Box Solar Cooker

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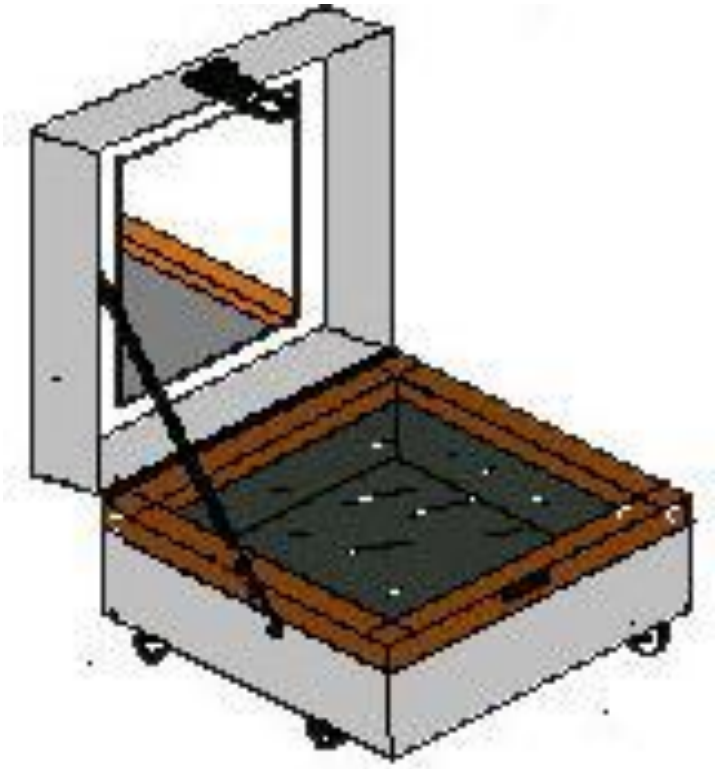
Introduction

- A **Box Solar Cooker** is basically an insulated **box** with a glass cover and a top lid which has a mirror on the inside to reflect sunlight into the **box** when the lid is kept open. The inner part of the **box** is painted black. Up to four black painted vessels are placed inside the **box** with the food to be cooked.

Diagram of Box type SC



Important parts of a box type solar cooker

- Outer Box: The outer box of a solar cooker is generally made of G.I. or aluminum sheet or fibre reinforced plastic.
- Inner Cooking Box (Tray) : This is made from aluminum sheet. The inner cooking box is slightly smaller than the outer box. It is coated with black paint so as to easily absorb solar radiation and transfer the heat to the cooking pots.
- Double Glass Lid: A double glass lid covers the inner box or tray. This cover is slightly larger than the inner box. The two glass sheets are fixed in an aluminum frame with a spacing of 2 centimeters between the two glasses. This space contains air which insulates and prevents heat escaping from inside. A rubber strip is affixed on the edges of the frame to prevent any heat leakage.
- Thermal Insulator: The space between the outer box and inner tray including bottom of the tray is packed with insulating material such as glass wool pads to reduce heat losses from the cooker. This insulating material should be free from volatile materials.

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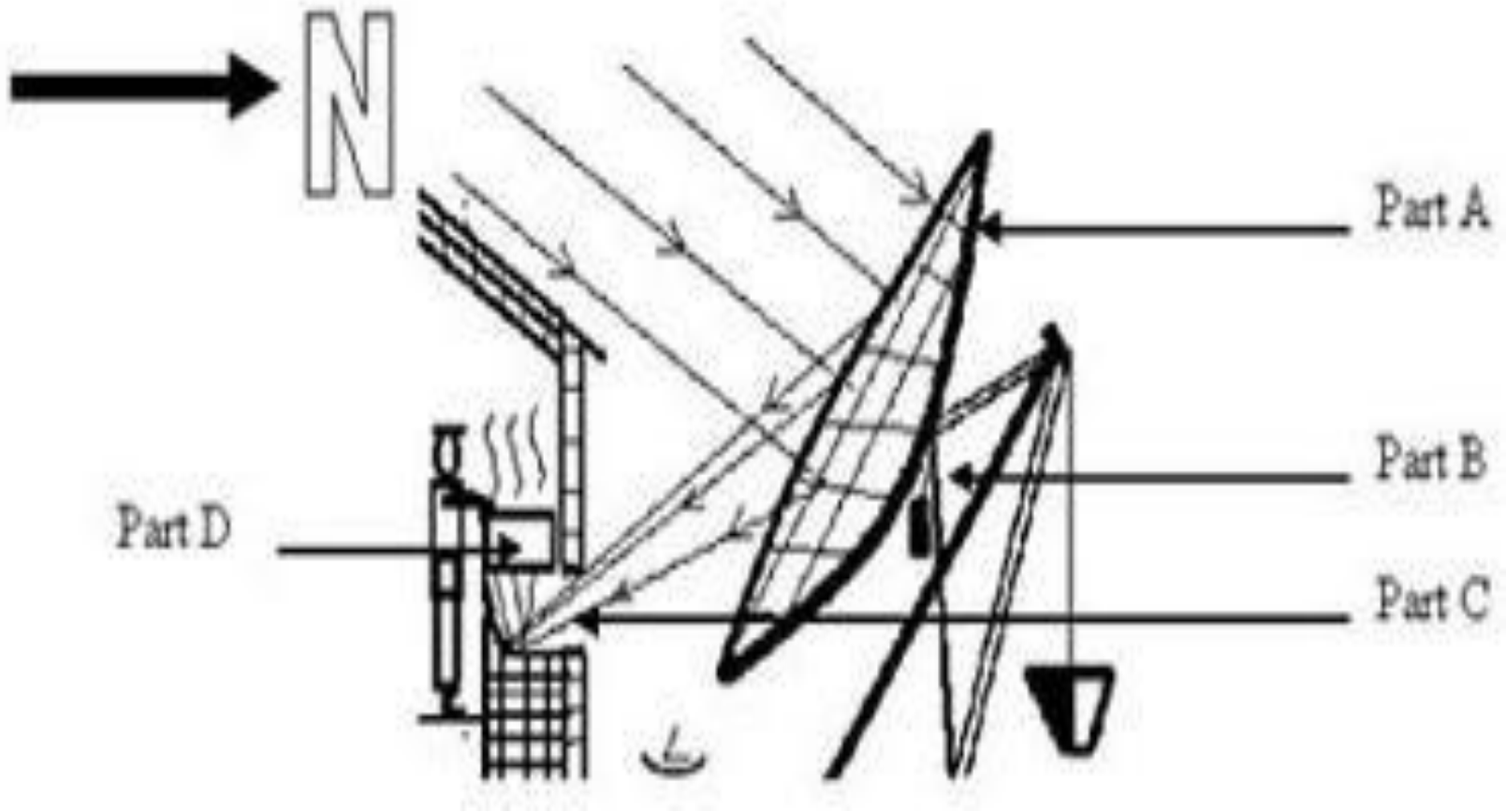
- Mirror: Mirror is used in a solar cooker to increase the radiation input on the absorbing space and is fixed on the inner side of the main cover of the box. Sunlight falling on the mirror gets reflected from it and enters into the tray through the double glass lid. This radiation is in addition to the radiation entering the box directly and helps to quicken the cooking process by raising the inside temperature of the cooker.
- Containers: The cooking containers (with cover) are generally made of aluminum or stainless steel. These vessels are also painted black on the outer surface so that they also absorb solar radiation directly.

Process of cooking food using a box type solar cooker

- Keep the solar cooker in the sun in open space free from any shadow. Keep the cooker in the sun at least for 45 minutes before loading it with cooking pots. This will keep the cooker ready for cooking and reduce the cooking time.
- Adjust the cooker in such a way that the reflecting mirror faces the sun and the reflected rays fall on the transparent glass lid. Tighten the position fixing hinges of the mirror in this position.
- Open the glass lid of the solar cooker, place the cooking pots inside it and close the lid properly. Once the cooking vessels have been placed inside the cooker the lid should not be opened.
- Open the lid fully once the food is cooked. While removing the cooking vessels after the food has been cooked, use cloth napkins as the vessels are very hot.

Concentrator type solar cookers for community cooking



Parts of the concentrator type solar cooker

- Solar Concentrating Disc (Primary Reflector) - The disc which helps in concentrating solar energy to a focal point
- Automatic Tracking System - With the help of a simple automatic mechanical tracking system the solar disc rotates in the direction of the movement of the Sun to give continuous and accurate solar energy concentration.
- Secondary Reflector - This is provided opening in the north-facing wall of the kitchen or the cooking place just below the cooking vessel. This reflector receives the concentrated solar radiation and reflects it on to the bottom of the cooking vessel.
- Cooking vessels

Process of cooking food using a concentrator type solar cooker

1. Installation

- The Solar disc is installed in the open shadow-free area or on terrace tops facing the South.
- The cooking place and vessels faces the North (at the same ground level). The reflection of the disc falls on a secondary reflector housed in an opening in the North kitchen wall.

2. Working of a Community Solar Cooker

- Daily in the morning the disc is manually oriented so as to face the morning sun – in the east.
- The daily orientation action winds the clock mechanism to work throughout the day and the disc starts rotating in the direction of the Sun guided by the Sundial.
- The Cooker begins to work automatically as the concentrated solar energy is directed to the cooking vessel.
- The primary concentrated reflection falls on the secondary reflector, which is placed right below the cooking vessel. The secondary reflector diverts the solar energy on the cooking vessel and the heating begin.
- The seasonal adjustment of the disc is required to be done once in six months due to shift of the Sun's position, with respect to the Earth axis.

Cost

- It ranges from Rs 7000 - Rs 50, 0000 depending upon the size and the model.

Thank You