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Construction of Water Heater by using Home Refrigerator

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***Abstract:** This Project relates to heat the water by recovering the heat is released on the of the cooling system such as refrigerator, air conditioner. This project is based on refrigerator and air condenser. This Project can be use for sheeting and also this project is modified is that the air condenser is replace by water condenser. Behind the refrigerator there is an exchange of heat is called "condenser". It releases and dissipates, with the ambient air, the heat accumulated on the level of the evaporator and compressor.*

***Keywords**: Hydrocarbon, Heat rejection ratio, Iso-butane, alternate refrigerator, evaporator, HCFCs, HCF,*

I. INTRODUCTION

This project relates to heat the water by recovering the heat released on the level of the condenser of the cooling systems such as refrigerator, air-conditioner, cold room etc. out of the above systems the refrigerator has most of the share in the families across India. Behind the refrigerator there is an exchanger of heat called as "condenser". It releases and dissipates, with the ambient air, the heat accumulated on the level of the evaporator and the compressor. We had the idea to recover this heat to heat domestic water which is needed in the kitchens, restaurants, hospital etc.In fact one can note that in the refrigerating system it is the evaporator which is only used. in the heat pumps it is rather the condenser which is only used in fact we learned how to use judiciously the two exchangers :- evaporator and condenser simultaneously in refrigerating system; the total coefficient of performance of the system is this increased to reach unusual values.

II. WORKING CYCLES

The domestic refrigerator works on vapours compression cycle.a vapour compression cycle is used in most household refrigerators, refrigerators, refrigerator-freezers and freezers. In this cycle, circulating refrigerant such as R134a enters a refrigerator interior. The vapour is compressed and exits the compressed as high pressure superheated vapour The superheated vapour travels under pressure through coils or tubes comprising "the condenser", such are passively refrigerant leaves the condenser, it is still under pressure but is bow only slightly above room temperature. This liquid refrigerant is forced through a metering or throttling device, also known as an expansion value.(Essentially a pin -how sized constriction in the tubing) to an area of much lower pressure. The sudden decrease in pressure results in explosive -like flash evaporation of a portion(typically about half) of the liquid. The latent heat absorbed by this flash evaporation is drawn mostly from adjacent still-liquid refrigerate, a phenomenon Known as "auto -refrigeration". This cold and partially vaporized refrigerant continues through the coils or tubes of the evaporator unit. a fan blows air from the refrigerator or freezer compartment ("box-air")across the coil tubes and the refrigerant completely vaporizes drawing further latent heat from compartment, and so keeps the box air cold. Note that the cool air in the refrigerator or freezer is still warmer than the refrigerant in the evaporator. Refrigerant leaves the evaporator, now fully vaporized and slightly heated, and returns to the compressor inlet to continues the cycle

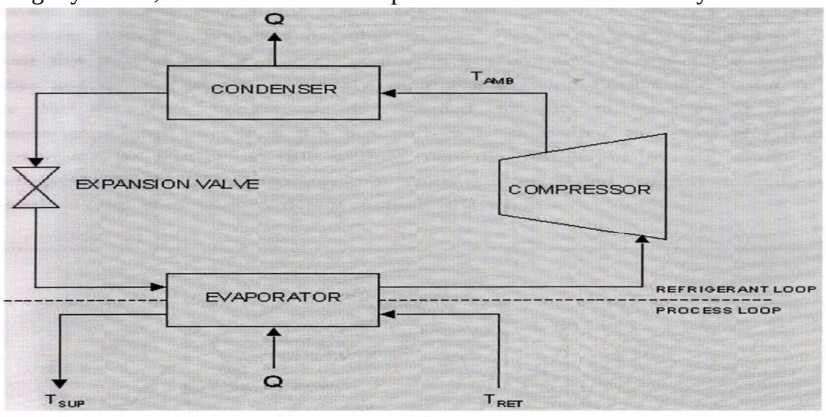

Figure: 3.3 Vapor Compressions Refrigerating System

Fig. 1

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A. Heat Exchanger

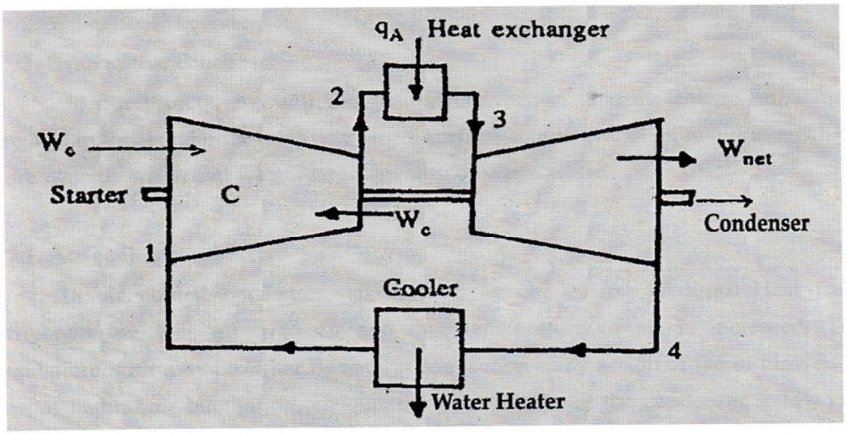

Figure: 3.7 Heat Exchanger Used in Home Refrigerator

Fig. 2

The figures show the principle of heat exchanger. There is air compressor and condenser. the compressor compresses the vapour refrigerant at very high pressure and temperature, and then the high pressure and temperature vapour refrigerant enter into condenser confesses the vapour refrigerant i.e. it remove the latent heat removed from the refrigerant vapour exist from compressor this waste latent heat remove from the condenser is used to warm the water. In this way heat exchanger works.

III. WORKING OF WATER HEATING SYSTEM USING HOME REFRIGERATION

It mainly depends upon the principle of heat exchanger. The condenser is the main part of heat exchanger. It consist of coils in which the high pressure and temperature vapour refrigerant is condense. The refrigerant, while passing through the condenser coil reject its latent heat to the surrounding. Condensing medium is air. The copper tube is attached to the condenser coils. Due to which the heat from the condenser is dissipated in the copper tube. The water tank is place at the top of the refrigerator to obtain high potential. The inlet of the copper tube is attached to the pump. Due to high potential water will be flow through the tube without using any pump. The water flowing throw the tube gain heat dissipated in the condenser coil as a result a temperature of the water is raised by some degree we get the warm water at the released valve. The water flow occurs due to thermo-siphon principle.

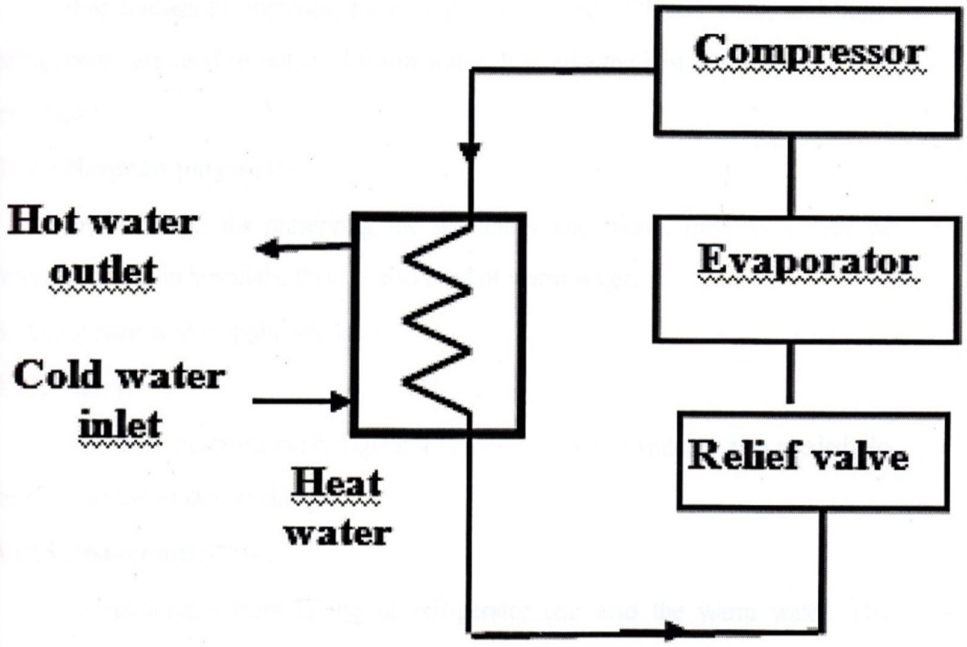

Fig.3 working of water heater system

IV. CONCLUSIONS

A. We hoped to have a T of 30^0 C but due to some losses it was not possible, also the containing water tank should be properly insulated to avoid heat losses to the atmosphere in the unused state.

B. For exact analysis heat transfer theory should be applied with temp measurement at various points in the condenser coil and in the system by thermocouple. A proper p-h chart should be drawn for this temperature so that exact COP can be calculated.

C. The study w the thermodynamic analysis shows that 'the combined water heater and refrigerator system' is feasible. But changes to condenser design are to be made in such as way that proper condensation of refrigerant should occur without disturbing the working VCRS cycle. Otherwise failure like in case of initial design can occur. The coupling of refrigerator to a cumulus to heat water is proved a successful operation. Out initial goal was the waste heat recovery from conventional condenser coil which was achieved. Indeed the final water temperature reached up to 56^0C from 31^0C, So a total T of 25^0C was achieved as made for just one time use of water but for continuous requirement, flow

D. In this project, we are utilizing the waste liberating heat of refrigerator for warming water. We will save the energy and use it in a proper way which can be used in all applications wherever required. so we get the importance of this heat exchanger and we come to know how to save and utilize energy in an effective way in this present scenario. It is thus awaited that this system could render a great service to the humanity from the energy saving point of view, fight against pollution and the accidents caused by electric water–heaters.

E. The addition of a regenerator of het on the level of the condenser and evaporator will increase the performance more.

F. We can see as required temp. Increase mass of water which can be heated decrees. So for application requiring higher values of T with high amount of water to be heated, this heat recovery from domestic refrigerator is not useful.

V. ACKNOWLEDGMENT

Though perseverance and enthusiasm combined with effort in right direction can bring forth the thing called success, but the realization of the reality that the path toward success is full of myriads ,temptations, impediments and pitfalls often proves to be disheartening in such situation. It the able guidance of knowledgeable persons that steers one through difficulties and help them achieve success. We highly obliged to express to deep sense of gratitude and grateful thanks to our project guide Prof. Rohit Sharma lecturer in Department of Mechanical engineering and Prof. Bhushan Mahajan the head of Mechanical engineering department for his valuable guidance and support which lead to the successful and timely completion of project work without it was very difficult task . We would also like to give my sincere thanks to Prof. B.R Choudhary Principal of J.D College of engineering and Management Nagpur for his valuable suggestions, constant encouragement and necessary help.

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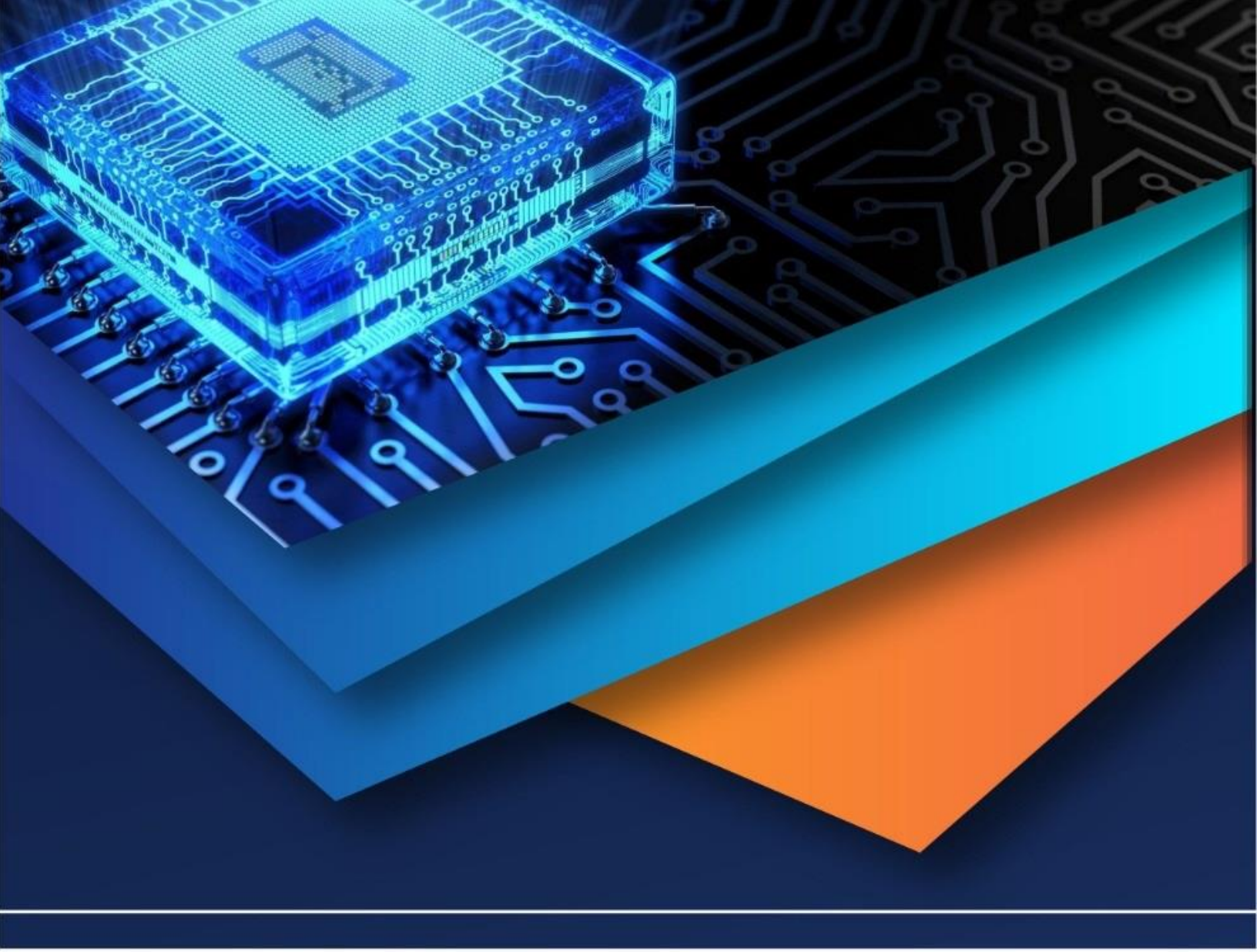

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