

पेटेंट कार्यालय
शासकीय जर्नल

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दिनांक: 19/03/2021
DATE: 19/03/2021

पेटेंट कार्यालय का एक प्रकाशन
PUBLICATION OF THE PATENT OFFICE

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202141010227 A

(19) INDIA

(22) Date of filing of Application :11/03/2021

(43) Publication Date : 19/03/2021

(54) Title of the invention : PERFORMANCE ANALYSIS OF SOLAR STILL WITH CARBON FIBER COMPOSITE AND COPPER FINS

(51) International classification	:C02F0001140000, B01D0005000000, B01D0001000000, C02F0001180000, F24S0010750000	(71)Name of Applicant : 1)Dr.M.RAMARAO Address of Applicant :ASSOCIATE PROFESSOR, DEPARTMENT OF MECHANICAL ENGINEERING, CHEBROLU ENGINEERING COLLEGE, CHEBROLU (VI & MD), GUNTUR, ANDHRA PRADESH, INDIA 522212. Andhra Pradesh India 2)Mr. PRAMOD SHIVAJI KATHAMORE 3)Mr. A. BALAJIKRISHNABHARATHI 4)Dr.RAM SUBBIAH 5)Mr. CHINNAHAJISAGARI MOHAMMAD AKRAM 6)Dr. M. PANDIAN 7)Dr. V. R. PRAMOD 8)Dr. RAGHAV G R 9)Dr. DINESH KUMAR 10)Mr. I. AUGASTIN SANTHIYAGU
(31) Priority Document No	:NA	(72)Name of Inventor : 1)Dr.M.RAMARAO 2)Mr. PRAMOD SHIVAJI KATHAMORE 3)Mr. A. BALAJIKRISHNABHARATHI 4)Dr.RAM SUBBIAH 5)Mr. CHINNAHAJISAGARI MOHAMMAD AKRAM 6)Dr. M. PANDIAN 7)Dr. V. R. PRAMOD 8)Dr. RAGHAV G R 9)Dr. DINESH KUMAR 10)Mr. I. AUGASTIN SANTHIYAGU
(32) Priority Date	:NA	
(33) Name of priority country	:NA	
(86) International Application No	:NA	
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(61) Patent of Addition to Application Number	:NA	
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(62) Divisional to Application Number	:NA	
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(57) Abstract :

ABSTRACT PERFORMANCE ANALYSIS OF SOLAR STILL WITH CARBON FIBER COMPOSITE AND COPPER FINS In this invention, Single basin solar still made up of a basin with a carbon fiber composite container in black color with copper tube and fins contains brackish or sea water. This is enclosed in a completely airtight surface formed by a transparent glass cover. Incident solar irradiance passes through the transparent cover and is absorbed by the black carbon composite base with composite fins. Consequently, water contained in the basin gets heated up and evaporates in the saturated conditions inside the still. Water vapor rises until they come in contact with the inner surface of the cover and condensed into pure water, run down along the glass cover bottom surface due to gravity and is collected using water collector. The performance of the solar still depends mainly on solar intensity, wind velocity, ambient temperature, and water and glass temperature difference, free surface area of water, absorber plate area, and temperature of inlet water, glass angle and depth of water. The solar stills are the best ways of getting distilled water in hot climatic regions as there is scarcity of water as well as electricity and also the construction of the solar still is quite simple, this is only reason for the implementation of solar stills in many countries for obtaining distilled water from the brackish water or salt water.

No. of Pages : 22 No. of Claims : 8

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DOCKET NO :21534

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Agent Number:

Sr. No.	CBR No.	Reference Number /Application Type	Application Number	Title/Remarks	Amount Paid
1	8944	ORDINARY APPLICATION	202141010227	PERFORMANCE ANALYSIS OF SOLAR STILL WITH CARBON FIBER COMPOSITE AND COPPER FINS	1750
2		E-101/2198/2021-CHE	202141010227	Correspondence	0
3		E-2/818/2021-CHE	202141010227	Form2	0
4		E-3/7756/2021-CHE	202141010227	Form3	0
5		E-5/948/2021-CHE	202141010227	Form5	0
6	8944	E-12/923/2021-CHE	202141010227	Form9	2750
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Date: 11/03/2021

To
The Controller of Patents,
The Patent Office, Chennai
Sub: Submission of Patent Application with Complete Specification

TITLE OF THE INVENTION: PERFORMANCE ANALYSIS OF SOLAR STILL WITH CARBON FIBER COMPOSITE AND COPPER FINs

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Sir/Madam,

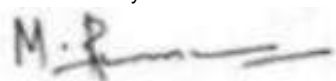
We are submitting herewith following documents towards filing of a patent application

1. Form-1
2. Form 2 and Complete Specification
3. Form- 3
4. Form-5
5. Form-9

You are requested to take the same on record and issue a receipt for the same.

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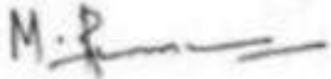

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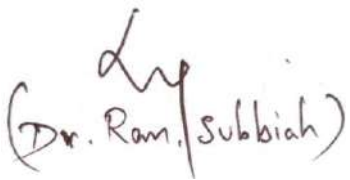
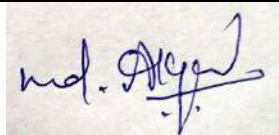
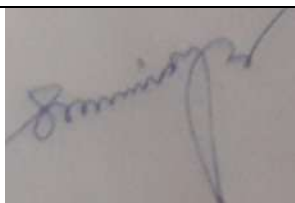
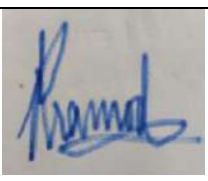
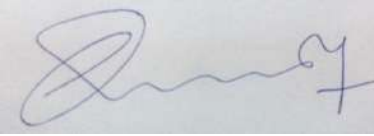




Dr.M.RAMARAO

“FORM 1 THE PATENTS ACT 1970 (39 of 1970) and THE PATENTS RULES, 2003 APPLICATION FOR GRANT OF PATENT (See section 7, 54 and 135 and sub-rule (1) of rule 20)				(FOR OFFICE USE ONLY)	
Application No.					
Filing date:					
Amount of Fee paid:					
CBR No:					
Signature:					
1. APPLICANT'S REFERENCE / IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)					
2. TYPE OF APPLICATION [Please tick () at the appropriate category]					
Ordinary (√)		Convention (x)		PCT-NP (x)	
Divisional ()	Patent of Addition ()	Division ()	Patent of addition ()	Division ()	Patent of Addition ()
3A. APPLICANT(S)					
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			State	TAMIL NADU
			Country	INDIA
			Pin code	621105

Natural Person (√)		Other than natural Person			
		Small Entity (x)	Startup (x)	Others (x)	
4. INVENTOR(S) [Please tick at the appropriate category]					
Are all the inventor(s) same as the applicant(s) named above?		Yes (√)			
If "No", furnish the details of the inventor(s)					
5. TITLE OF THE INVENTION					
PERFORMANCE ANALYSIS OF SOLAR STILL WITH CARBON FIBER COMPOSITE AND COPPER FINS					
6. AUTHORISED REGISTERED PATENT AGENT		IN/PA No.	- NA-		
		Name			
7. ADDRESS FOR SERVICE OF APPLICANT IN INDIA		Name	Dr.M.RAMARAO		
		Postal Address	ASSOCIATE PROFESSOR DEPARTMENT OF MECHANICAL ENGINEERING CHEBROLU ENGINEERING COLLEGE CHEBROLU (VI & MD)-522212, GUNTUR (DIST),AP, INDIA.		
		Telephone No.			
		Mobile No.	9788563254		
		Fax No.			
		E-mail ID	ramaraoenergy1983@gmail.com		
8. IN CASE OF APPLICATION CLAIMING PRIORITY OF APPLICATION FILED IN CONVENTION COUNTRY, PARTICULARS OF CONVENTION APPLICATION					
Country	Application Number	Filing date	Name of the applicant	Title of the invention	IPC (as classified in the convention country)
NA	NA	NA	NA	NA	NA
9. IN CASE OF PCT NATIONAL PHASE APPLICATION, PARTICULARS OF INTERNATIONAL APPLICATION FILED UNDER PATENT CO-OPERATION TREATY (PCT)					
International application number		International filing date			
NA		NA			
10. IN CASE OF DIVISIONAL APPLICATION FILED UNDER SECTION 16, PARTICULARS OF ORIGINAL (FIRST) APPLICATION					
Original (first) application No.		Date of filing of original (first) application			
NA		NA			
11. IN CASE OF PATENT OF ADDITION FILED UNDER SECTION 54, PARTICULARS OF MAIN APPLICATION OR PATENT : NA					
Main application/patent No. : NA		Date of filing of main application : NA			
12. DECLARATIONS					
(i) Declaration by the inventor(s) (In case the applicant is an assignee: the inventor(s) may sign herein below or the applicant may upload the assignment or enclose the assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period). We, the above named inventor(s) are the true & first inventor(s) for this Invention and declare that the applicant(s) herein are our assignee or legal representative.					
NAME		SIGNATURE		DATE	
Dr.M.RAMARAO				11/03/2021	
Mr. PRAMOD SHIVAJI KATHAMORE				11/03/2021	

Mr. A. BALAJIKRISHNABHARATHI		11/03/2021
Dr.RAM SUBBIAH		11/03/2021
Mr. CHINNAHAJISAGARI MOHAMMAD AKRAM		11/03/2021
Dr. M. PANDIAN		11/03/2021
Dr. V. R. PRAMOD		11/03/2021
Dr. RAGHAV G R		11/03/2021
Dr. DINESH KUMAR		11/03/2021
Mr. I. AUGASTIN SANTHIYAGU		11/03/2021
<p>(ii) Declaration by the applicant(s) in the convention country (In case the applicant in India is different than the applicant in the convention country: the applicant in the convention country may sign herein below or applicant in India may upload the assignment from the applicant in the convention country or enclose the said assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period) We, the applicant(s) in the convention country declare that the applicant(s) herein are our assignee or legal representative.</p> <p>(a) Date (b) Signature(s) -----NA----- (c) Name(s) of the signatory</p>		
<p>(iii) Declaration by the applicant(s) ▪ We the applicant(s) hereby declare(s) that: - ▪ We are in possession of the above-mentioned invention.</p>		

- The provisional/complete specification relating to the invention is filed with this application.
- The invention as disclosed in the specification uses the biological material from India and the necessary permission from the competent authority shall be submitted by me/us before the grant of patent to me/us.
- There is no lawful ground of objection(s) to the grant of the Patent to me/us.
- We are the true & first inventor(s).
- We are the assignee or legal representative of true & first inventor(s).
- The application or each of the applications, particulars of which are given in Paragraph-8, was the first application in convention country/countries in respect of our invention(s).
- We claim the priority from the above mentioned application(s) filed in convention country/countries and state that no application for protection in respect of the invention had been made in a convention country before that date by me/us or by any person from which I/We derive the title.
- Our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Paragraph-9.
- The application is divided out of my /our application particulars of which is given in Paragraph-10 and pray that this application may be treated as deemed to have been filed on DD/MM/YYYY under section 16 of the Act.
- The said invention is an improvement in or modification of the invention particulars of which are given in Paragraph-11.


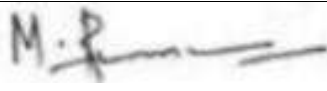

13. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION (a) Form 2

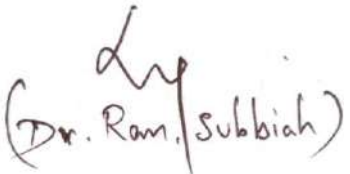
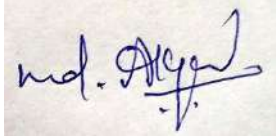
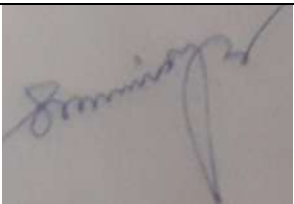
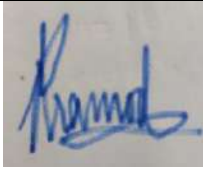
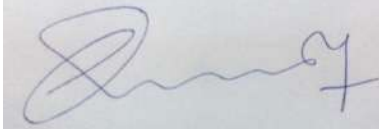


Item	Details	Fee	Remarks
Complete specification	No. of pages : 22		
No. of Claim(s)	No. of claims : 08 and No. of pages :01		
Abstract	No. of pages :01		
No. of Drawing(s)	No. of drawings :-- and No. of pages:--		

In case of a complete specification, if the applicant desires to adopt the drawings filed with his provisional specification as the drawings or part of the drawings for the complete specification under rule 13(4), the number of such pages filed with the provisional specification are required to be mentioned here.

- (b) Complete specification (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).
 - (c) Sequence listing in electronic form
 - (d) Drawings (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).
 - (e) Priority document(s) or a request to retrieve the priority document(s) from DAS (Digital Access Service) if the applicant had already requested the office of first filing to make the priority document(s) available to DAS.
 - (f) Translation of priority document/Specification/International Search Report/International Preliminary Report on Patentability.
 - (g) Statement and Undertaking on Form 3
 - (h) Declaration of Inventorship on Form 5
 - (j).....
- Total fee

We hereby declare that to the best of our knowledge, information and belief the fact and matters slated herein are correct and We request that a patent may be granted to us for the said invention.

NAME	SIGNATURE	DATE
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Dr. M. PANDIAN		11/03/2021
Dr. V. R. PRAMOD		11/03/2021
Dr. RAGHAV G R		11/03/2021
Dr. DINESH KUMAR		11/03/2021
Mr. I. AUGASTIN SANTHIYAGU		11/03/2021

To,
The Controller of Patents, The Patent Office, at **CHENNAI**

Note: -

* Repeat boxes in case of more than one entry.

* To be signed by the applicant(s) or by authorized registered patent agent otherwise where mentioned.

* Tick (✓) /cross (x) whichever is applicable/not applicable in declaration in paragraph-12.

* Name of the inventor and applicant should be given in full, family name in the beginning.

* Strike out the portion which is/are not applicable.

Form 2
THE PATENT ACT, 1970
(39 of 1970)
&
The Patent Rules, 2003
COMPLETE SPECIFICATION
(Section 10 and Rule 13)

**PERFORMANCE ANALYSIS OF SOLAR STILL WITH CARBON FIBER
COMPOSITE AND COPPER FINs**

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The following specification particularly describes the invention and the manner in which it is to be performed.

FIELD OF THE INVENTION

This invention in general relates to the field of Mechanical Engineering and Renewable Energy and more specifically a design and procedure for Solar Distiller to provide increase in productivity of distilled water.

PRIOR ART DISCUSSION

US4235679A A sun oriented still into which cold seawater is taken care of by methods for a line perforated long its flat length. The seawater at that point streams down a slanted plane through a dark wick material set on top of a twofold or equal plate base which fills in as a warmth exchanger that moves heat from a working liquid to the seawater. The seawater thus vanishes while streaming down the wick and the fume consolidates as unadulterated water on the upper inward surface of the actually moving warmth back to the working liquid which is being coursed through the upper front of the still. The fume condensate is gathered as it streams down the slanted upper internal surface and thus is drawn off; the working liquid is recycled to persistently warmth and afterward cool the distillate.

US7507316B2 The sun oriented actually has an edge, an evaporator inside the casing and a glass sheet upheld by the casing and dispersed over the evaporator. The evaporator has a fringe rib in contact with the edge of the glass sheet. The glass sheet and fringe spine are settled inside a deep down confronting channel on the casing, the fixing between the glass and the rib being by surface strain of water between the glass and the rib. Sunlight based stills are notable, a model being the U.S. Pat. No. 753,643 for the sake of the creator coordinated to a sun oriented actually including various cells, each having an arch to limit or forestall mutilation in this manner disposing of stresses delivered by the changing temperature conditions during the openness of the still to the sweltering daytime temperatures and the a lot

cooler, even temperatures moving toward freezing during the evening. This sunlight based actually is exceptionally powerful and can deliver huge volumes of refined water. Sunlight based stills are developed so that there should be a viable seal between the glass sheet and the edge of the still. This is to guarantee that the consolidated water doesn't get away, yet in addition that air doesn't enter the inside of the still and along these lines seriously diminish the proficiency or even the activity of the still. Exceptional as far is known, the glass sheet is fixed to the casing or body of the still by a fixing part gave between the sheet of glass and the casing, this is regularly an elastic or neoprene or elastic like material, either as an elastic ring or uniquely formed and delivered seal into which the glass sheet is embedded and cinching constrain applied to seal against the glass sheet, normally by the arrangement of a fixing part, for example, elastic, caulk, neoprene silicone and so forth This cinching pressure is typically applied by a circumferential part having a spine overlying the edge of the glass, the part being in a bad way down to apply the strain to seal the edge of the glass sheet. In this manner the water created can be in contact with the sealant and defilement of the water could result. Sun powered stills to create consumable water are needed in numerous nations where clean unadulterated uncontaminated water is inaccessible and it is an object of this innovation to deliver sun based stills which are effortlessly amassed with at least devices.

US9180383B2 The exposure is coordinated to high productivity sun powered still gatherings and their segments, and all the more especially, to a sun based still fit for retaining direct daylight and diverted daylight utilizing a portable heliostat arranged to adjust the still evaporator, the heliostat and a counter-current warmth exchanger with the sun. Exemplifications of the current innovation by and large identify with desalination and cleansing and all the more especially to fluid decontamination through dissipation and buildup helped by sun powered energy. Desalination frameworks are frameworks that eliminate sugar or other broke up solids from water, regularly to deliver consumable water. As of now, a few techniques for desalination are utilized by business desalination frameworks, the most well known being converse assimilation and glimmer vaporization. Both of these techniques are moderately costly, have huge energy necessities and certain parts that destroy oftentimes. For instance, switch assimilation frameworks power water

through layers and these films, which are costly all by themselves, could get obstructed and torn, in this manner requiring continuous substitution. Likewise, streak vaporization frameworks have consumption and disintegration issues because of the splashing of hot salt water inside these frameworks. The energy prerequisites for a converse assimilation framework might be roughly 6 kWh of power for every cubic meter, of water, while a blaze vaporization framework may need as much as 200 kWh per cubic meter of water. Because of the high energy inputs, successive support, and related costs desalination of water for a huge scope premise has been generally costly, frequently more costly than discovering substitute wellsprings of groundwater. These equivalent elements have made desalination utilizing these techniques on a limited scale impractical.

US9102546B2 A mechanical assembly and strategy for refining new water from ocean, and saline water are uncovered. Generally, an upset, Y-molded construction is designed with the end goal that every leg of the figure contains two, concentric line implies. One line implies establishments the outside of the leg, and is clear. The more modest line implies is situated inside the first, and a vacuum exists between the two. Water is allowed to enter the line implies, through a further line implies in correspondence with the wellspring of the water. At the point when the water ascends in the legs of the contraption, concentrated warmth gave through, e.g., Fresnel focal points, acts to dissipate the water, bringing about division of salt and debasements thusly. Unadulterated water gathers in the gadget and amasses in a store accommodated this reason.

In numerous pieces of the world new, consumable water isn't promptly accessible or ample. Incidentally, large numbers of these locales are encircled by, or approach, essentially boundless measures of water that isn't consumable due to saltiness (e.g., ocean water), or other mineral impurities (e.g., bitter water).

This issue has been perceived for an extensive stretch of time, and different ways to deal with creating consumable and, all the more ideally, refined water, have large amounts of the field. Obviously, e.g., U.S. Pat. No. 7,955,478 portraying what is alluded to as a "vertical, cylindrical dissipation device." The

development depicted in this patent shows that Fresnel focal points, which are an element of one epitome of the innovation, can be utilized in the planning of refined water. The gadgets portrayed in the '478 patent incorporate internal and external chambers yet don't uncover a vacuum component therebetween.

Numerous ways to deal with the field of getting ready refined water from ocean water utilize sun based energy. Find in such manner, U.S. Pat. Nos. 5,468,351 and 4,749,447, which likewise examine the utilization of Fresnel focal points. Likewise instructing sun based force based refining mechanical assemblies are U.S. Pat. Nos. 4,194,949; 4,160,523; 3,960,668; 3,232,846; 2,412,466; and 2,332,294, which are all joined by reference.

SUMMARY

CARBON FIBER COMPOSITE CONTAINER

The carbon fiber composite container is the outer casing of the solar still, which acts as a thermal insulator helps in retaining the heat generated inside the carbon fiber composite which leads to the increase in the rate of evaporation of the water which is poured into the solar still in the form of salt water or brackish water.

COPPER FINS

Copper fins is used as a heat storage material as it has thermal conductivity (390 W/m·K) and also good corrosion resistance. Its high thermal conductivity helps in conducting more heat to the salt water or brackish water and its corrosion resistance helps in preventing it from corroding when placed in the salt water or brackish water.

GLASS COVER

The top cover of the carbon fiber composite container is taken as glass as it allows more amount of solar radiations to pass inside the solar still as it increases the absorption of solar radiations by the copper fins.

K TYPE THERMOCOUPLES

The thermocouples are used to measure the variation of temperature of the copper fins, water, water vapor, glass bottom surface and ambient temperature on hourly basis.

SIX POINT TEMPERATURE INDICATOR

The six point temperature indicator is used for displaying six temperatures based on the location of the thermocouples which can be seen by adjusting the knob provided at the front.

PU TUBE AND BEAKER

The PU tube is used as a outlet tube for collection of the distilled water and also as an inlet tube for entry of the brackish water or salt water into the solar still. A beaker is used for measuring the amount of distilled water collected.

MATERIAL SELECTION

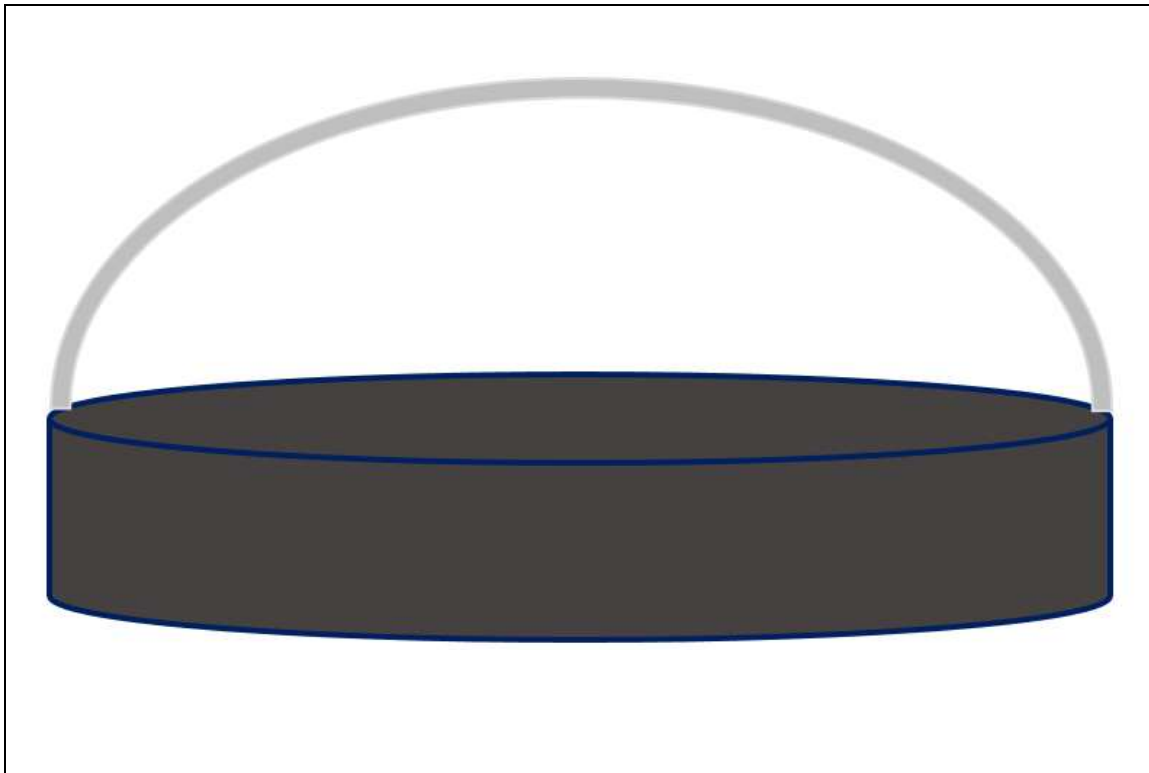
Parts name	Material	Size	Purpose of selection
Casing	Carbon fiber composite	4.5 mm thick	low Thermal Conductivity
Top cover	Glass	508 x 540 mm 5 mm thickness	High transmittivity
Heat storage material	Copper tube and copper fins	Outer diameter: 10 mm, thickness of tube 2 mm, fin thickness: 5 mm	High thermal conductivity and corrosion resistance
Water collector	Acrylic	(C-shaped) 3 mm thickness	Low thermal conductivity

BILL OF MATERIALS

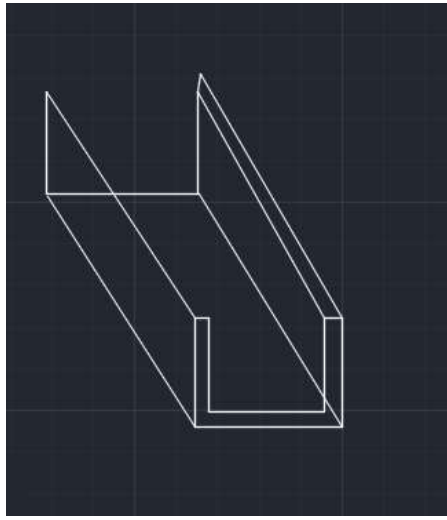
S.No	Description	Material	Quantity
1	Solar still & water collector	Carbon fiber composite	1
2	Energy storage material	Copper	1
3	Top cover	Glass	1
4	6 point Digital temperature indicator		1
5	K type thermo couple		5
6	Silicone paste		1

DESIGN OF THE COMPONENTS

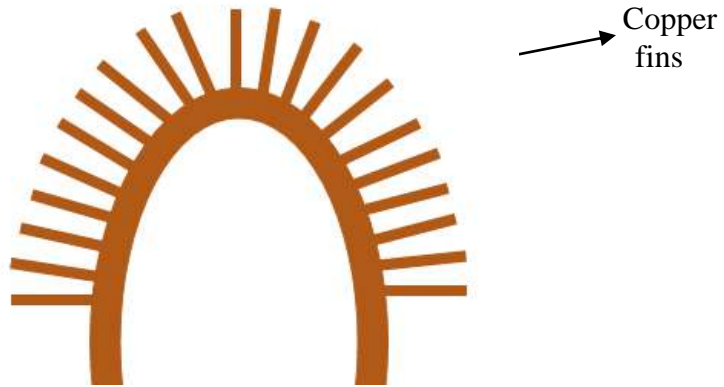
CARBON FIBER COMPOSITE CONTAINER



WATER COLLECTOR



COPPER FINNS



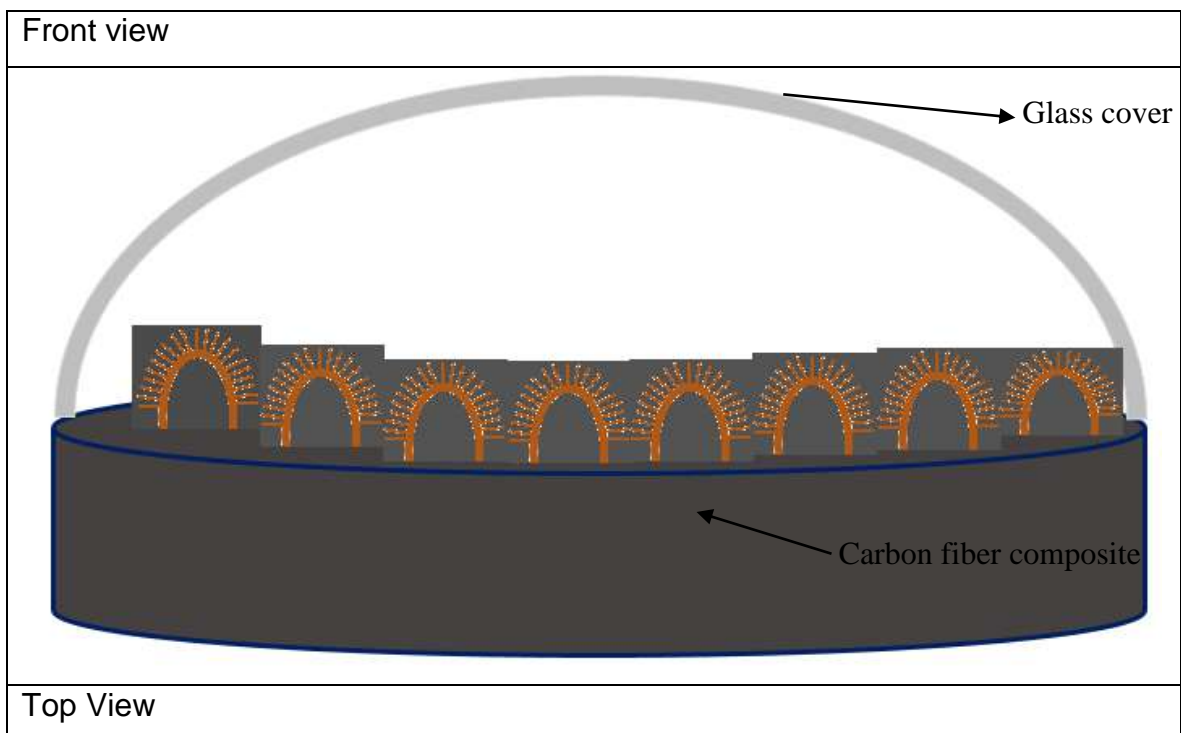
THERMOCOUPLE

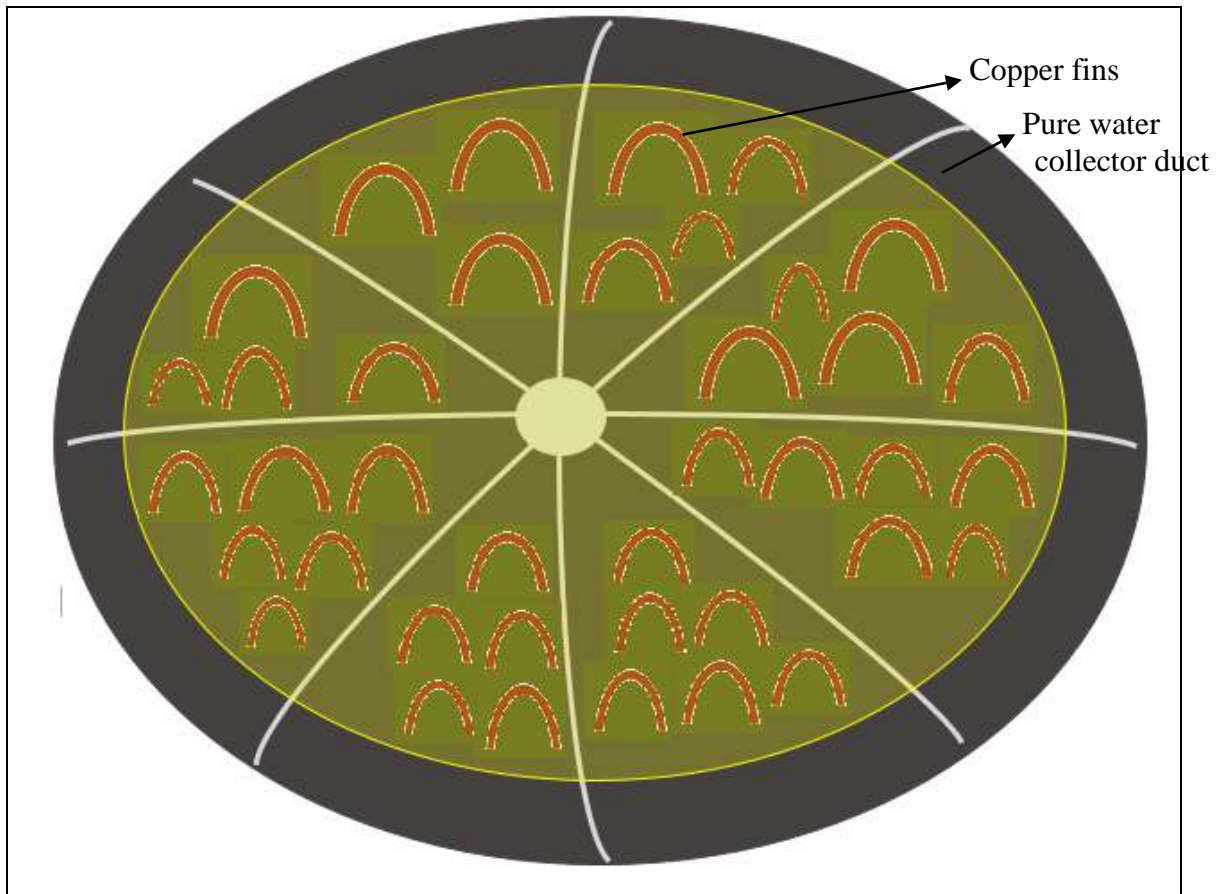


DIGITAL TEMPERATURE INDICATOR



DETAILED DRAWING & ASSEMBLED





FABRICATION

Fabrication

- carbon fiber sheet is bought.
- Cutting into sheets of different sizes

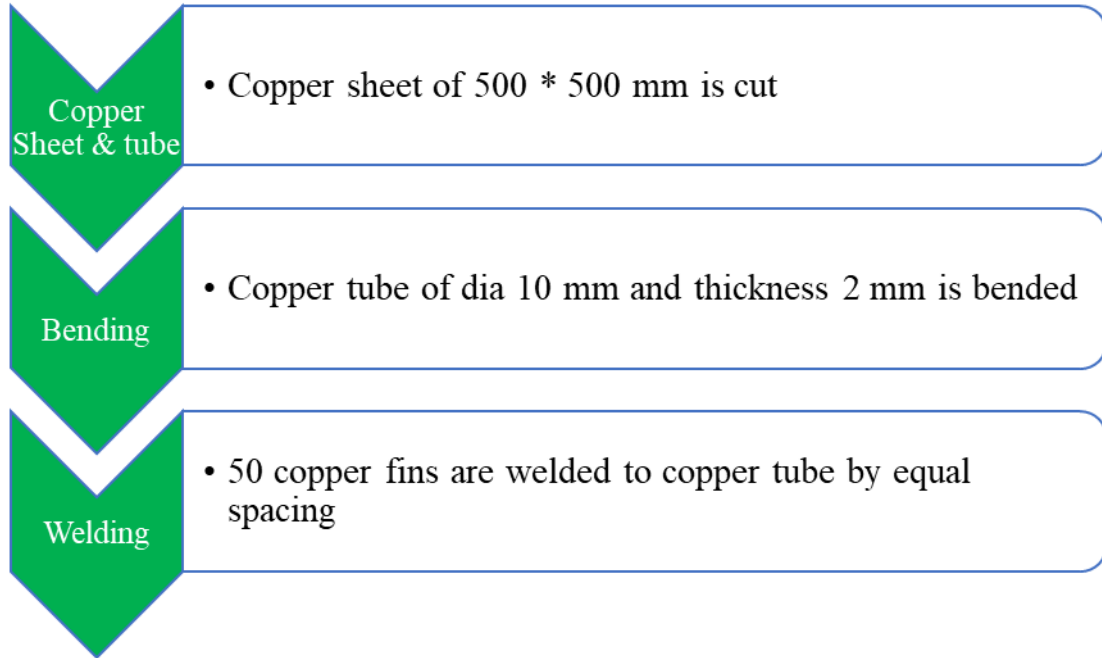
Making of container

- Polymer composite is fabricated using hand layup technique

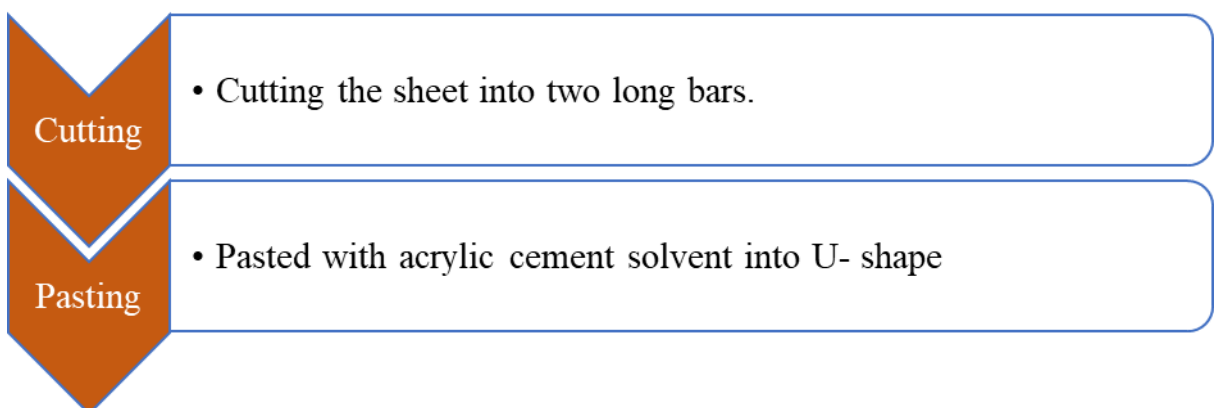
Drilling

- A hole is drilled of $\text{Ø}20$ mm for water inlet
- A holed is drilled of $\text{Ø}16$ mm for passing of thermocouple
- A hole is drilled of $\text{Ø}10$ mm for distilled water outlet

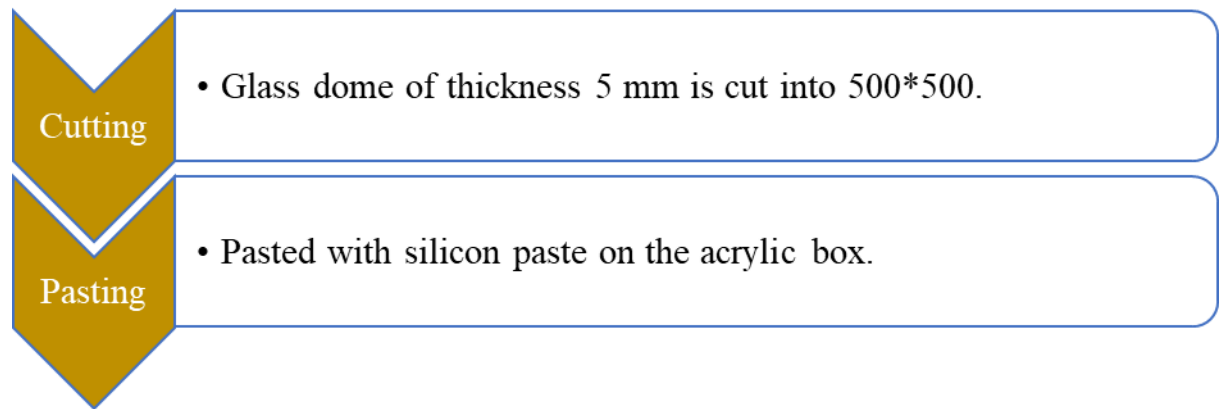
COPPER FINS



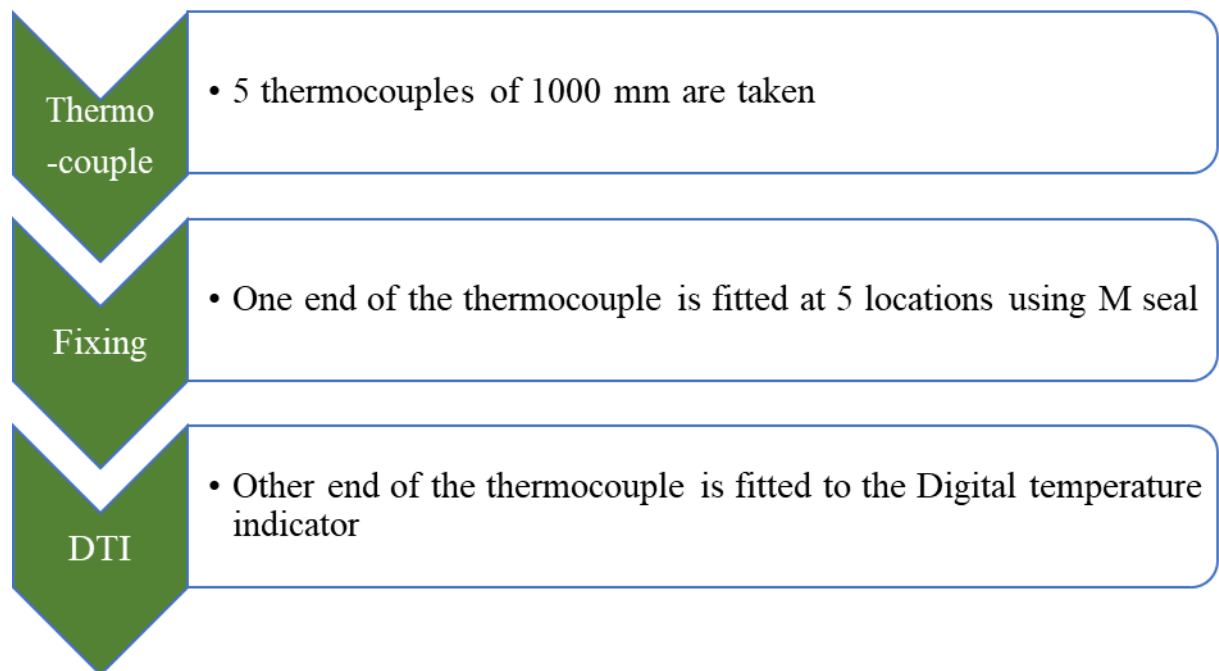
WATER COLLECTOR



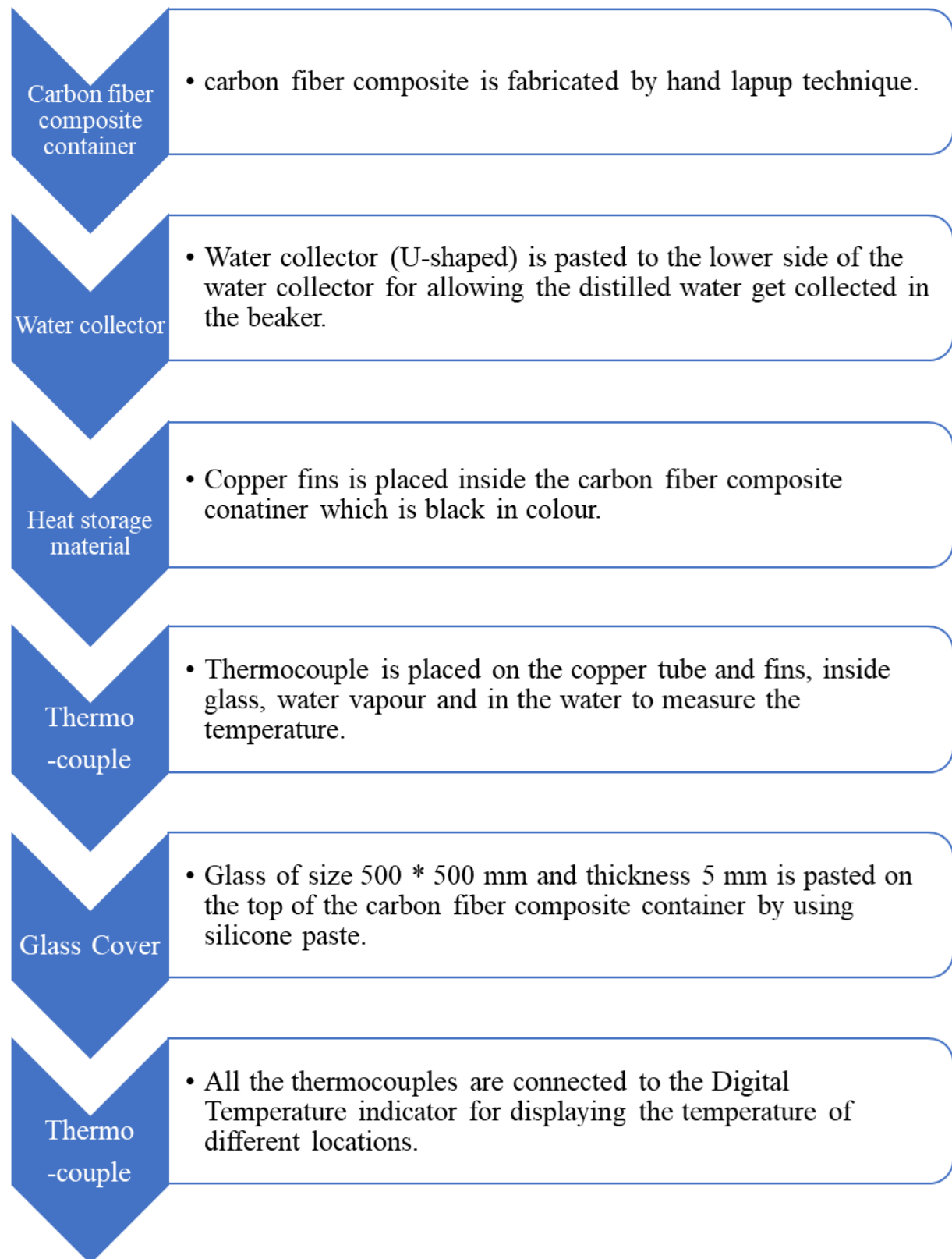
GLASS COVER



THERMOCOUPLE



ASSEMBLY



WORKING OF THE SOLAR STILL

Single basin solar still consists of a basin with a carbon fiber composite container in black color with copper tube and fins contains brackish or sea water. This is enclosed in a completely airtight surface formed by a transparent glass cover. Incident solar irradiance passes through the transparent cover and is absorbed by the black carbon composite base with composite fins. Consequently, water contained in the basin gets heated up and evaporates in the saturated conditions inside the still. Water vapor rises until they come in contact with the inner surface of the cover and condensed into pure water, run down along the glass cover bottom surface due to gravity and is collected using water collector. The performance of the solar still depends mainly on solar intensity, wind velocity, ambient temperature, and water and glass temperature difference, free surface area of water, absorber plate area, and temperature of inlet water, glass angle and depth of water. The solar stills are the best ways of getting distilled water in hot climatic regions as there is scarcity of water as well as electricity and also the construction of the solar still is quite simple, this is only reason for the implementation of solar stills in many countries for obtaining distilled water from the brackish water or salt water.

The brackish or salt water is poured into the solar still through the inlet pipe of diameter of 20 mm and then closed by a air tight cap for maintained the solar still air tight so that the water vapour does not escape into the atmosphere. The solar still is placed such the inclined top glass cover is facing the south direction so that more amount of solar radiations pass into the solar still. We should make sure that there are no air gaps in the solar still which may lead to decrease in the amount of distilled water collected.

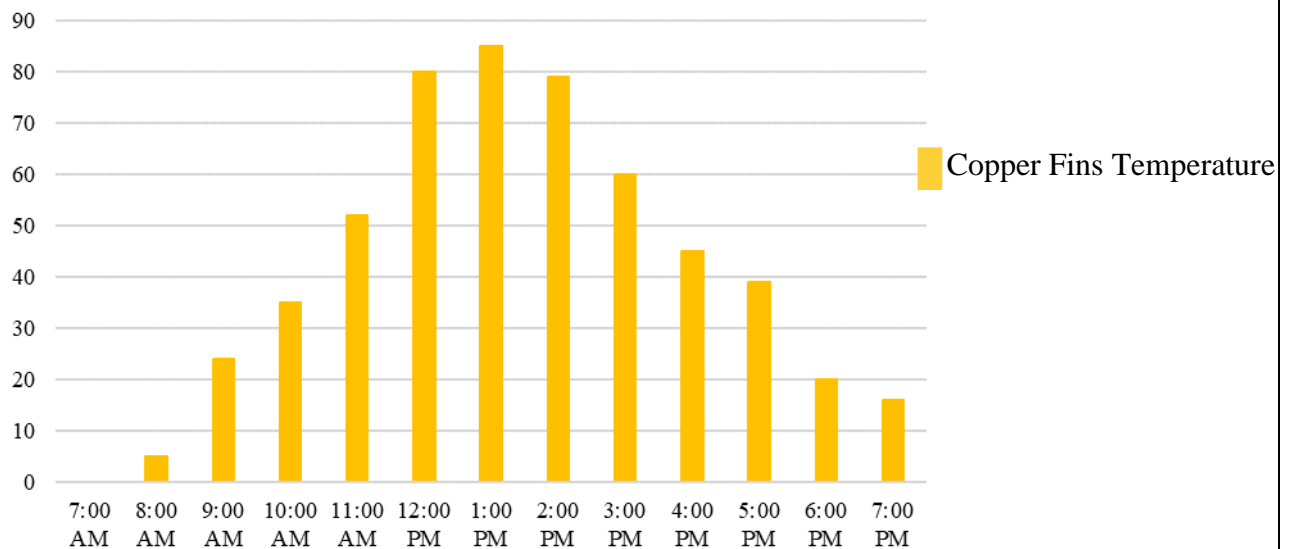
After the brackish water is poured into the solar still, after some time the solar radiations start to enter into the solar still which leads to heating up of the copper fins. As copper has a thermal conductivity of 390 W/mk. It helps in conducting more amount of heat to the brackish water or salt water which leads to the evaporation of water. This water vapour starts to condense on the bottom surface of the glass due to the temperature difference between the water vapour and glass. This condensed water starts to slide down on the bottom surface of the glass due to the 20° inclination of

the glass. This condensed water then gets collected in the water collector which is placed at the outer ring for the distilled water to pass out through the outlet PU tube of diameter of 10 mm. This distilled water is collected in the beaker and then the amount of distilled water collected is measured.

The thermocouples are placed to read the temperature change at the carbon fiber composite, water, water vapour and glass bottom surface of the solar still and also ambient temperature with change in time.

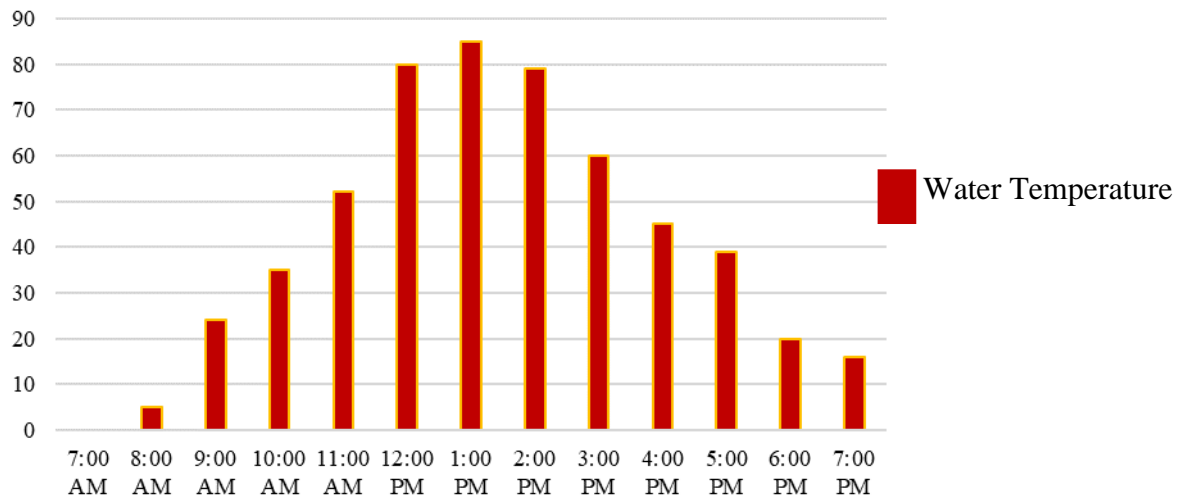
GRAPH RESULTS

TIME VS COPPER FINS TEMPERATURE



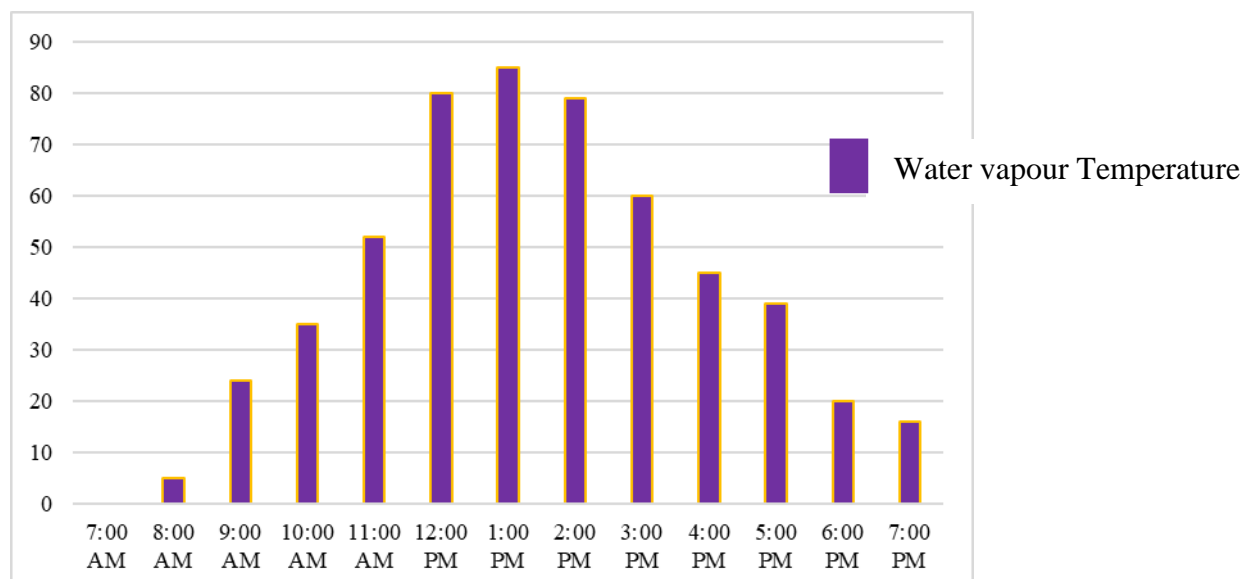
From fig we can see the graph which shows the variation of the temperature of the copper fin which is used as a heat absorbing material in Celsius and the time in hours. This graph is plotted based on the experimental analysis carried out on a shiny day between 7.00 AM and 7.00 PM. The temperature of the copper fin is found to be maximum at 12.00 PM and found out to be the almost same with a small variation between 11.00 AM and 2.00 PM.

TIME VS WATER TEMPERATURE



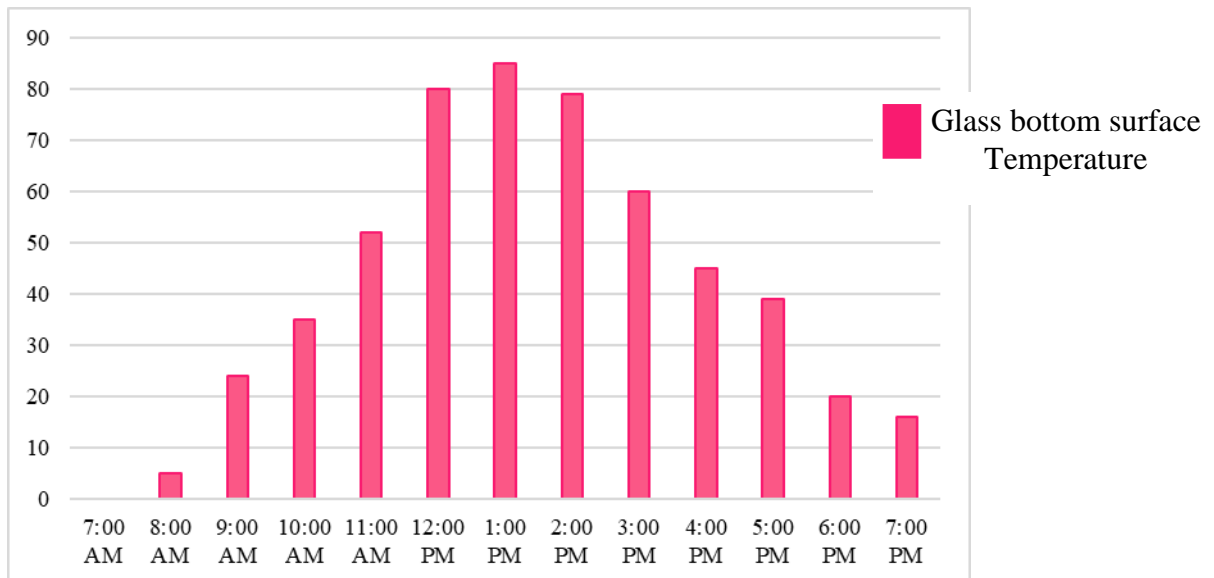
From fig we can see the graph which shows the variation of the temperature of the salt water which is poured into the solar still for distilling it in Celsius and the time in hours. This graph is plotted based on the experimental analysis carried out on a shiny day between 7.00 AM and 7.00 PM. The temperature of the salt water is found to be maximum at 12.00 PM and found out to be the almost same with a small variation between 11.00 AM and 12.00 PM then it keeps decreasing as the temperature of the copper fins is also decreasing.

TIME VS WATER VAPOUR TEMPERATURE



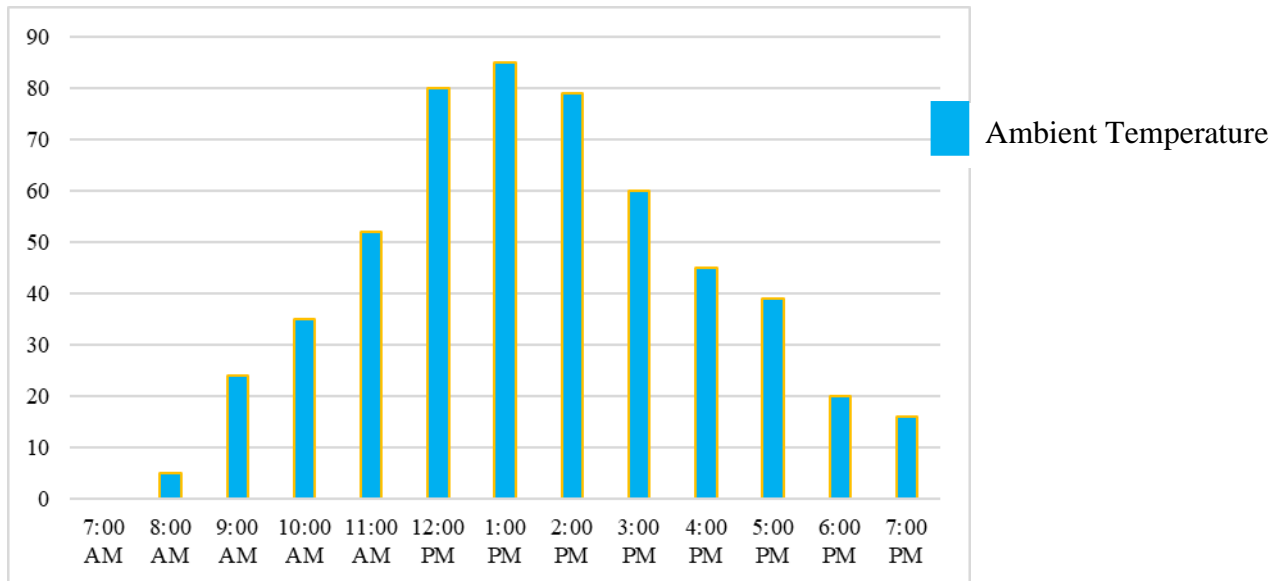
From fig we can see the graph which shows the variation of the temperature of the water vapour in Celsius and the time in hours. This graph is plotted based on the experimental analysis carried out on a shiny day between 7.00 AM and 7.00 PM. The temperature of the water vapour is found to be maximum at 12.00 PM and found out to be the almost same with a small variation between 11.00 AM and 3.00 PM.

TIME VS GLASS BOTTOM SURFACE TEMPERATURE



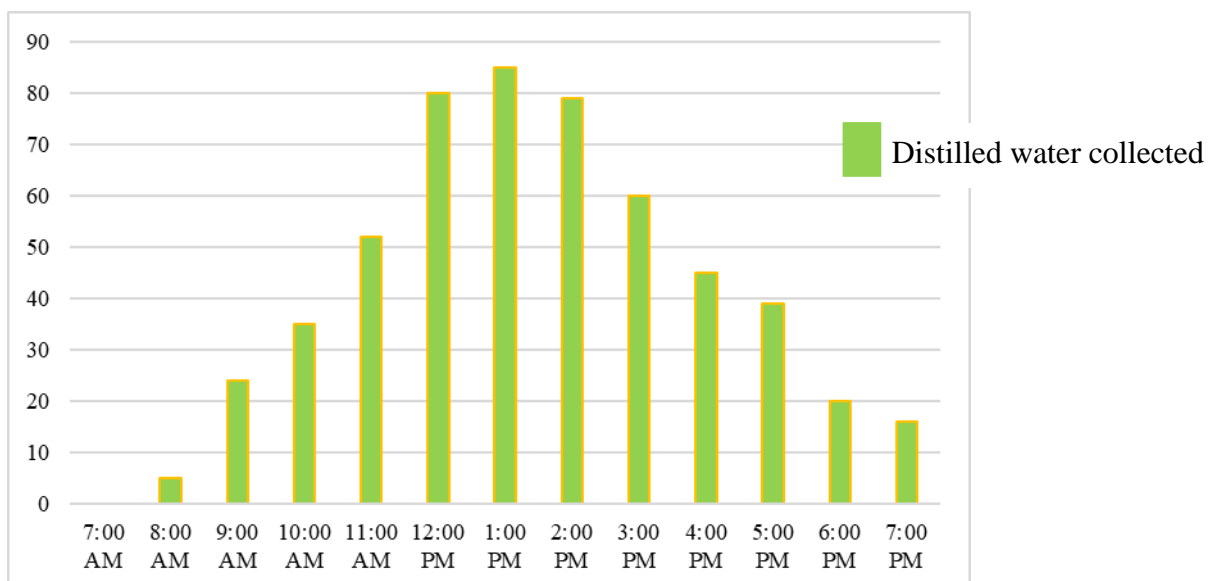
From fig we can see the graph which shows the variation of the temperature of the glass bottom surface in Celsius and the time in hours. This graph is plotted based on the experimental analysis carried out on a shiny day between 7.00 AM and 7.00 PM. The temperature of the glass bottom surface is found to be maximum at 11.00 PM and found out to be a narrow increase in the temperature form 7.00 AM to 11.00 PM and a narrow drop in the temperature from 11.00 AM to 5.00 PM.

TIME VS AMBIENT TEMPERATURE



From fig we can see the graph which shows the variation of the ambient temperature in Celsius and the time in hours. This graph is plotted based on the experimental analysis carried out on a shiny day between 7.00 AM and 7.00 PM. The ambient temperature is found to be maximum at 11.00 PM and 12.00 PM and found out to be the almost same with a small variation between 1.00 PM and 4.00 PM.

TIME VS DISTILLED WATER COLLECTED



From fig we can see the bar chart which shows the variation of the distilled water collected in ml and the time in hours. This graph is plotted based on the experimental analysis carried out on a shiny day between 7.00 AM and 7.00 PM. The distilled water collected is found to be maximum at 1.00 PM and found out to be the almost same with a small variation between 12.00 PM and 2.00 PM. The total amount of distilled water which was collected by the end of the day is 505 ml.

CLAIM (S)

1. The Single basin solar still made up of a basin with a carbon fiber composite container in black color with copper tube and fins contains brackish or sea water.
2. According to claim 1, wherein the carbon fiber composite sheet as the base material, so the temperature inside the still was sustainable and the Water temperature has reached its maximum of 69°C.
3. According to claim 1, wherein to increase the rate of heating of water, we used copper fins. Hence, by adding all these additional features to the present stills, we found that our carbon fiber composite Solar still has more Efficient than the other solar stills which are made with Steel.
4. According to claim 1, wherein the copper temperature, water temperature, glass bottom surface temperature, vapor temperature, and ambient temperature are taken in hourly basis on a sunny day from morning 7.00 AM to evening 7.00 PM
5. According to claim 1, wherein the large amount of distilled water is obtained between the time period of 11.00 AM and 2.00 PM as most of the solar radiations pass into the glass thus increasing the temperature of the copper fins which leads to the increase in the amount of heat conduction to the brackish water or salt water.
6. According to claim 1, wherein the maximum of 80 ml of distilled water is obtained during the time period of 12.00 PM to 1.00 PM. It is clear that the amount of distilled water obtained depends mainly on the solar intensity and the material used for heat absorption purpose
7. According to claim 1, wherein the solar still is a simple and easy to construct, Initial cost is low, the energy source is free and renewable, and also maintenance is required only on scheduled days, which is used for converting the brackish water or salt water into potable water which operates completely on the solar energy without any man power and needs only some maintenance on scheduled maintenance days.
8. According to claim 1, wherein the productivity of distilled water using the solar still is less, it is best method for producing water in large scale.

ABSTRACT

PERFORMANCE ANALYSIS OF SOLAR STILL WITH CARBON FIBER COMPOSITE AND COPPER FINNS

In this invention, Single basin solar still made up of a basin with a carbon fiber composite container in black color with copper tube and fins contains brackish or sea water. This is enclosed in a completely airtight surface formed by a transparent glass cover. Incident solar irradiance passes through the transparent cover and is absorbed by the black carbon composite base with composite fins. Consequently, water contained in the basin gets heated up and evaporates in the saturated conditions inside the still. Water vapor rises until they come in contact with the inner surface of the cover and condensed into pure water, run down along the glass cover bottom surface due to gravity and is collected using water collector. The performance of the solar still depends mainly on solar intensity, wind velocity, ambient temperature, and water and glass temperature difference, free surface area of water, absorber plate area, and temperature of inlet water, glass angle and depth of water. The solar stills are the best ways of getting distilled water in hot climatic regions as there is scarcity of water as well as electricity and also the construction of the solar still is quite simple, this is only reason for the implementation of solar stills in many countries for obtaining distilled water from the brackish water or salt water.

FORM 3
THE PATENTS ACT 1970
(39 of 1970)
&
The Patent Rules, 2003
STATEMENT AND UNDERTAKING UNDER SECTION 8
(See Section 8, rule 12)

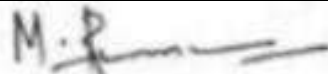


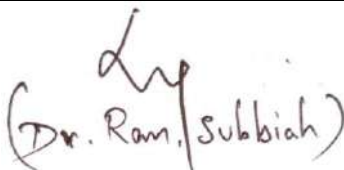
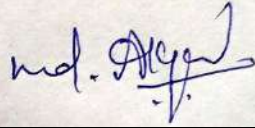
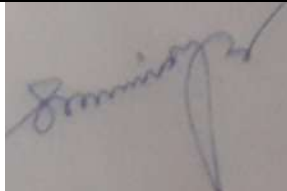
NAME OF APPLICANT & INVENTORS

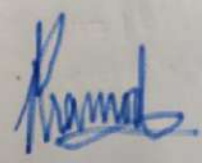
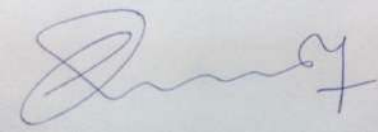


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Hereby declare, we have not made any application for the same / substantially the same invention outside India.

TITLE OF THE INVENTION: PERFORMANCE ANALYSIS OF SOLAR STILL WITH CARBON FIBER COMPOSITE AND COPPER FINS

NAME	SIGNATURE	DATE
Dr.M.RAMARAO		11/03/2021
Mr. PRAMOD SHIVAJI KATHAMORE		11/03/2021
Mr. A. BALAJIKRISHNABHARATHI		11/03/2021
Dr.RAM SUBBIAH		11/03/2021
Mr. CHINNAHAJISAGARI MOHAMMAD AKRAM		11/03/2021
Dr. M. PANDIAN		11/03/2021

Dr. V. R. PRAMOD		11/03/2021
Dr. RAGHAV G R		11/03/2021
Dr. DINESH KUMAR		11/03/2021
Mr. I. AUGASTIN SANTHIYAGU		11/03/2021

To
The Controller of patents, The Patent office at CHENNAI

FORM 5
THE PATENTS ACT, 1970 (39 of 1970)
&
THE PATENTS RULES, 2003
DECLARATION AS TO INVENTORSHIP
(See section 8, rule 12)

1. Name of Applicant & Inventors		
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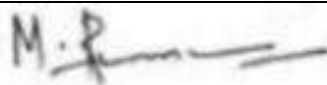


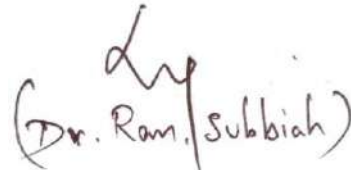
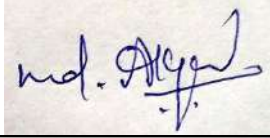
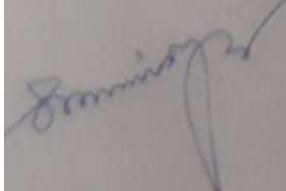
Dr. RAGHAV G R	ASSOCIATE PROFESSOR DEPARTMENT OF MECHANICAL ENGINEERING SCMS SCHOOL OF ENGINEERING AND TECHNOLOGY, VIDYA NAGAR, PALISSERY, KARUKUTTY, ERNAKULAM, KERALA-683576 Mobile:: 9994571650 E-mail : raghavmechklnce@gmail.com	Indian
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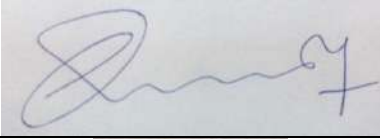
Hereby declare that the true and first inventor of the invention disclosed in the complete specification filed in pursuance of my application numbered _____ dated _____

TITLE OF THE INVENTION: PERFORMANCE ANALYSIS OF SOLAR STILL WITH CARBON FIBER COMPOSITE AND COPPER FINNS

3.Declaration to be given when the application in India is filed by the Applicant in the convention country: -

I the applicant in the convention country hereby declare that our right to apply for a patent in India is by way or assignment from the true and first inventor.

NAME	SIGNATURE	DATE
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Mr. PRAMOD SHIVAJI KATHAMORE		11/03/2021
Mr. A. BALAJIKRISHNABHARATHI		11/03/2021
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Dr. V. R. PRAMOD		11/03/2021
Dr. RAGHAV G R		11/03/2021
Dr. DINESH KUMAR		11/03/2021
Mr. I. AUGASTIN SANTHIYAGU		11/03/2021

To
The Controller of Patents, The Patent office at CHENNAI.

FORM 9
 THE PATENTS ACT, 1970
 (39 of 1970)
 &
 THE PATENTS RULES, 2003
REQUEST FOR PUBLICATION
 (See section 11A(2); rule 24A)

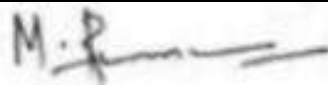


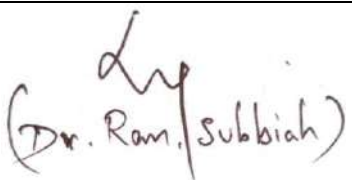
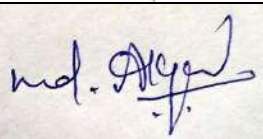
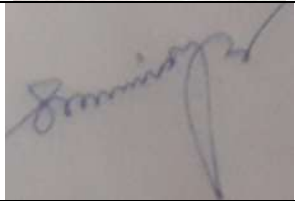
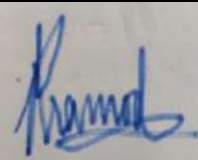
We (state name, address and nationality of Applicant & Inventors)

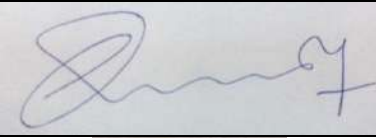


TITLE OF THE INVENTION: PERFORMANCE ANALYSIS OF SOLAR STILL WITH CARBON FIBER COMPOSITE AND COPPER FINs

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Hereby request for early Publication of our application for Patent No. _____ dated _____ under section 11A(2) of the act.

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Dr.RAM SUBBIAH		11/03/2021
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Dr. RAGHAV G R		11/03/2021
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To
The Controller of patents, The Patent office at CHENNAI.