckling in the vertical plane (i.e.in the plane of the links), the links are considered As hinged at the middles and for buckling in a plane perpendicular to the vertical plane, it is considered as fixed at the middle and the both the ends.
Here,The maximum load due to twisting of shaft
Force = 450 kg
= 450 x 9.81
= 4414.5 N.
We know that he load on each link,
F1 = 4414.5/4
= 1103.63N.
Assuming a factor of safety as 3, the links must be designed for a buckling load Of
Wcr = 1103.63 x 3
= 3310.9 N
Let
t1= Thickness of the link
b1= width of the link
So, cross sectional area of the link = A = t1x b1
Assuming the width of the link is three times the thickness of the link, i.e.b1= 3 x t1
Therefore
$A = t_1 \times 3\, t_1$
$= 3\, t_1^2$
And moment of inertia of the cross section of the link,
$I = 1/12\, t_1 b_1^3$
$= 2.35\, t_1^4$
We know that, $I = AK^2$,
where
k = radius of gyration.
$K2 = I/A$
$= 2.35\, t_1^4 / 3\, t_1^2$
$= 0.75\, t_1^2$
Since for the buckling of the link in the vertical plane, the ends are considered as hinged, therefore, the equivalent length of the link
L = 450 mm.
And Rankine's constant, a = 1/ 7500
Now using the relation,

$$Wcr = \frac{f*A}{1 + a\,(L/K)^2}$$

with usual notation,
Here f = 100 N / mm2

$$3310.9 = \frac{100 * 3 * t_1^2}{1 + 1/7500\ 450^2/0.75\ t_1^2}$$

$$3310.9 = \frac{300\ t_1^2}{1 + 36/t_1^2}$$

$300\ t_1^4 – 3310.9 t_1^2 – 36 * 3310.9 = 0$
$t_1^2 – 11.04 t_1^2 – 397.3 = 0$

$$t_1^2 = \frac{11.04 \pm \sqrt{(11.04)2 + 4 \times 397.3}}{}$$

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$t_1^2 = \frac{11.04 \pm \sqrt{1711.11}}{2}$

$t_1 = \sqrt{52.40}$

$t_1 = 7.23$ mm

$b_1 = 3 * t_1$
$= 3 * 7.23$
$= 21.71$ mm.

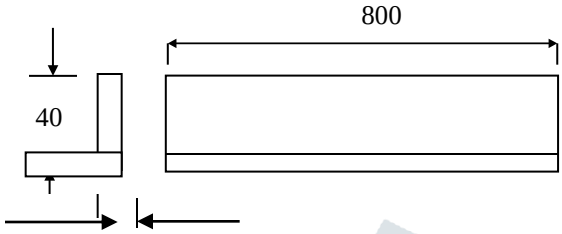

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Fig 3.2 Design of Angle

But for the factor of safety we have selected the standard available link strip of Size 40 x12 x800mm,which can bear the impact loading.
Hence our design is safe.

4.Scope

Our item being the little and conservative one, still it has such a significant number of extensions for its future improvements as following:- We can introduce compartment sensor with the end goal that at whatever point the pot goes under the tap it opens and drops the water.The water level pointer can be introduced so the dimension of water can be effectively identified and maintained.The body material can be supplanted by hardened steel to spare it from the natural consumption and disintegration.

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