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Design and Fabrication of Duct Rotating Air Cooler

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A B S T R A C T

In the summer weather, we have gets from environment a hot air with winds. Most of the countries are so hot temperature area were human cannot easily survive, So we are using the air conditioning or cooling system with the various equipment of the system such as air conditioning system, water blower System and air cooler system. In all this system, most commonly we are using air cooling system which is cost effective and more availability in the all countries. In previous air cooler arrangement is different, the water is flows from upward the motor, in the ai cooler the tub and cooler not fixed it is separate easily separate together.As per the human requirement according to the summer season increases the cooling air requirement, due to sweating and heat is increase. And the simple air cooler not fullfield the human requirement. Hence we decide by using duct efficiency of the product increases and made duct rotating air cooler. The duct cooler is more efficient Duct cooler gives more cooling than desert. In a simple words duct cooler is a impeller type called as Blower fan. Duct cooler is a Impleller type which increases the speed and volume of an air stream with the rotating impellers.

Keywords: Fan, motor, impeller, stand, wheel, duct, etc..

1 INTRODUCTION

Air cooling is often outlined as rejecting heat from associate degree object by flowing air over the surface of the item, through suggests that of convection. Air cooling needs that the air should be cooler than the item or surface from that it's expected to get rid of heat. An air cooler works on the principle of state change cooling whereby evaporation of water is employed to chill the air a straightforward example of state change cooling is sweating in humans. As sweat starts to evaporate, it extracts the additional heat absorbed in it from the skin within the kind of gas therefore leading to a cooling result.

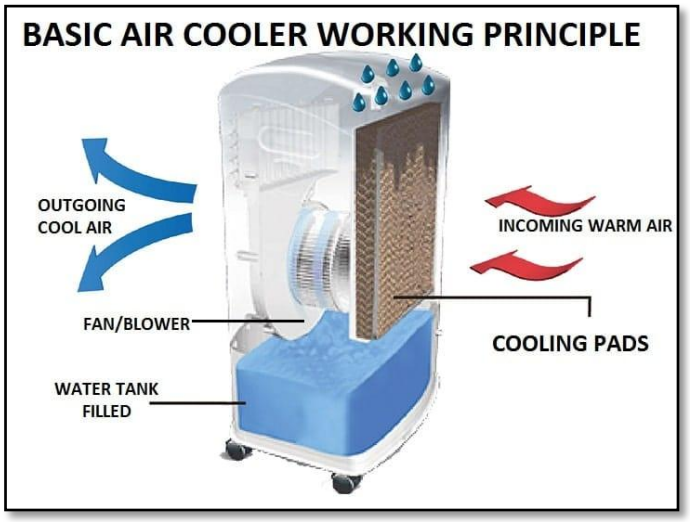

Fig 1 .Air Cooler

Air coolers work on the principle of cooling by the evaporation of water that is gift in them. These coolers are referred to as desert coolers or swamp coolers and that they need water, that is crammed in these coolers. The cooling result is created because of the transition in part from liquid state to vapour state. Various elements that ar required to create Associate in Nursing cooling system or an easy air cooler are: 1)Fan and vents- a disciple is required to direct the cool air towards the space. These fans unendingly flow cool air within the rooms. 2)Water thereforeurce- cooling system uses water so it's necessary to fill the cooler with water so the cooling will occur. 3)Cooling pads- the aim of cooling pads is to soak up water and to pass

air through them. 4)Distributor- Water has to be distributed properly to those cooling pads. this can be done by cooling pumps and varied pipes that interconnect the cooling pads. These cooling pads ought to aways be in saturated state otherwise the water can evaporate faraway from these pads. An air cooler serves to chill down the new air during a area or vehicle. Air cooler cools the part air during a area or vehicle by adding water to the air. The water is extra within the kind of minute droplets. The air cooler features a fan put in in it that pulls the nice and cozy air from outside through a water wetted filter medium. The water within the cooler is gaseous by the nice and cozy air drawn by the fan. The gaseous water releases within the area. The temperature of the space comes down as a result of the nice and cozy air is drawn by the fan of the air cooler. Associate in Nursing air cooler isn't a similar as Associate in Nursing cooling system. The air cooler doesn't use mechanical device and refrigerant gas. we will say that tho' the air cooler isn't as effective as cooling system, it's not harmful for the atmosphere and is price effective. The air coolers cool the part air principally by the method of evaporation of water. The temperature of the space falls due to many reasons such as:- 1.Relative Humidity Level 2.Air temperature 3.The size of the space 4. the number of cross ventilation.

2 PROBLEM IDENTIFICATION

While analysis, In the summer weather, we have gets from environment a hot air with winds. Most of the countries are so hot temperature area were human cannot easily survive, So we are using the air conditioning or cooling system with the various equipment of the system such as air conditioning system, water blower System and air cooler system.In all this system, most commonly we are using air cooling system which is cost effective and more availability in the all countries.

In previous air cooler arrangement is different, the water is flows from upward the motor, in the ai cooler the tub and cooler not fixed it is separate easily separate together.As per the human requirement according to the summer season increases the cooling air requirement, due to sweating and heat is increase. And the simple air cooler not fullfield the human requirement.

Hence we decide by using duct efficiency of the product increases and made duct rotating air cooler.

3 OBJECTIVE

Our Objective for the project are:-

1) Increase the efficiency of the cooler using duct
2) Reduce Space and weight of the machine:- The product move easily from one place to another with low effort
3) Minimization of cost:- People can easily purchase the product.

4 LITERATURE OF REVIEW

1.1 Advanced Strategy Guideline: Air Distribution Basics and Duct Design Arlan Burdick IBACOS, Inc. December 2011

In the paper conclude, the upper playacting house encompasses a lower load, and consequently less air volume is required to condition the area. This presents each challenges and opportunities once coming up with the air distribution system. Challenges arise once victimization air retailers sized by “rule of thumb” that don't have the throw required to produce air combination within the space to attain the required comfort results. At constant time, the energy economical house style method offers opportunities to integrate the HVAC system into the planning earlier within the method. Early thought of the HVAC system within the whole house style will cause associate degree economical and cozy house. attempting to force a system late within the style method could find yourself with undesirable consequences. The instrumentality designated to satisfy the heating and cooling masses encompasses a specific capability of air delivery against a particular static pressure. every part within the air distribution system has associate degree associated pressure loss that has got to not exceed the on the market static pressure of the instrumentality. Lower volumes of air should be delivered to the area in a very manner that may give smart combination with the area air to produce comfort. Careful thought of the air outlet strategy associate degreed a full duct style area unit crucial to the HVAC system delivering the comfort in an energy economical house, whether or not it's new construction or associate degree energy upgrade retrofit. each system noise and noise at the air outlet area unit necessary comfort concerns within the air distribution system style. The come air system to bring air back to the air handling instrumentality is crucial to the comfort levels inside the house. as a result of the come air ducts area unit generally a lot of larger than the availability ducts, the position of the come air system is to be thought of early within the style method. within the entire HVAC style method, heating and cooling masses area unit addicted to the development and placement of the house, whereas the instrumentality choice relies on the hundreds, and also the air distribution system relies on each the hundreds and also the instrumentality capability. The success of a style in either versatile duct or rigid duct depends on the devoted execution of the planning throughout installation. The ACCA/ANSI customary five (ACCA 2010) has been established to make sure that quality installations occur.

1.2 “DESIGN AND FABRICATION OF ENERGY EFFICIENT AIR COOLER”

Author by, DR. JOSEPH GONSALVIS, MANOJ NAYAK MICAH PETER, D’SOUZA PREETHAM Y.J NIKHIL P.S

The objective of this paper, work is to develop Associate in Nursing air cooler, that employs the similar principle in manufacturing cool breeze of air as within the existing air coolers. However, eliminates the utilization of higher tank for storage of water and also the would like for a pump for recirculation of water from the lower tank to the higher tank therefore energy is saved. The air cooler not solely saves energy however conjointly occupies lesser house and additional stable. The lower sump is employed for storing the water. so as to boost the water the natural property of fibers the capillarity is employed. the material unfit within the sump raises water because of capillarity incorporates completely different regulation aside from typical air cooler existing within the market, that uses the principle of capillary action to boost water. Objective is to satisfy the cooling impact same as typical air cooler within the market by overwhelming less power.

1.3 Development and Fabrication of Modified Evaporative Cooler

Pratik Bhake1 , Shrirang Joshi1 , Kunal Kumar Mishra1 , Ataul Haque1 Prof. (Mrs.) Prachi K. Tawele2 , Prof (Ms.) Sonam V. Sontakke2

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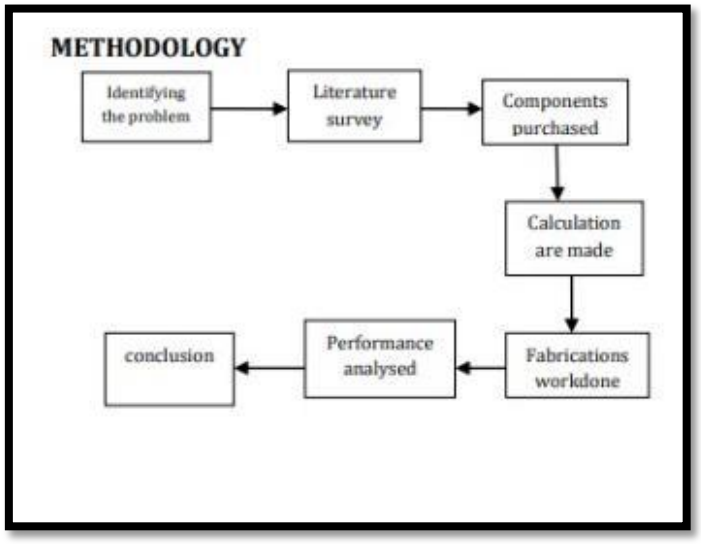
In this paper mentioned, AN cooling conjointly called swamp cooler or desert cooler, could be a device that cools air through the evaporation of water. phase change cooling differs from typical air con system that use vapour compression or absorption refrigeration cycle. phase change cooling works by mistreatment water's giant total heat of vaporization. The temperature of dry air may be born considerably through the activity of liquid water to vapour that is thought as evaporation, which might cool air mistreatment a lot of less energy than refrigeration. during this system we tend to square measure mistreatment this idea for cooling of air. we've designed a air cooler that doesn't contain pump , whereas the opposite coolers gift within the market that square measure equipped with pump to wet the cooling material. we've conjointly used air filters at the outer vents of the cooler in order that we are {able to} able to clean moreover as cool the air and conjointly create it a lot of hygienical. By coming up with the cooler in such a fashion we tend to were able to wet the cooling material fully and acquire sensible results out of it.

1.4 cum Storage System. Author by P.Tamil Selvam, H. Imdad Ahmed, S. Naveen Kumar, R. Kumaravelan and V.C. Sathish Gandhi

In this paper, mentioned The changed air cooler ejaculate storage system could be a form of standard air cooler that is employed for providing room cooling as well refrigeration systems. The system consists of a lower tank that is a mud pot whose outer periphery is stuffed by sand suspension. The lower tank and the suspension ar command by a bigger mud pot, i.e., a pot-in-pot system. The lower tank is crammed with water and it's connected to the higher receptacle through a pump. The water in the higher receptacle is undergone a cooling pad that is employed for fascinating the water. a disciple is mounted next to the cooling pad and is followed by a vent system. The receptacle additionally has another port that is connected to the cold storage box. On running the system for five hours, the temperature of a ninety six cubi feet area gets reduced by twelve degree C and therefore the temperature of the cold storage box gets reduced by 11Degree C and reaches Degree C, therefore providing the correct temperature for storage of spoilable things. .

5 METHODOLOGY



6 COMPONENTS

The components used in our duct rotating air cooler projects are:-

1) Outer Body:
2) Fan Blades
3) Nut and Bolt
4) Motor
5) Pipe
6) Air Filter
7) Water pump motor
8) Diverter
9) Duct

7 WORKING

In our project we have a tendency to used outer body , fan blade, motor, air filter , water pump, diverter, duct, nut and bolt . Ducts area unit almost like conduits that area unit channels or passages through that air is either delivered or removed. Duct Air Coolers make sure the provide of contemporary cool air that is conditioned through the phase change cooling technology, and conjointly take away the stale air out of space} or area. The conduits or the air duct are also effective in ventilation and these Duct Coolers may also serve the dual purpose of providing contemporary air/ventilation within the {space|the area} or space throughout the atmospheric condition or the winters. A Duct Cooler blows the refreshing and funky air through metal conduits with the desired quantity of pressure to each a part of the {space|the area} or space targeted to supply cool air. each the management and also the flow of cool air area unit exemplarily uniform for a Duct Air Cooler, because the air is pushed to a way distance from the fan through ducts and is distributed through single or multiple retailers. The cooling system works on the principle of evaporation. The operating of the cooler is straightforward. The operating will be therefore explained because the close air force in by the cooler, the air gets in grips with the water and also the water content of the air will increase. thanks to this will increase in water content the air gets cooled due to the air losses its heat. The operating of the cooling system and regular• cooler is comparable to every different. All the phase change coolers have a cooling medium in it. In our cooler we've used wood wool because it is affordable and pronto obtainable all over. the encompassing air already consists of dry air and vapour, however by suing AN cooling system we have a tendency to increase in it. The working rule of this kind of cooler is that it• pulls the air within centripetally manner through the centrifugal flow fan so this air is forced forward at a protracted distance with the assistance of the axial flow fan. The air is force through the wood wool that is• wrapped over the cylindrical cage. because the cylindrical cage rotates within the cooler with the assistance of the low rate motor the wood wool absorbs water from the storage tank at the lowest of the cooler and once the air is force through the cylindrical cage the wet wool cools the air and offers the cooling result.

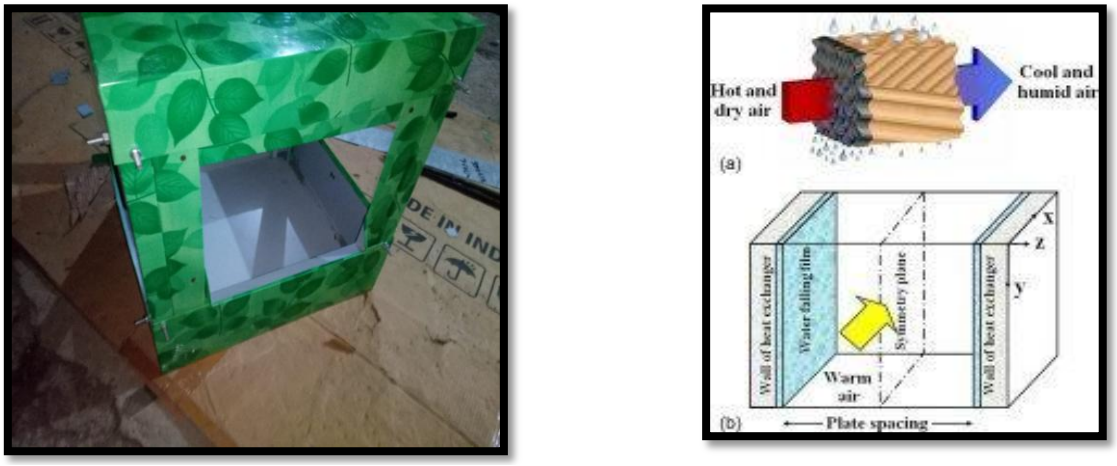


Fig. 17 construction of Papad making machine

The speed of motor is controlled victimization the regulator if connected to the cooler. The speed of the cylindrical cage is unbroken slow to permit the wood wool to induce enough time to soak up water from the cistern. If the speed of motor is unbroken high the wood wool wouldn't get enough time to gather water from the tank and therefore the correct cooling won't be achieved. an extra downside might} arrive whereas rotating the cage high speed that the water may splash out of the cooling system which might be dangerous, so the speed of the cage is unbroken slow to soak up sensible quantity of water in it. Fig. Actual air flow of the cooler The motor chosen for the fan blades could be a high speed• one therefore on cool the given space at a quicker rate. The centripetal fan is unbroken slightly within the cylindrical cage to gather the air additional effectively from the wood wool. The air that's force by the centripetal fan is currently force by the axial flow fan. The axial flow fans area unit organized ahead of the• motor in order that they'll throw the air at a bigger distance and funky additional effectively to the encompassing space. The good thing about victimization the cylindrical cage is that the• air drawn is additional expeditiously from all the places whereas within the traditional physical change coolers the air isn't drawn from the corners of the cooler body. Here by employing a cylindrical formed cage we tend to area unit ready to draw the air additional impactively and acquire a awfully sensible cooling effect.

Fig. 18 Experimental Working of the Duct rotating air cooler

8 DESIGN AND SPECIFICATION

The design and specification of the project

Table.1 Design Specifications

AREA	
Length	36"
Breath	24"
Height	30"
GAUGE STEEL SHEET	60MM
FAN BLADES	
Axial Flow Fan	16 Inch, 6 Blades
Centripetal Flow Fan	9 Inch, 4 Blades
MOTOR SPECIFICATION	
FAN MOTOR SPECIFICATION	
Shaft	Two Sided Shaft
Power :	200W, 230V
Revolution	1400 Rpm
Diameter	37MM
CAGE MOTOR SPECIFICATION	
Shaft	Side Shaft.
Revolution	5-10 Rpm
Diameter	6MM
Length Drive	22MM
WATER CAPACITY	100 Litres.
COOLING POD MATERIAL	Wood Wool

9 ADVANTAGES AND DISADVANTAGES

Advantages

1) As there are only fan and motor pump in the air cooler, it can be easily repaired in case of any fault. The costs involved in the repairs are also very less.
2) Air coolers increase the levels of humidity and it will be good in dry weather.
3) The air cooler Low cost than Air Conditioner(AC)
4) Easily assemble the product
5) Easily move from one place to another

Disadvantages

1. Air coolers increase the wetness. it'll become uncomfortable in summer season thanks to enhanced level of wet.
2. Another drawback is that the air cooler becomes a home for mosquitoes. It results in spreading of diseases.
3. folks having asthma attack ought to need to be additional cautious concerning the cleanliness of the air coolers.

10 APPLICATIONS

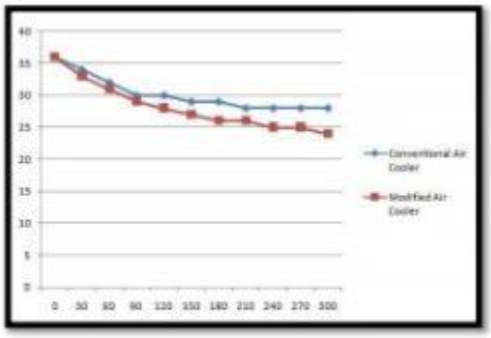
1) Portable and compact machine for different applications like papad, chapatti, puri, karanj.
2) Middle class family can prepare business plan.
3) Decrease in Health issues – Backbone pain
4) Rural employment- Start business of making these items
5) Commercialization of the end product

11 RESULT

The result as per the project objecting taking reading below:-

Table.3 Comparison of Room Temperature using Conventional Air Cooler and Modified Air Cooler

SR. NO.	TIME IN MINUTES	TEMPERATURE (°C)	
		Conventional Air Cooler	Modified Air Cooler
1.	0	36	36
2.	30	34	33
3.	60	32	31
4.	90	30	29
5.	120	30	28
6.	150	29	27
7.	180	29	26
8.	210	28	26
9.	240	28	25
10.	270	28	25
11.	300	28	24



On X-Axis = Time in Minutes
On Y-Axis = Temperature (°C)

12 CONCLUSION

The design and fabrication product satisfactory condition. Fullfielf the client would like . This project is associate economical operation and competitive worth. As less variety of elements area unit returning in-tuned with the water the probabilities of rust is reduced and lifetime of the cooler is enlarged. Eliminating the utilization of pump, thus there's no would like of amendment the water pumps yearly that value around Rs.300-400. Water consumption is low as compared to standard air cooler. thanks to its straightforward style, it's simple to vary the wood wool. a lot of hygienical than the traditional air cooler as there's no water falling outside the cooler, which ends up no outflow of water. By victimisation the air filters on the facet vents, the cooler even purifies the approaching outlet air thus than we will get cleaner air along side cool air. higher air cooling capability than typical air cooler.

13 FUTURE SCOPE

1) In future, duct air coole made automated using IOT
2) We can decease and siuze and increases the efficicenct while working in future

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