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Waste Heat Recovery Management

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Abstract - *Gas stoves have both domestic as well as commercial applications. Heat loss is one of the major disadvantage of a gas stove. One-fourth of the energy produced by the gas stove gets wasted as heat energy. This heat energy loss could be converted into useful work in an efficient manner. The waste heat energy from the gas stove could be captured by using a heat absorbing tubes. This heat absorbing copper tubes are then connected to the storage tank, where the water is stored. The copper tubes transfer the heat absorbed to the water and thus raises the temperature of the water. The storage tank is insulated so that the temperature inside the storage tank would be maintained above a constant level. This system would reduce the consumption of energy by converting heat loss into useful work. This system follows the principle of convective heat transfer.*

Key Words: Waste heat energy, Useful work, Energy consumption, Efficiency.

1. INTRODUCTION

A gas stove is energized by burnable gas like syngas, flammable gas, propane, butane, LPG, and so on. Strong powers like coal or wood were utilized before the coming of flammable gas. Gas stoves were created in 1820s. The size of a gas stove varies from 30" to even 42" (modern models). One of the significant parts of a gas stove is the warmth radiated by the burners. Generally burner heat is determined as far as BTU (British Thermal Units). All the burners of a gas stove don't have equivalent and most extreme warmth yield. Contingent upon the quantity of burners, a portion of the gas cooktops have a couple of burners that have high warmth capacity – which is regularly around 12,000 BTU. A portion of the very good quality cooktop models give higher scope of warmth and substantial burners that can go up to 20,000 BTU or much more.

One of the major disadvantage of a gas stove is the amount of heat energy getting wasted. Around one-fourth of the energy produced by a gas stove is getting wasted as heat energy. If this waste heat energy from the gas stove could be used in an efficient manner then it would result in less consumption of energy.

Waste heat recovery management (WHRM) is mainly focused on to use this waste energy from the gas stove in an efficient manner. This system consists of a heat exchanger, copper coil, storage tank, safety valve and an insulating material. The waste heat energy from the gas stove could be captured using copper tubes and could be used to boil water. This system would be of great use in commercial sectors like catering companies, restaurants, etc.

1.1 Problem Statement

As we know, the main disadvantage of a gas stove is the wastage of heat energy. The waste heat recovery management system makes use of this waste heat energy to boil water. This system uses copper coils and a heat exchanger to raise the temperature of water stored in a storage tank. This system thus reduces the over consumption of energy and also converts waste heat energy from the gas stove into a useful work.

2. METHODOLOGY

2.1 Gas Stove

A gas stove burner comprises of a burner get together appended to a little gas valve that is associated with the fundamental gas line. At the point when you turn the handle, the admission valve opens and gas moves through a venturi tube, a wide channel that limits in the center. Gas enters through one of the wide finishes, and as it goes into the limited segment, its weight increments. There is a little air opening in the area where the funnel extends once more, and as the gas moves into this segment, the weight discharges, sucking oxygen into the air gap. The oxygen blends in with the gas, making it burnable.

2.2 Proposed System

WHRM system converts the waste heat from the gas stove into useful work. It uses copper tubes to capture the waste heat energy from the gas stove. The interior of the gas stove is given a thin layer of insulation so that the waste heat stays inside the gas stove frame. The waste gas due to its lower density flows up to the heat exchanger where a number of copper tubes are arranged. The waste heat energy from the gas stove is thus captured by the copper tubes. The water stored in the storage tank flows down to the heat exchanger due to gravity. The heat captured by the copper tube is then transferred to the water by following the principle of convective heat transfer. The water then gets stored in a tank. This tank is insulated with a suitable insulating material so that the temperature of the water is well maintained for a period of time. The heat exchanger and the storage tank are connected to each other using pipes. The gas stove alone is a single unit. The heat exchanger and the storage tank could be easily detached from the gas stove. Hence the maintenance of this system would be much easy.

This system could be used to convert the waste energy from the gas stove to useful work. Waste heat recovery management system also helps to reduce the consumption of energy to an extent.

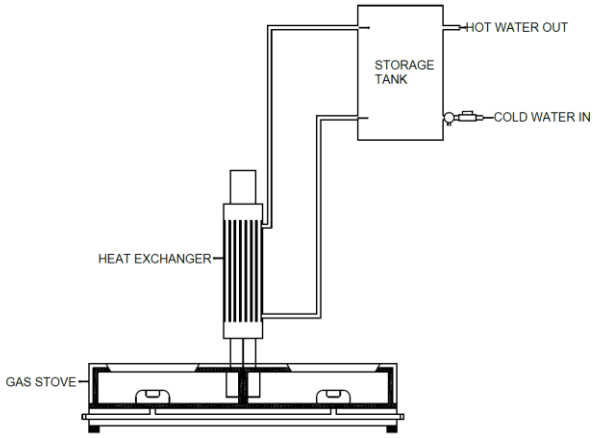

Fig -1: Proposed Design

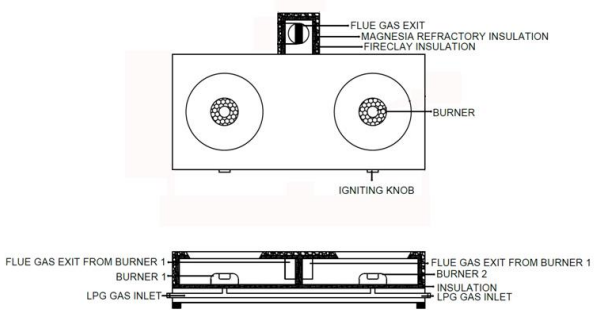

Fig -2: Gas Stove

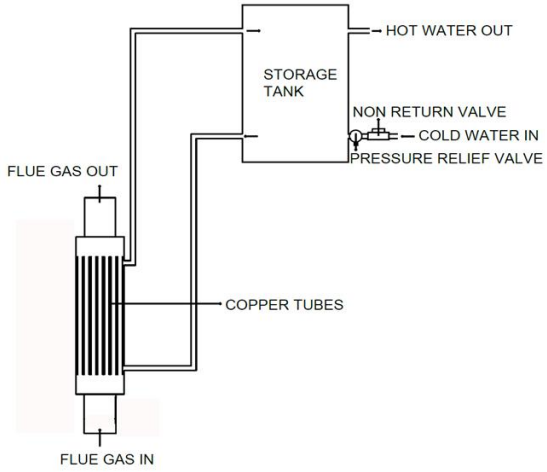

Fig -3: Heat exchanger and Storage tank

2.3 Project Scope

- Conversion of waste heat
  Waste heat recovery management converts waste heat into useful work. The excess heat from the gas stove could be used in an efficient manner.

- Reduces consumption of energy
  Since the waste heat recovery management system uses the waste heat from the gas stove, it no longer needs any additional energy for boiling water and hence the consumption of energy could be reduced.

- Reduces wastage of energy
  The WHRM system converts waste heat from the gas stove into useful work in an efficient manner. Hence less wastage of energy.

- Low cost
  Since the WHRM system makes use of the waste heat energy, it reduces the consumption of energy and hence no additional expenditure for energy.

3. CONCLUSIONS

WHRM system converts the waste heat from the gas stove into useful work. The proposed system would be very useful in commercial applications like restaurants and catering services, etc. The system would help on reduced consumption of energy and hence prevents wastage of energy.

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BIOGRAPHIES

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