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A NEW CONCEPT OF COOKING FOOD BY GENERATING SUPERHEATED STEAM IN SOLAR CHULHA

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Abstract: The paper focused on cooking food by generating superheated steam. The Main application for this invention in domestic home appliance it is used for making food by solar energy. It is easily used and installation at home. Our Purpose is saving LPG gas, woods and other resources due to their limitations or highly expensive cost. It can be used specially in villages, rural, as well as urban areas where no available or less supply of LPG gases so this will help for cooking easily with low cost. The purpose of this study is to create a Scheffler reflector-based solar cooker prototype, experimentally analyze the system and predict its behavior when subjected to the solar conditions. While referring to a specific set of design constraints, pertinent to developing countries, a Scheffler reflector and tracking stand will be fabricated.

Keywords: Concept of superheated steam, material used and Working Mechanism.



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INTRODUCTION

Solar cooking practices are needed in developing countries as the use of firewood causes health hazards and is destructive to the environment. For used sun energy it is simplest methods for cooking food as a free of cost. In villages areas simple solar cookers are often disregarded in these areas because of various cultural and technological limitations that affect where and when the cooking is done as well as how solar energy is collected and stored. The goal of this study is to create and analyze a solar cooker prototype according to design constraints pertinent to India. The effectiveness of several solar collection and thermal storage methods were investigated in order to produce a new design. Experiments will conduct to observe how much energy is being relayed from the sun to a thermal storage unit. We are comparing three type of solar Chula in which the design which is mention in this paper is not avavilbe in market recently it is a simple and unique conceprt for cooking food with the hep of superheated steam.

This project focuses on people residing in these areas specially villages. Conventional methods used by people for cooking and heating (for example LPG, kerosene, coal and wood are going to end in near future and are damaging the environment in form of deforestation and excess mining, furthermore they are expensive for people of rural areas. That is why it is needed to find ways to utilize solar energy resources efficiently for cooking and heating.

Problem Identify

- Rural peoples are facing various problems like unavailability of stoves and fuel for cooking which in turn with many problems like peoples are sometimes deprived of meals when the wood they use for cooking is wet, these wood has to be cut and bring from nearby available trees.
- Smoke coming out from 'chulhas' they used created problem in breathing, itching in the eyes and other such health problems.
- LPG or PNG is having problem of chances of explosion

Comparative Study:

LPG/PNG and KEROSENE	Traditional Clay Chulha	Solar Chulha
There are possibilities of explosion and resulted in serious damages to lives and property.	Burning wood, charcoal, fossil fuels, and other types of fuel contribute to the ever increasing global air pollution. Air being filled up with many health damaging pollutants, including small soot particles that penetrate deep into the lungs.	There is no fire, no flames, no explosion & no air pollution.

Objectives of Research work

- To **design and fabricate a solar chulha** which utilize solar energy for household cooking. As its name indicates that it is not only to fulfill the basic necessities like fuel to cook food but also a step to the sustainable use of renewable energy resources.
- To integrate **Two Cooktop** as;
 1. **Circular copper coil** in which superheated steam will flow
 2. **Electric Induction Plate** which will battery operated
- To design this project as a selling product at minimum cost below 10,000/-
- To reduce uses of LPG and PNG for daily cooking because these technologies are beyond the budget of poor people.

DETAILED DESCRIPTION OF INVENTION [WITH REFERENCE. TO DRAWINGS, IF ANY]

Materials used for solar chula.

1. Water Drum
2. Copper pipe (approx. 5 m, 1 inch dia.)
3. Pressure guage
4. Regulators
5. Circular coil
6. Scheffler Disc

BEST METHOD / WORKING OF THE INVENTION:

CIRCULAR COPPER COIL

- In this project we adopt new concept to produce heat for cooking via **superheated steam** which will be generate by water boiling inside a water drum due to reflection of sun light on schelfer disc.
- As per requirement chulha regulator will be ON for supply pressurized superheated steam in copper coil on cooktop and temperature of copper coil on cooktop will be heat up to 204 degree Celsius minimum temperature as well as it is sufficient heat for making tea, coffee, chapatti, vegetables etc.
- In circular coil there are number of small holes through which steam passes to Cooking Utensils for cooking purpose.

Electric Induction Plate

- A Battery should be connect with solar panel because to save solar energy.
- Integrate Electric Plate as 2nd Cooktop for the purpose cooking in evening.

Sample of Calculation: Material used Aluminum fry Pan

Thermal Conductivity of Al = 225 W/m K

Copper Tube; total length = 5 meter & Diameter 0.5 m
Temperature Gradient = [$T_1 = 350^\circ\text{C}$ Max , $T_2 = 204^\circ\text{C}$ Min.]
Area of Fry Pan = Aprox.12 inch Diameter = .3048 m

Q = Rate of Heat Transfer

Formula: Heat required to achieve temperature 204°C for heating cooking utensils e.g Aluminum fry pan

$$Q = - KA dt/dx$$

$$Q = - KA (T_2 - T_1) / L$$

$$Q = - 225 \times .3048 \times (204-350) / 5$$

$$Q = 2002.53 \text{ W/m}^2$$

$$Q = 2.00253 \text{ KW/m}^2$$

= approx. 2 KW/m²

WORKING DIAGRAM

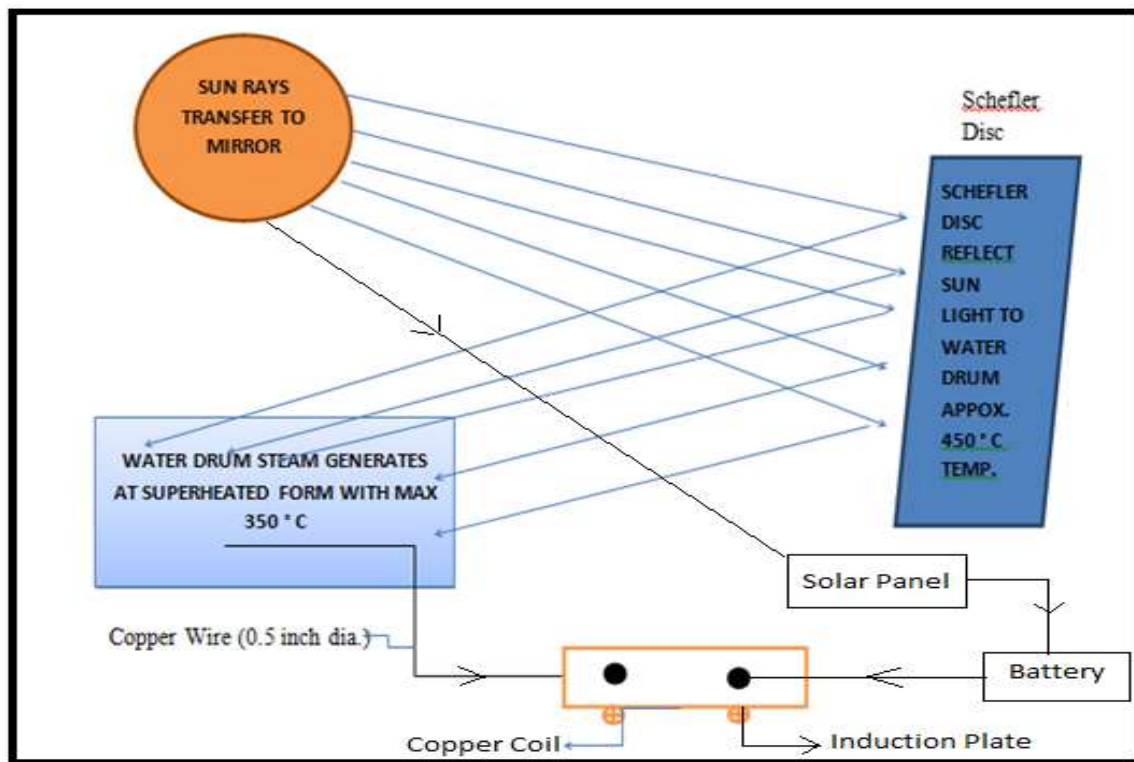


Fig 1: Solar Chulha

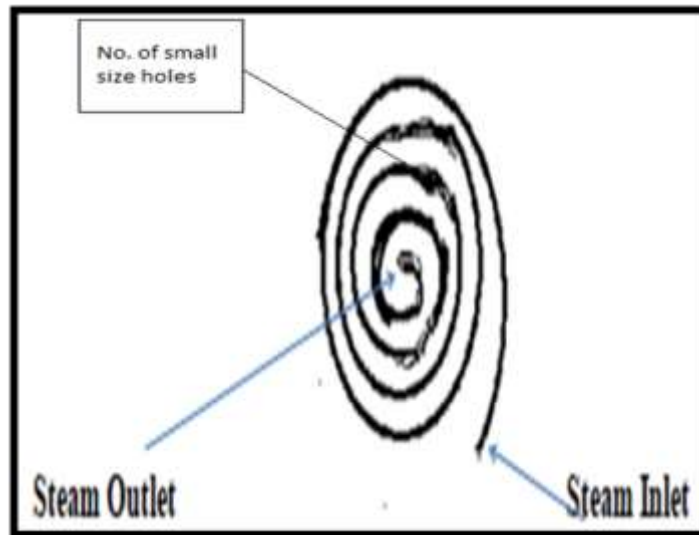


Fig 2: Circular Coil

CONCLUSION:

1. Maximum utilization of solar energy through TWO cooktop as Circular copper coil and Electric Induction Plate.
2. Market sellable product should be below Rs. 10,000/-

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