DESIGN AND FABRICATION OF SOLAR AIR COOLER

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ABSTARCT

A revived interest in solar-powered air cooling has been seen in recent years as a result of the increased awareness of global warming and other environmental challenges. This study provides a description of the current developments in solar-powered air conditioning. Absorption chillers are a tried-and-true technology that utilizes LiBr–water as the working fluid combination. These chillers are the primary foundation upon which closed-cycle heat-powered cooling systems. Because of recent advancements in gas-fired systems of this kind, double- and triple-effect chillers are now available. These chillers have a coefficient of performance (COP) that is much greater than their single-effect counterparts. This makes it feasible to minimize the amount of solar heat that is needed for each kilowatt-hour of cooling. These systems, on the other hand, need for solar collectors that operate at high temperatures. This article provides an explanation of the fundamentals of multi-stage absorption systems. In this article, an economic comparison is presented, which demonstrates that the solar component of the system accounts for the majority of the overall system cost. As of right now, the alternative with a high coefficient of performance and a high temperature is still more expensive than the one with a low temperature. Described below are open-cycle desiccant systems that use either solid or liquid sorbents as its components. Open-cycle absorption and desiccant systems have been developed for use with low temperature heat sources such as flat plate solar collectors. This is in contrast to the primary focus of research on novel closed-cycle absorption systems, which has been directed toward increasing the operating temperature in order to improve efficiency through multi-staging. In this article, a revolutionary open-cycle (DER) system is presented. This system makes it feasible to utilize solar heat at relatively low temperatures, which allows for the production of chilled water and cold, dehumidified air in varying amounts, depending on the load..

INTRODUCTION

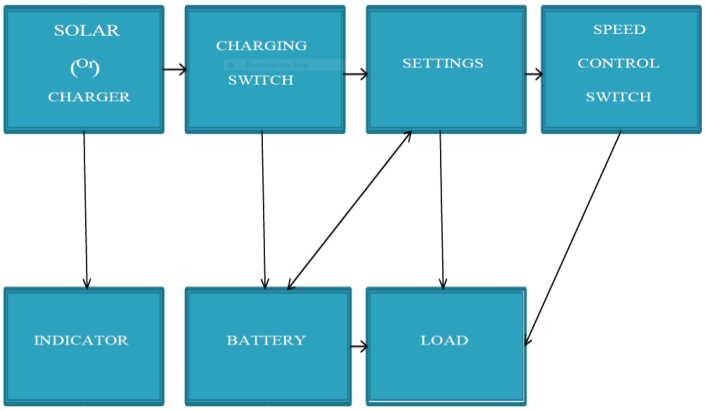
This article provides an explanation of the comfort conditions that the gadget is able to provide for the human body. When the weather is hot and humid, particularly during the summer, we experience discomfort as a result of the combination of the two factors. Therefore, it is essential to maintain the parameters associated with thermal comfort. The temperature, humidity, and air speed in a room are the factors that affect the level of thermal comfort. Another major aspect that contributes to thermal comfort is radiant heat, which refers to hot surfaces, or radiant heat loss, which refers to cold surfaces. When compared to the potential saturation level, the relative humidity (RH) is a measurement of the amount of moisture that is present in the air. Warmer air has the capacity to contain more moisture content. When humidity levels become close to 100 percent, the air moisture begins to condense; this condition is referred to as the dew point. In a building, the temperature is determined by the temperature outside and the solar loading, in addition to any heating or cooling that is contributed by the heating, ventilation, and air conditioning system or any other sources of heating and cooling. Room occupants are also a source of heat in the room since the average temperature of the human body is much greater than the temperature of the space. There is a need for such a source that is abundantly accessible in nature and does not impose any negative impacts on the planet. Solar energy is the only thing that has the potential to solve all of these issues once and for all.

LITERATURE RIVIEW

It is required that Ramesh Kumar, Anbarasan, write a paper in the year 2018. The conclusion of the study is that "cooling air can be produced by solar power." The title of the title of the paper is "solar air cooler," and the name of the journal is "design and fabrication of solar air cooler."
In the year 1992, Wertheim is required to produce a paper. On the other hand, the name of the magazine is "machining with minimal cutting fluid," while the title of the article is "high pressure system." "Tool wear is reduced, and the tool life is also increased," is the conclusion that summarizes the findings of the article.2 [2] In the year 2002, Senthilkumar is required to publish a paper. "high pressure cooling system" is the title of the article that is being discussed. The title of the publication is "machining with minimal cutting fluid," and the conclusion of the study states that "cutting fluid is supplied through a spindle in milling process."[3]: In the year 2008, Ramkumar is required to publish a paper. "Minimal cutting fluid is passed through a two jets" is the title of the article that is being discussed. "machining with minimal cutting fluid" is the whole title

of the publication. The conclusion of the article is that "to improve the tool life and to reduce the temperature that exists between the tool and the job."

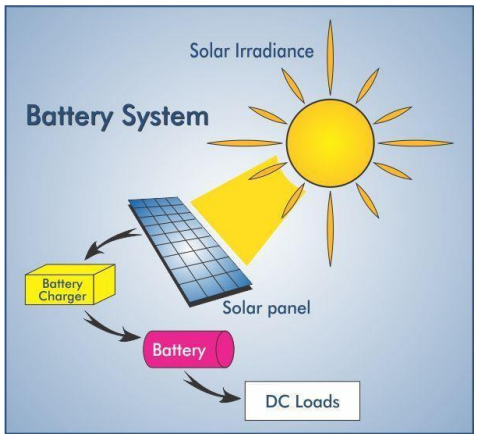
BLOCK DIAGRAM



COMPONENTS OF SYSTEM SOLAR PANEL

By using the photovoltaic effect, photovoltaic modules are able to create electricity by utilizing the light energy (photons) that is derived from the Sun. Crystalline silicon cells or thin-film cells are used in the majority of modules. Wafer-based cells are available. The top layer or the rear layer of a module might serve as the structural component of the module, which is responsible for bearing the load. In addition to this, cells need to be shielded from both mechanical harm and moisture. Despite the fact that the majority of modules are stiff, there are also semi-flexible modules that are built on thin-film cells. Electrically, the cells must be linked in series, with one cell being connected to the next. The majority of photovoltaic modules make use of the MC4 connector type on the outside of the module in order to permit quick connections that are waterproof to the rest of the system. To produce the required output voltage, the electrical connections of the module are formed in series. On the other hand, the connections are connected in parallel to offer the necessary current capacity. The conducting wires that are responsible for removing the current from the modules could be made of silver, copper, or other transition metals that are non-magnetic and conductive. In the event that there is partial shading of the module, bypass diodes may be included inside the module or utilized externally in order to optimize the output of the module portions that are still lighted. Some of the most specialized solar photovoltaic modules include concentrators, which are devices that concentrate light onto smaller cells by use of lenses or mirrors. Consequently, this makes it possible to make cost-effective use of cells that have a high cost per unit area, such as gallium arsenide as an example. For the purpose of providing additional support for the panel structure, solar panels additionally make use of metal frames that are composed of racking components, brackets, reflector shapes, and troughs

PERFORMANCE OF SOLAR



The performance of the module is often evaluated under standard test circumstances (STC), which include an irradiation of 1,000 W/m2, a solar spectrum of AM 1.5, and a temperature of 25 degrees Celsius for the module. he nominal power (PMAX, measured in W), the open circuit voltage (VOC), the short circuit current (ISC, measured in amperes), the maximum power voltage (VMPP), the maximum power current (IMPP), the peak power (watt-peak, Wp), and the module efficiency (%) are all examples of electrical characteristics. The word "nominal voltage" is a term that has been carried over from the days when solar modules were solely used to charge batteries. It refers to the voltage of the battery that the module is best suited to charge. Due to the fact that the actual voltage output of the module is subject to fluctuate depending on the illumination, temperature, and load circumstances, the module never works at a single voltage that is consistent throughout its operation. The nominal voltage provides customers with the ability to quickly determine whether or not the module is compatible with a certain system. The greatest voltage that the module is capable of producing while it is not linked to any electrical circuits or systems is referred to as the open circuit voltage, or VOC. VOC may be measured using a voltmeter either directly on the terminals of an illuminated module or on the cable of the module that is unplugged..

The different types of thin-film solar cells can be categorized by which photovoltaic material is deposited onto the substrate:

- Amorphous silicon (a-Si)
- Cadmium telluride (CdTe)
- Copper indium gallium selenide (CIS/CIGS)
- Organic photovoltaic cells (OPC)

DC MOTOR

Motor is single phase induction motor same as ceiling fan motors. Difference occurs in the mechanical modelling of FAN structure. Exhaust fan structure is made in such a way, it blows air inside out. A ceiling fan is structured such a way that it provides air directly below.

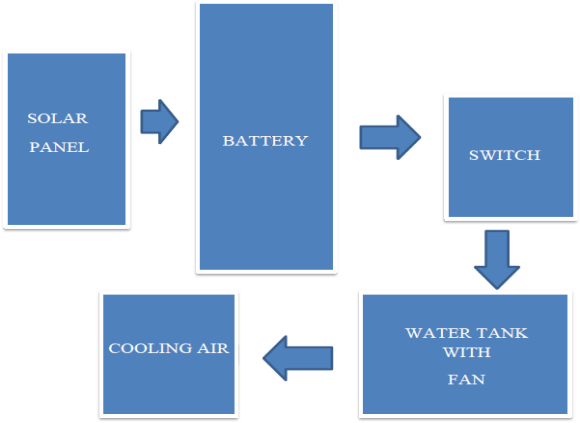
METHODOLOGY TO SOLVE A PROBLEM

The elements of the projects are assembled in a correct way.

First the power supply is taken from a solar panel and stored in a battery. Then the battery is used to convert the power in AC-DC. Then the switch is to control the pulse setting. The air cooler will run according to power supply.

The water is stored in a water tank. The fan used to convert the cooling water to cooling air.

FLOW CHART FOR THE EXPERIMENT



FABRICATION PROCESS

In the fabrication process of solar air cooler application process having various operations like

1. Cutting
2. Drilling
3. Welding
4. Grinding

CUTTING

Cutting is a collection of processes where in material is brought to a specified geometry by removing excess material using various kinds of tooling to leave a finished part that meets specifications.
The net result cutting is two products the waste or excess material, and the finished part. In material working, the waste would be sawdust and excess material .In cutting metals the waste is chip or swarf and excess metal.

GRINDING

Grinding uses an abrasive process to remove material from the work piece.

A grinding machine is a machine tool used for producing very fine finishes, making very light, or high precision forms using an abrasive wheel as the cutting device. This wheel can be made up of various sizes and types of stones, diamonds or inorganic materials.

WELDING

Welding is a fabrication process that joins materials, usually metals or thermoplastics, by causing coalescence. This is often done by melding the work pieces and adding a filler material to form a pool of molten material That cools to become a strong joint ,but sometimes pressure is used in conjunction with heat or by itself, of produced the weld.

DRILLING

Drilling is a cutting process that uses a drill bit to cut a hole of a circular cross-section in solid materials.

The drill bit is rotary cutting tool, often multipoint. The bit is pressed against the work piece and rotated at from hundreds to thousands of revolutions per minute.

COST OF THE MATERIALS	**Cost(Rupees)**
Dc Motor	2300
SPSTS switch	25
Solar panel	2000
Battery	1150
Lithium	1500

SPECIFICATIONS

No of solar panel

Type of fluid : water

Power supply : AC Battery Type

Amount of fluid used : 15ml/min

Battery 2

Motor type : dc motor

Electrical Characteristics:

Open circuit voltage - 21.6v Short circuit
current - 1.94A Maximum power - 20wp

CONCLUSION

One of the results of the project is that the living room has been brought to a comfortable thermal environment. That is a temperature of up to 25 degrees Celsius and a relative humidity of sixty percent. A comparison of the price of this product to the prices of other items now available on the market reveals that the solar product is more appealing and more accessible to the average person. An alternative to the issues that arise from power outages, this solar product is ideal for use in rural areas, educational institutions, and commercial establishments. It has a myriad of appealing components.

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