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Fabrication of Modified Air Cooler

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ABSTRACT

Every machine has some problems ,which reduce the efficiency of that machine. The existing air cooler has many problems ,which may be due to the use of some faulty design. Many times it happen that tank water level goes below the lifting pump hence it unable to lift the water and pump run in idle condition there are many danger of overheating and burning of winding of pump . Another problems is that unnecessary consumption of power due to the negligence of human ,the actual water requirement of cooling pad to give the sufficient coolness is less as compared to the water supplied to it continuous running .thus there is an extra consumption of power.In our project we try to solve these two problems ,and try to modify the existing air cooler.

Keywords: - Evaporative Cooling, Heat Transfer, Air Cooler, Pot System.

INTRODUCTION

The air cooler may be define as the type of heat exchanger ,which lower the temperature of the surrounding up to the certain cooling there is no humidity control and no air purification system like in air conditioners .since from the older time man has been trying to find out some convenient way to get the rid of the hot summer seasons. So the invention made the man invented the air cooler in the form of hand fan cooler ,the wetted grass mat where employed.In the evaporative process to cool the air ,since then evaporative process has been machined and various device has been developed and manufactured to utilized the evaporation in a heat exchanger process. Then the various research and the developments in design and technology has been made and an electrically driven and pump type air cooler is made but the basic principle is same as that was in the older air cooler. So in our project we spent the time to modify the existing cooler by considering the concept of electricity saving in cooler. The modified air cooler cum storage system is a type of conventional air cooler which is used for providing room cooling as well refrigeration systems. The system consists of a lower tank which is a mud pot whose outer periphery is filled by sand slurry. The lower tank and the slurry are held by a larger mud pot, i.e., a pot-in-pot system. The lower tank is filled with water and it is connected to the upper tray through a pump. The water in the upper tray is passed through a cooling pad which is used for absorbing the water. A fan is fixed next to the cooling pad and is followed by a vent system. The tray also has another port which is connected to the cold storage box. On running the system for 5 hours, the temperature of a 960 cubic feet room gets reduced by 12 degree Centigrade and the temperature of the cold storage box gets reduced by 11 degree Centigrade and reaches 24 degree Centigrade, hence providing the right temperature for storage of perishable items.

OBJECTIIVES

- Shows the modification in existing air cooler
- To prepare and efficient and cost effective system.
- To make aware of non conventional energy sources to reduce environmental pollutions.
- This product preferably suitable for villages, because they face lot of power cut problems in summer (around 12 to 14 hrs in day). And for offices and schools which runs in day to which save energy

COMPONENTS REQUIRED

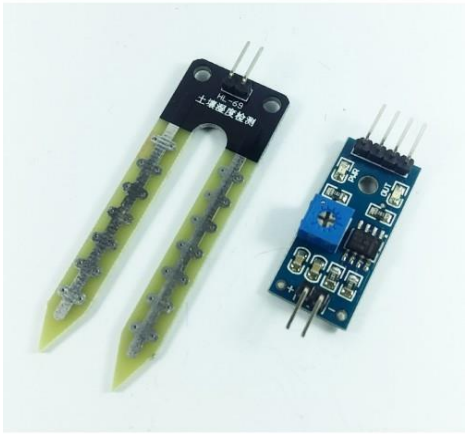
1. wet air cooler

2. SOLAR PANNEL

3. CHARGE CONTROLLER

4. DC DRY BATTERY

5. MOISTURE SENSOR



6. DC DIAPHRAM PUMP

WORKING PRINCIPLE

Evaporative coolers lower the temperature of air using the principle of evaporative cooling, unlike typical air conditioning systems which use vapor-compression refrigeration or absorption refrigeration. Evaporative cooling is the conversion of liquid water into vapor using the thermal energy in the air, resulting in a lower air temperature. The energy needed to evaporate the water is taken from the air in the form of sensible heat, which affects the temperature of the air, and converted into latent heat, the energy present in the water vapor component of the air, whilst the air remains at a constant enthalpy value. This conversion of sensible heat to latent heat is known as an isenthalpic process because it occurs at a constant enthalpy value. Evaporative cooling therefore causes a drop in the temperature of air proportional to the sensible heat drop and an increase in humidity proportional to the latent heat gain. Evaporative cooling can be visualized using a psychrometric chart by finding the initial air condition and moving along a line of constant enthalpy toward a state of higher humidity.[A simple example of natural evaporative cooling is perspiration, or sweat, secreted by the body, evaporation of which cools the body. The amount of heat transfer depends on the evaporation rate, however for each kilogram of water vaporized 2,257 kJ of energy (about 890 BTU per pound of pure water, at 95 °F (35 °C)) are transferred. The evaporation rate depends on the temperature and humidity of the air, which is why sweat accumulates more on humid days, as it does not evaporate fast enough. It is simple in construction we take air cooler cabinet , mount fan with motor and pump motor on proper position ,then after we fix humidity control sensor on cooling pad to sense the humidity , at bottom inside the tank fit level sensor to maintain the level in tank. The complete idea of our project of introduce in The part of introduction . Let discuss the working ,start the air cooler with full fill of water tank .automatically humidity /moisture sensor sense the dry condition of cooling pad and start the pump till up to cooling pad becomes wet ,after wetness sense the air cooler cooling pad and switch off the circuit pump. In another stage when tank water level goes below sensor start the sump tank pump and maintain the level ,after level maintaining sump tank pump switch off automatically .

RESULT AND DISSCUSSION

Observation

T1	*T2*	*T3*	*T4*	*P1*	*P2*	*H1*	*H2*	*H4*
130C	*56.10C*	*33.50C*	*0.30C*	*3bar*	*10.34bar*	*410*	*443*	*245*

Here,

T1= Temperature at the inlet of Compressor

T 2 = Temperature at the outlet of Compressor

T 3 = Temperature at the outlet of Condenser T 4 = Temperature at the inlet of Evaporator P 1 = Pressure at the inlet of Compressor

P 2 = Pressure at the outlet of Compressor h1=Enthalpy at the inlet of compressor h2=Enthalpy at the outlet of compressor h4= Enthalpy at the inlet of Evaporator

The Table represents the observations for Relative Humidity

Td	*Tw*
180C	*12.50C*

Here, Td = Dry Bulb Temperature of air (D.B.T.)

Tw = Wet Bulb Temperature of air (W.B.T.)

CONCLUSION

Our modified air cooler concept is more beneficial as compare to the ordinary air cooler. By completing this project we have achieved a clear knowledge of comfort cooling system for human by using non-conventional energy. This project would be fruitful in both domestic & industrial backgrounds. We also know about non-conventional energy sources and utilization .

The authors gracefully acknowledge Dr. N. K. Mandavgade for their guidance, support and direction.

Advantages

- Save extra consumption of power
- Cheaper and smooth in operation

- No need to fill the water manually
- Cooling efficency can be increase
- Possibility of overheating and burning winding of pump motor is eliminated

Application

- **This project work can be very much beneficial if used in countries like ours that it because of our vast population .the amount of our parentages of air cooler in summer season we can try to save water and electricity of to 40 – 60 % with increase in cooling efficiency.**
- **In banks**
- **Houses**
- **Villeges**
- **Factories etc.**

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