ABSTRACT

The main purpose of our project is replace old wood fuel stoves with an eco-friendly solar cooker .A solar cooker is a device which uses the energy of sunlight to heat food or drink or to sterilize it.the vast variety of the solar cookers presently in use are cheap ,low tech devices.because they use no fuel and cost ,nothing to operate ,they reduce air pollution and slow deforestation and desertification.solar cooking is a formof outdoor cooking and is often used in situations where minimal fuelconsumption is important, or the danger of accidental fires is high.

DESIGN OF SOLAR COOKER

BOX TYPE :

Box-type solar cooker consists of an insulated outer and inner box,metallic cooking tray sat inside the box, double glass lid on the cooking tray, and two reflecting mirrors fitted to the two sides of the lid of the box and an adjustable stand. The cooking tray is insulated on the sides and bottom.The cooker box consists of a top open black painted inner box kept inside of the another box and the space between the two boxes is filled with glass wool insulation.The two reflecting mirrors are placed on the upper side of the box with a gap between them and are in hold by a hinge joint with the cooker box.This is a conventional type of cooker and its length is three times its width and depth is same as that of width.

The cooker is to be placed facing sun, keeping longer side vertically inclined position and the inclination of the cooker box can easily be changed from 15 degree to 45 degrees with respect to the ground by the adjustable stand, attached at the back side of the box.

The reflectors are set along the length of the cooker box cover, one in each side, by hinge and holding strip. So length of reflectors are equal to the length of the glass cover .The widths are equal to the width of the glass cover .The reflectors are inclined at an angle of 115 deg with the face of the box cover.

The face of the cooker is to be placed perpendicular to beam radiation to collect the maximum energy. This perpendicular position can be easily achieved simply by the rotation of the cooker towards the sun with the help of caster wheels ,suitably attached at the bottom side of the cooker and by changing the inclination of the cooker by adjustable stand of the back side .But the position of the reflectors remain unchanged throughout the working period.

Black painted aluminium cooking pots are used and are placed side by side at the longer side of the cooker on cooking trays. For each cooking tray two bolts acted as hinge are fixed at both longer sides of the cooker inner box. The cooking tray is suspended from the end of the bolts through M.S strips. Length of these strips is equal to the cooking pot radius and these strips are fixed with the ends of tray aligned with the exact middle position of the tray as shown in Fig-2. When the cooker box inclination is changed the cooking tray along with cooking pot, for its own weight, rotated around the bolts and always remained in horizontal position. To avoid the chance of tilting of pots, square shaped trays, length of which are kept equal to the diameter of pots are used and ends of the trays are folded upward.

EQUIPMENT USED:

Wooden box

Reflecting mirrors-2

Adustable stand

Hinged joints

SPECIFICATIONS:

length:940mm

width:32mm

height:300mm

capacity of cooking pot: 1.25 litre

Raw Materials Required For Fabrication:

G.I.sheet, Aluminium sheet, M.S. Channels , Glass , Mirror ,Asbestos fiber Sheet, Glass wool, Caster wheel, Black board paint, Hinge , lock , Screws and other miscellaneous items .

Details of Machinery and Equipment Required For Fabrication:

Hand saw, Hand shear, Portable drilling machine, Hammer, Screwdriver, Pliers, Measuring tape Painting brush etc.

cooking pot with a lid

Material: Aluminium
Thickness: 0.5mm
Diameter: 150mm
Depth: 90mm
Total capacity of the pots: 5 Liters (1.25 liters x 4)

Cooker Box (Outer)
Material: G.I. Sheet
Thickness: 1mm
Size: Length=940mm, Width=320mm, Height=295mm
General Finish: Smooth, Free from sharp edges

Gasket and Insulation
Gasket Material: Compressed asbestos fiber
Thickness: 2mm
Insulation Material: Glass Wool
Pad (insulation) thickness: Side=50mm, Bottom=50mm

Reflecting Mirror

Number of reflector: Two
Thickness: 4mm
Additional design Feature**:** Provision for keeping the mirror in inclined position (working position) with respect to its folding position (when not in use)

Heat storage

Molten salts- sodium nitrate and potassium nitrates ,a highly heat

retaining compound is used .Its melting point It is melted by solar heat

concentration.Then it is used as a solar battery.

Advantages:

1)Almost 90% of the energy collected by a solar system occurs between 9 am to 3 pm .The provision for changing the inclination of proposed cooker from 15 degree to 45 degree with the horizontal is sufficient to collect direct solar radiation perpendicularly throughout the mentioned period. Thus radiant energy falling per unit aperture area of the cooker face is increased than if the cooker is placed horizontally like conventional box type cooker .Also transmissivity of the cooker glazing is increased for its perpendicular position with the beam radiation.

2) In this cooker system with two reflectors ,energy collection is high and even four reflectors can be conveniently used to concentrate solar radiation similar to tracking reflectors

3)It is durable and simple to operate.

4)It does not pollute the environment and conserves conventional energy

5)It saves time, as the cook need not be present during cooking in a solar cooker

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