" DESIGN AND FABRICATION OF REFRIGERATOR CUM AIR CONDITIONER"

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ABSTRACT

In 21st century the world facing problem of electricity, to overcome this problem worldwide many researches going on. Many of the world' s largest growing industries as well as electricity producers companies said that around 30% of electricity is consumption worldwide for the application of refrigeration and air conditioning. The manufacturers of refrigerants and refrigeration, air conditioning equipment, governmental agencies, and environmental groups continue working together toward the goal of reduced environmental impact via reduced emissions and improved energy efficiency. Examples of progress are presented for several sectors of refrigeration and air conditioning, followed by projections for further significant reductions. Although this project will emphasize environmental impact for power reduction. Looking forward refrigeration has adverse effect on environment. Further cooler uses water so as to give cool air outside, for this application much more quantity of water has been used every year. Also to make this efficient woods product known as „wood wool / khas" have been used which became a major reason of deforestation. To restrict all these, an attempt is made to have an optimized unit of refrigeration cum air conditioning which will overcome the problem of electricity required for running both the application so far and again help to save water and wood, also maintain an ecological balance between people and surrounding. Both the system will run on single cost of refrigerator so that the normal person can afford the system and will have pleasure to take a pleasant comfort.

Keyword: - *Compressor, Condenser, Evaporator, Pressure Gauges, Fan, etc.….*

1. INTRODUCTION

Cooling systems like air conditioning, Refrigerator, Air Coolers, Water Cooler systems are high electric power consumption's; these systems also have huge impacts on the ecosystem. A proper use or choice with an energy saving plan should be considered in order to make the development of ecosystem sustainable so that a harmony between people and environment could be formed. The best innovative work has done in 20th century was refrigeration where Refrigerator recognized and developed in earlier of 20th century and Air Conditioners lately in that of 20th century. In India, during summer season the temperature increases up to about range of 45°c to 50°c. During this season there is increase in demand of cooling equipment' s such as air coolers, air conditioner etc. If we talk about traditional air coolers, these coolers have very high demand in India because they are cheap and affordable in every aspect and most of the Indian population is belongs to the middle class and thus they can afford these traditional coolers. But these coolers too have disadvantages such as they consume large amount of water i.e. about 45 to 50 liters of water every day. And also, we know that middle class population of India is about 267 million. Although if we consider 250 million of population uses about 50 liters of water every day in their cooler, they consume12500 million liters of water only in summer season which is very high amount. Also, these coolers consume large amount of wood wool, which is obtained by cutting large number of trees and trees are the essential parameter which is used for reducing global warming.

In over span of three decades, there is continuously increase in energy demand due to everlasting population increases in India. This has led to increase in pollution and power cost that cannot be afforded by normal

person. The continuous cycling observed in those equipment' s reduces their lifetime and increases power requirement. Worldwide acknowledge and said that refrigeration and air conditioning systems are responsible for roughly 30% of total energy consumption, therefore unquestionably with a major impact on energy demand. Researchers in many countries have been involved in developing refrigeration and air conditioning systems that deal with the drawbacks of conventional systems. The need of proper energy consumption is a worldwide concern and the big question arises for reducing energy wasting included proper used of energy and also how to lower power consumption. Instead of all these aims must be achieved without compromising comfort and other advantages brought by the use of energy, and with same efficiency and quality of installations.

The concept of this project explores the possibility of combining four units i.e. Refrigerator and Air-Conditioner, Air Cooler, Water Cooler into a single unit, such that the running cost should be reduced. This is how we are trying to make the environment and a common person comfortable. By this product a normal person could have a sound sleep so that his productivity for the next day increases.

1.1 Overview

The motivation for the project comes from rising energy demands and hence its cost. As we all know that we are lacking of power resources, so this product will help us in tackling this problem as we are trying to make a personalized cooling system which will run at a very low cost that can be afforded by a common man. In minimum construction, maintenance and running cost, this attempt is quite useful for domestic purpose so that our ultimate aim of the project that is those who cannot afford an Air Conditioner can have the comfort of Air Conditioner could be completed. Since all energy cost are on a rise, therefore this project is a way forward in realizing the economic as well as environmental demands. As it is said " the energy saved is the energy produced" . On the other hand, the common man can have the comfort of Air conditioner.

2. RELATED WORK

In Big cities like Pune, Aurangabad, Nagpur and other such cities space availability is big problem. In summer season there is need of cool air and cold water. Hence, we require two separate units that is air cooler and water chiller or refrigerator.

Hence space requirement is more and also the cost is higher. Hence, we have to develop a unit which fulfills both the purpose and possess less space for Installation with affordable rate. Also, there is scope for developing this unit for industrial applications.

In a paper published by Mr. V.D.Navle, Prof.J.N.Yadav titled as "Design, Construction of Combined Airconditioning and Refrigeration Unit" in which by recovering part of energy for air conditioning effect energy can be saved. Since variation of outdoor air temperature is small in tropical countries, cooling is needed year round. This is the best condition to perform combined effect of refrigerator and air conditioners for energy saving. A prototype combined airconditioning and refrigeration is designed and built. Refrigeration system using CO2 was commonly applied in marine sector. At that time, this machine was operated as subcritical cycle. There had been operating problem with this system when the ship was passing through hot water temperature where its cooling capacity drops rapidly (Lorentzen, 1995). To increase the cooling capacity, some additional CO2 had to be charged into the system and then discharged when air temperature has decreased, which of course was not a good practice from operational practice point of view. This problem has been solved by the invention of Prof. Gustav Lorentzen who suggest transcritical cycle in place of subcritical cycle which make possible to operate the transcritical cycle like subcritical cycle without a need of charging and discharging CO2 manually.

In one article by Sreejit k published journal papers on " Experimental Investigation of a Domestic Refrigerator Having Water-Cooled Condenser Using Various Compressor Oils" stating that condenser coils can be used for floor heater. Household refrigerator is common appliance that consists of thermally insulated compartment and which transfers heat from inside compartment to its external environment so that the condenser coil gets heated and can be used as a floor heater by simply forming a floor by adjusting the coil to the floor. So the floor heater can be used for heating water and many other purposes. S.C. Kaushik. presents an investigation of the feasibility of heat recovery from the condenser of a vapour compression refrigeration (VCR) system through a Canopus heat exchanger (CHE) between the compressor and condenser components. The presence of the CHE makes it possible to recover the superheat of the discharged vapour and utilize it for increasing the temperature of the external fluid (water) removing heat from the condenser. The effects of the operating temperatures in the condenser and evaporator for different inlet water temperatures and mass flow rates on the heat recovery output and its distribution

over the condenser and CHE (the fraction of the condenser heat available through the CHE), available outlet water temperature and heat recovery factor have all been studied and optimum operating parameters for feasible heat recovery have been ascertained. The parametric results obtained for different working fluids, such as R-22, R-12, R-717 and R-500, have been presented. It is found that, in general, a heat recovery factor of the order of 2.0 and 40% of condenser heat can be recovered through the Canopus heat exchanger for a typical set of operating conditions.

3. WORKING PRINCIPLE

The machine has three main parts. They are a compressor, a condenser and an evaporator. The compressor and condenser are usually located on the outside air portion of the air conditioner. The evaporator is located on the inside the air cooler. The working fluid arrives at the compressor as a cool, low-pressure gas. The compressor squeezes the fluid. This packs the molecule of the fluid closer together. The closer the molecules are together, the higher its energy and its temperature. The working fluid leaves the compressor as a hot, high pressure gas and flows into the condenser you looked at the air conditioner part outside a air cooler, look for the part that has metal fins all around. The fins act just like a radiator in a car and help the heat go away, or dissipate, more quickly. When the working fluid leaves the condenser, its temperature is much cooler and it has changed from a gas to a liquid under high pressure. The liquid goes into the evaporator through a very tiny, narrow hole. On the other side, the liquid's pressure drops. When it does it begins to evaporate into a gas. As the liquid changes to gas and evaporates, it extracts heat from the air around it. The heat in the air is needed to separate the molecules of the fluid from a liquid t a gas. By the time the working fluid leaves the evaporator, it is a cool, low pressure gas. It then returns to the compressor to begin its trip all over again. Connected to the evaporator is a fan that circulates the air inside the air cooler to blow across the evaporator fins. Hot air is lighter than cold air, so the hot

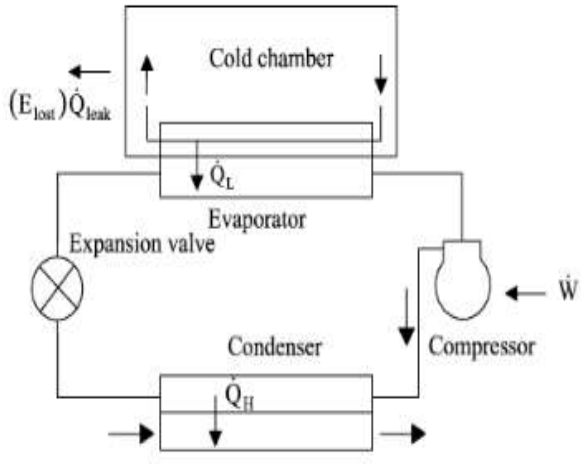

Fig-1: Schematic drawing of the refrigeration system implemented (top) and energy interactions (bottom).

Fig-2: Prototype Model

4. CONCLUSIONS

As per experimental study to reduce electricity consumption for refrigeration cum air conditioner, air cooler and water cooler, also save water and forest which are affected a great impact to maintain an ecological balance and to make it cost effective, so normal person can offer this product. Environmental groups and governmental agencies

have cooperated over the last two decades to bring about reductions in refrigeration and air conditioning systems energy consumption and refrigerant emissions. The reductions have been possible through a combination of factors: Increased environmental impact awareness, commitment of industry personnel, improved systems technology and operating/service procedures, and governmental regulations. These successes give us great confidence in continuing efforts for reduction of climate change impact of refrigeration and air conditioning system. HFC refrigerants have high societal value in providing safe and reliable refrigeration and air conditioning. At equivalent costs of other options, climate change impact from minimal refrigerant emissions can be more than offset by improved energy efficiency

5. REFERENCES

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