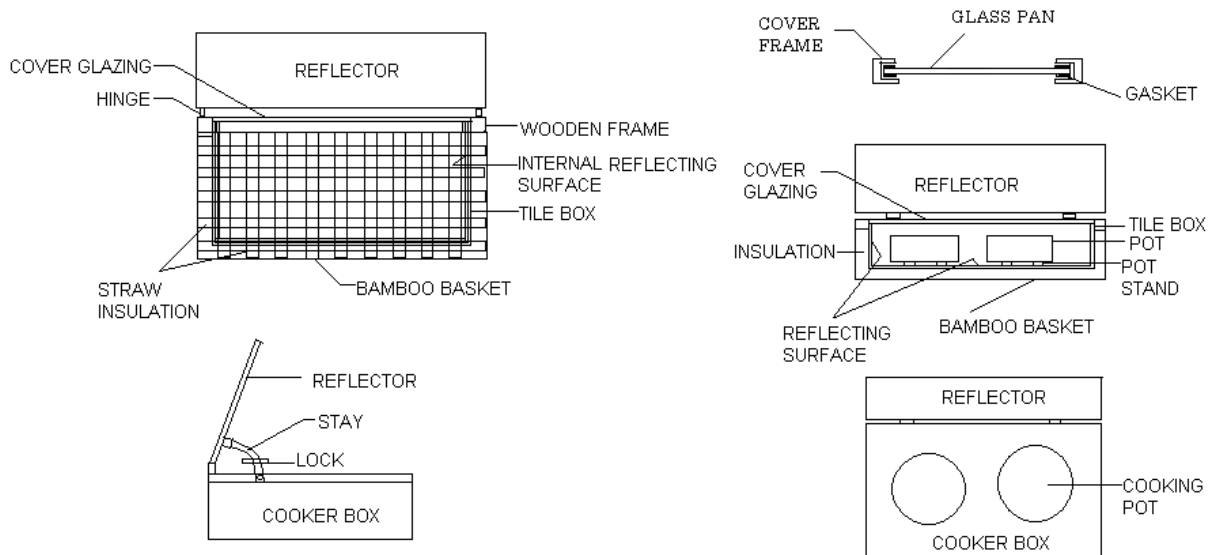


LOW COST TILE BOX SOLAR COOKER

In the present design, an attempt is made to reduce the cost of conventional box type cooker by using materials different from the common type. Performance of this new design will be more or less same as conventional cooker.

This newly designed cooker will be very appropriate for rural applications. Fabrication of the cooker is very easy and so cost of labour is also lowered down. This cooker can be built by semi-skilled village artisans by using simple hand tools and with locally available raw materials.



Constructional Features

The detailed constructional feature of the cooker is shown in Figures. The top open cooker box is made of ½ inch thick earthen tiles generally used for roofing purpose of village house. Cooker box is kept in a bamboo basket (fabricated by bamboo battens) and at least 1 inch thick straw layer is put in all sides and bottom in between the basket and cooker box. The arrangement not only will save the cooker box from the chance of breakage but it will also reduce the heat loss from cooker box to the surroundings. Outside of the straw layer if covered by a polythene sheet it will be more effective for heat retention. Inside surface of the cooker box is covered by aluminium foil in all sides and bottom to direct solar radiation towards the cooking pots. For reflecting surface, earthen material of the box will not be able to absorb radiant heat. Heat will be transferred to the tile box only through the conduction process from aluminium foil but foil will not be able to transfer heat much as thin foil itself will absorb heat only from entrapped hot air and tile material is not at all a good conductor. So, most of the absorbed heat will be retained in cooking pots only. Cooking pots should not be directly in touch with foil to avoid damage of the foil; rather these are to be kept on pot stands (common ring shaped stands made of steel wire available in utensil shops). A rectangular frame made of wooden battens tightly fitted with outside of the cooker box walls at top. 1/8 inch thick asbestos based paper gasket is used in between wooden frame and walls of the cooker box for sealing purpose. This type of asbestos gasket is generally used in high pressure joints of automobile water lines and there is no chance of contamination of loose asbestos fibre with food item for high quality bonding of the gasket materials. Slotted wooden frame provides seating for cover glazing. South facing booster reflector is also hinged with the wooden frame. 3mm thick single glass pan is used as cover glazing. Frame

of the glass cover is made from low cost tin sheet available by cutting of empty mustered oil container. Cooking pots are to be placed side by side inside of the cooker by opening hinged glass cover as usual. Booster Reflector is fabricated by fixing aluminium foil on tin sheet of mustered oil container. Reflector can be adjusted in desired inclination through the adjustment of wing nut in slotted links.

To make leak proof joint in between wooden seating and closed cover glazing, nylon rubber pieces cut from old tube of motorcar tire is used as gasket material. For proper setting of gasket, small grooves may be cut at the topside of wooden battens. Rubber gasket is also used inside of metallic channels of cover frame for sealing of glass pan. Epoxy adhesive is used in addition for fixing gasket in all the joints. Adhesive is also used to attach aluminium foil inside of cooker box and on reflector sheet. Inside dimensions of the cooker box are 26inch x 15inch x 5 inch. Length of the cooker, greater than its width is designed to increase the time gap in between reorientations. Diameter and height of the two aluminium cooking pots are 8½ inch and 3inch respectively. Cooking pots are painted dull black by automobile muffler paint (blackboard paint is not suitable because it is not so permanent colour and clean out during washing of pots).

Approximate Cost Estimation (for prototype making)

1. Empty mustered oil tin container- Total 3Nos @Rs.22 each- (sheet for reflector back support and for frame of cover glazing)	Rs.66
2. Aluminium pot- 2Nos. -	Rs.110
3. Pot stands-	Rs.30
4. Earthen tile box-	Rs.50
5. Bamboo basket-	Rs.40
6. Wooden batten frame -	Rs.50
7. Aluminium foil 6 x 1.5ft @Rs.20 per ft. (for booster reflector and for cooker box)-	Rs.120
8. 3mm thick plain window glass- 2 pieces- 29inch x 18inch @Rs18 /sq.ft	Rs.68
9. Dull black paint (DUCO paint): 100 ml.approx @ Rs.215 per Lt-	Rs.20
10. Straw, gasket material and adhesive-	Rs.60
11. Hinge, stay links, clips, Screws etc.	Rs.60
12. Overall Fabrication charge (cost of labour)-	Rs.150
	Total- Rs.824

Tools and Equipment Required for Fabrication

Wooden Mould, Pottery Kiln, Hand Saw, Hand Shear or Shear Cutting Machine, Portable Drilling Machine or Hand Drill, Soldering Iron, Hammer, Rubber Mallet, Screwdriver, Wrench, Pliers, Measuring Tape, Painting Brush etc. In addition, some Gigs and Fixtures like Thick Iron Plates, Angles, and Rails etc are required for convenient sheet metal working.

Man Power (Item wise total man power depends upon production rate)

Potter- For cooker box making

Carpenter- For wooden frame of cooker box and bamboo basket.

Sheet metal worker- For sheet metal work.

Tin smith for soft soldering of glass cover frame corner joints.

Fitter- For final assembly work.

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