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THE EFFECT OF ELLIPTICAL SHAPED CONDENSER COIL ON THE PERFORMANCE OF "VCR" SYSTEM

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ABSTRACT

A refrigerator is machine which cool and maintained a body at a temperature below that of surrounding Majority of refrigerator system works on vapor compression refrigeration system. This system consists of compressor, condenser, expansion valve and evaporator. The main objective of this paper is to find the coefficient of performance of vapor compression refrigeration system using convectional condenser and then verifying the effect of performance experimentally by modifying convectional shaped the condenser to elliptical shaped. Comparison between condenser and convection one is also done by keeping all parameter constant. The results showed that condenser gives better performance than the conventional one and gives lower pressure ratio and then lower electrical power, higher refrigeration effect and higher coefficient of performance.

Keywords: *Vapor compression refrigeration system, COP, Pressure Ratio, and condenser*.

I. INTRODUCTION

The simple VCC is used in domestic refrigeration system. By changing the geometry of condenser coil .We can achieve the better refrigeration effect. The various shapes of condenser coil were made installed and analyzed checked and the change in performance of refrigerator was obtained which is positive and negative way. The positive result increased in efficiency but the change in small enough to be negligible and negative result were obtained.

II. LITERATURE SURVEY

The purpose of this literature review is to study the recent work carried out by design the condenser of domestic refrigerator and find out the better design to enhance the COP of domestic refrigerator without changing any components other than condenser.

Otto J.Nussbaum studied all relevant type of condenser and investigate the effect of advantages and disadvantages of various condensers on performance of refrigeration system. Air cooled condenser with small capacity i.e.5 to 7.5 Hp is commonly used as indoor condensing unit.

An experimental investigation of N.d. Shirgire and P. Vishwan gives variation of overall heat transfer coefficient for straight tube and helical coil heat exchanger by keeping constant mass flow rate of hot water and varying the cold water mass flow rate. Overall heat transfer coefficient is higher for helical coil heat exchanger as compared to straight tube heat exchanger.

"B.Chinna Ankanna" and "B.Sidda Reddy" making some calculation by considering geometry and parameters of helical coil to calculate effectiveness and overall heat transfer coefficient.

" Sanjeev Singh Punia" and " Jadhav Singh" conduct an experiment to investigate effect of capillary tube length. Capillary tube diameter and capillary coil diameter on the mass flow rate of refrigerant through helical coil tube. Rajesh Joshi and Dr.A.I. Khanwawala gives experiment support to the research paper of Sanjeev Singh Punia and

Jadhav Singh ,Rajesh Joshi and Dr. Khanwawala use R134a refrigerator their experiment. They noted all thermo physical properties of R134a refrigerant at mean temperature of condenser i.e. at 60 degree.

Nishant P.Tekade and Dr.U.S. Wankhade studied various papers related to spiral tube heatexchanger. They noted that selection of refrigerant is depends on thermo physical properties and technological and economical aspects.

III. METHODOLOGY

The component of the Vapor compression refrigeration cycle compressor, condenser, expansion valve and evaporator. A low pressure, low temperature liquid is converted into vapor in the evaporator thus absorbing heat refrigerated space and keeping that space cool. The fluid is driven around the cycle by the compressor which compresses the lover temperature, lower pressure vapor living the evaporator to high pressure high temperature to vapor .The vapor is condensed to liquid in the condenser thus giving of heat at a high temperature to the surrounding environment. Finally the high pressure and temperature liquid living the condenser than goes expansion valve through filter and dryer. In the expansion valve the refrigerant get much cooler than condenser. The pressure and temp. of the refrigerant decreases in the expansion valve then it goes to evaporator. In the evaporator latent heat from the surrounding is absorb by the refrigerant and thus required space will cool at desired temp.As the cycle is completed, that is the way refrigerant flows through the system.

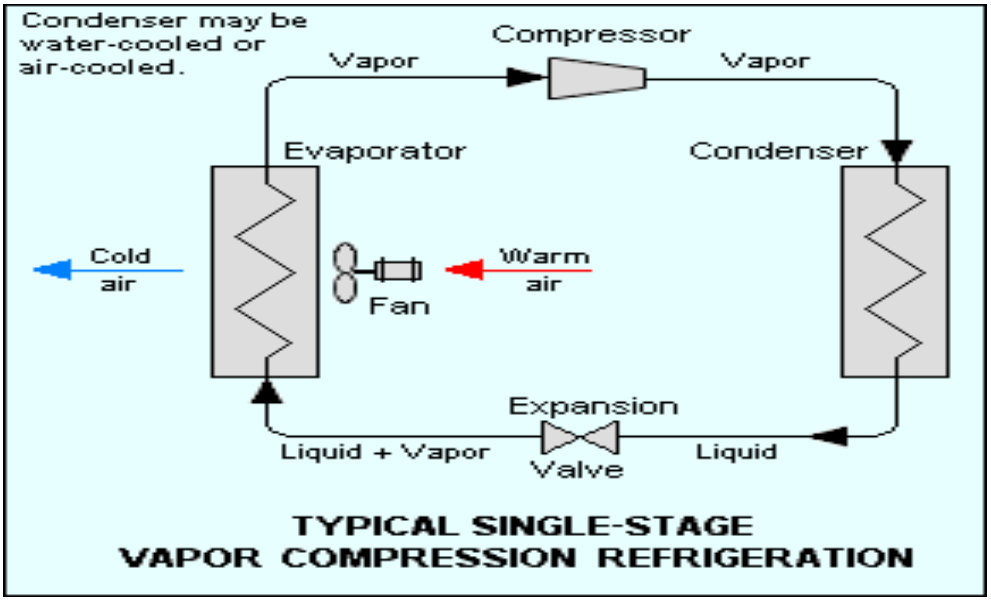

Fig.1 Single stage vapor compression refrigeration cycle.

IV. COMPONENTS

COMPRESSOR
CONDENSER
EXPANSION VALVE
EVAPORATOR

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V. SPECIFICATION

Sr. No.	Component name	Inner diameter (mm)	Outer diameter (mm)	Length (Feet)
1.	Condenser coil	5	6	58
2.	Evaporator coil	7	8	25
3.	Expansion coil	0.8144	0.9144	15
4.	Compressor	Compressor pressure = 472kg/cm^2		

VI. ACTUAL MODEL

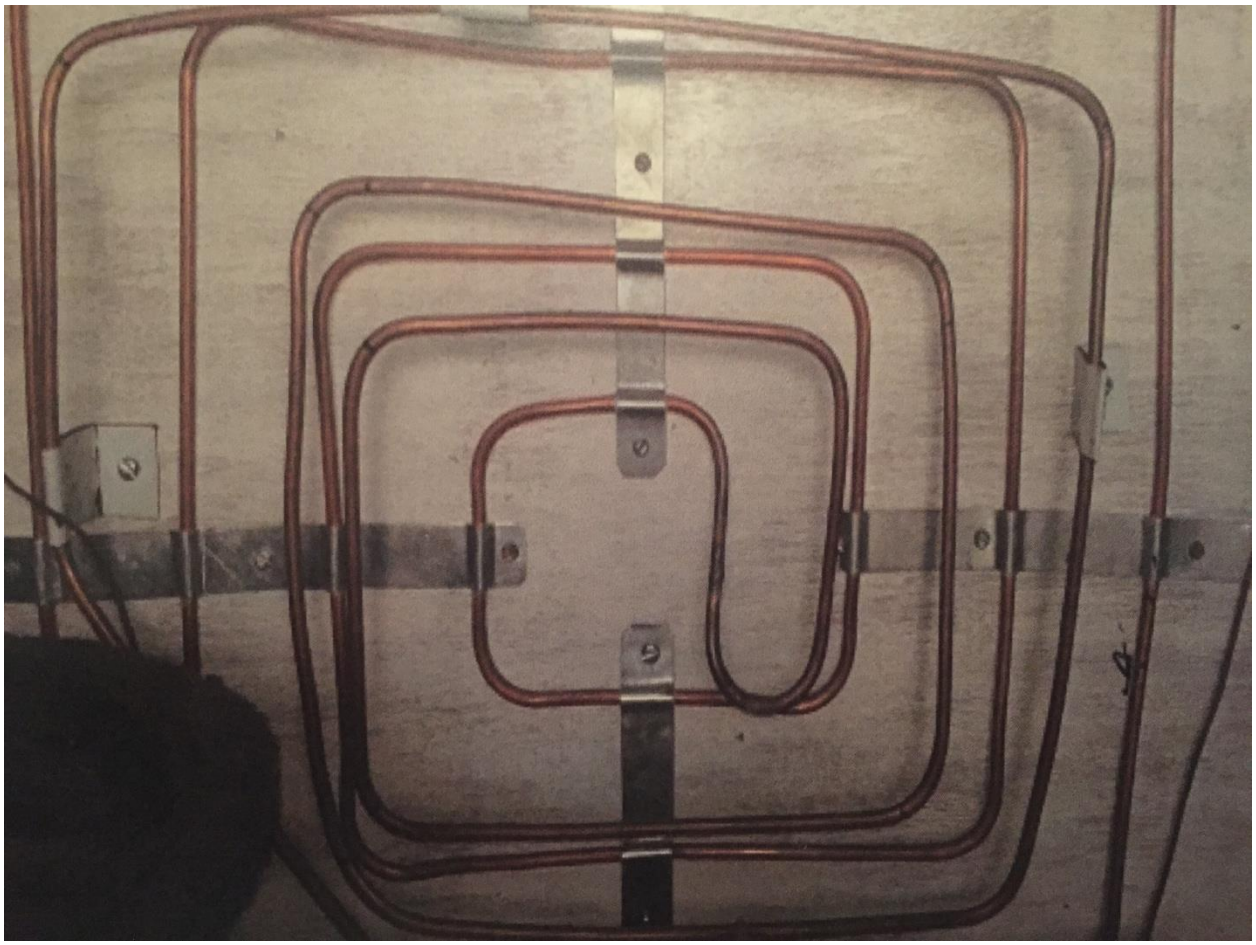

Fig No.2 Actual Condenser coil.

VII. ADVANTAGES

1) Coefficient of performance is high.
2) They are used to store food for long time.
3) Protect the food from microbes.
4) Keep the object cool and thus protect the food from heat and direct sunlight.
5) Freezing stops the multiplying of microorganisms.

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VIII. APPLICATIONS

1) Comfort air conditioning of auditoriums, hospital, residences, hotels, offices etc.
2) Manufacture and preservation of medicines, surgery has found a wide application because preservation of blood and human tissue has become possible by refrigeration only.
3) Storage and transportation of food stuffs such as meat, dairy product, fish, fruit, vegetables and fruit juices.
4) Manufacture of ice.
5) Processing of textiles, printing work and photographic material etc.
6) Cooling of concrete for dam.

IX. FUTURE SCOPE

1) In future we can change the setting of compressor or change the compressor to achieve more refrigeration effect at big amount.
2) For big plant, we can use this type of designed condenser coil.
3) We can do automation also in it.
4) Ultimately lead to development of country by saving non renewable energy sources such as electricity and water.

X. CONCLUSION

The conclusion will be that the designed or geometry of the condenser coil set is appropriate for the COP of the respective refrigerator and change made in it are not effective in increasing enhancing the COP of refrigerator was expected starting the work on project.

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