Solar box cookers

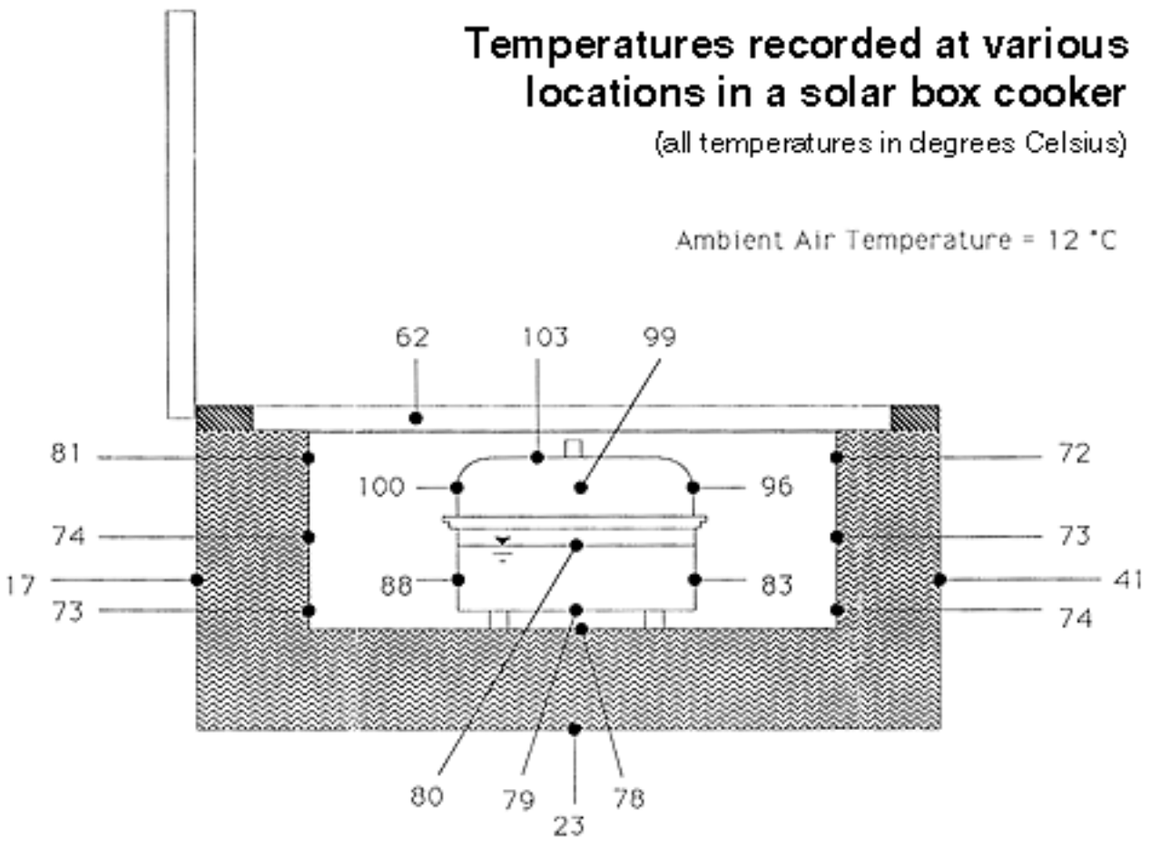
The original author of this article is Dr. Ashok Kundapur. Find more of Dr. Kundapur's work on his website: http://www.solcooker.net/Cindex.htm.

Overview of box-type designs Edit

Box-type cookers are another group of old but popular type of solar cookers. The very first design of box-type cooker was probably that of Nicholas-de-Saussure (1740-1799). It was simply an insulated box with glazing; this design forms the basis of all the present designs of box-type cookers including Richard Wareham's (1995) Sunstove.

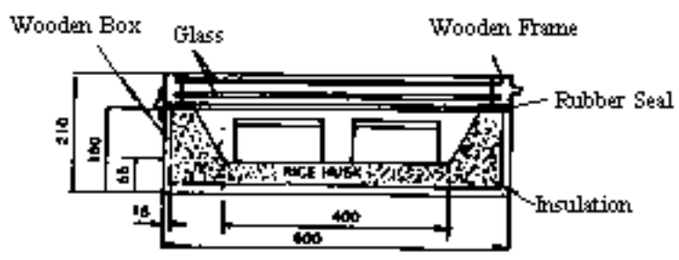
The box cookers presented here are classified on the basis of presence or absence of reflectors, i.e., those without or with mirrors boosters. The cookers of the second category are further divided into five groups.

See also: Principles of Solar Box Cooker Design



Box cookers without reflectors Edit

Horase-de-Saussure's design perhaps was the first to appear on the scene in the 18the century (Walton 1977). It was simply an insulated box with two glass panes forming the cover.



Typical Box Cooker

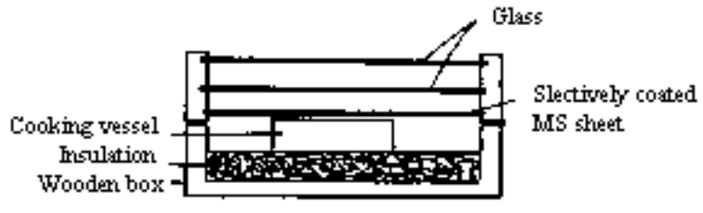
Vaughen (1979) has recommended such a box with a slight difference. It is a typical box type meant for villagers. A rectangular pit is dug in the ground, suitably insulated with hay or rice husk, and a flat box not taller than 10 cm made of a metal sheet is fixed into this pit, and then covered with two glass panes with about 1.5 to 2.5 cm space in between. Such a cooker would work well, at least during summer, in most parts of the country, but to increase the efficiency it would be essential to add a flat reflector. The author's endeavors with solar cooking started with a similar design but the box constructed with mud, was above the ground. Round Aluminium boxes painted with black board paint acted as cooking vessels. Results were good, though at times the rice cooked was rather bland.

Larger versions of such box-type cookers are being tried out. (Nahar et al. 1996; Singh 1993). The Chinese type and Brace Research Institute Designs, called food warmer (VITA 1961) appear to be similar designs. The food warmer, with better insulation and triple glazing, is still popular (Wareham 1995). It is called as Sunstove. (see the composite photo) Kumar, Kishore (1994) have made the box circular.

Many other minor variations are reported, including changes for the cooking vessels, like fixing knobs for the lid and 'ears' for the base, making the lid of the vessel concave (Arora, Sharma 1993). Some more design modifications will be discussed later in the text. The nineteenth century cooker of Herschel was probably built on similar lines (Meinel, Meinel 1977). The box was buried in sand and covered with two glass panes, stagnation temperature of 116°C was reported. It is on record that certain nomadic groups of Saudi Arabia bury the food

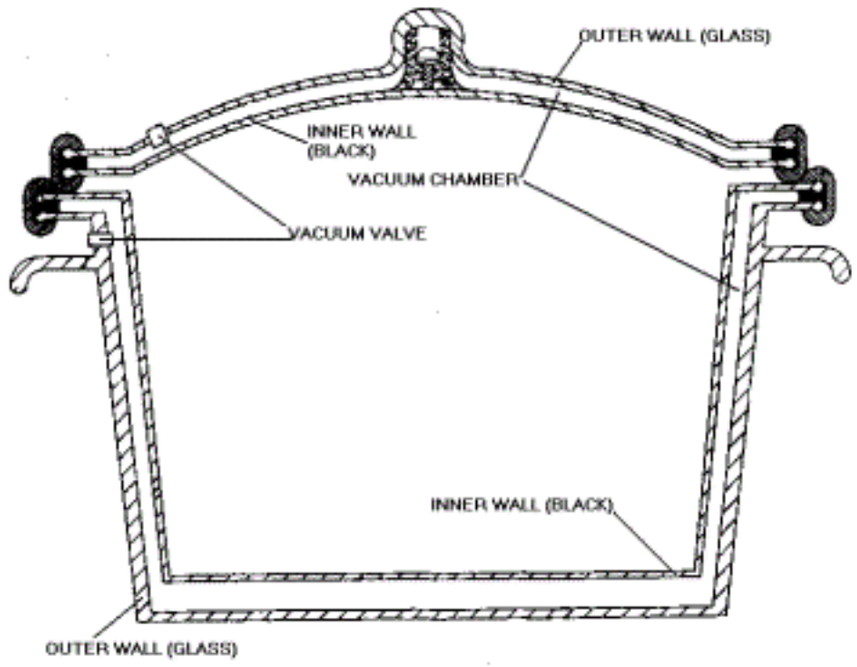
under the sand for cooking. The author feels that they could get their food cooked more reliably if they cover the area with a double glass dome (with the space in between preferably vacuumed) with a knob for easier handling (Concept VI).

Shanmugan et al. (1982) suggest the incorporation of a flat square steel sheet just below the second glazing on the inner side, this sheet with special absorptive coating acts as a heat collector and transmits heat to the vessels kept just below it in the insulated box. The advantage of this design is that the cooking vessels may not require any coating. This is a plus point, for, in an ordinary box-type cooker the vessels are painted black, and the coating wears off on washing.Besides the vessels always look better without black paint on it. This is a very promising variation. Further, it may help to reduce the cost. Addition of one or two reflectors would indeed make this cooker very effective.



Shanmugam type

This vacuum enclosure, Concept VI, was proposed in the year 1982 or so by me. But I do not think Mr. J.Samalea of Spain was ever aware of it. But the concept of Vacuum as a good thermal insulation is indeed very old, in fact older than Thermos flasks. But only problem was that the technique was never properly applied in Solar Cooker Technology. Now it is J. Samalea, who has introduced this concept in Solar Cooking in 2002. His Vacuum Cooker has been announced through Solar Cooker Review of Solarcooking.org. The diagram of the unit is actually taken from Solar Cooker International of Nov. 2003. To know more please visit Salalea's site http://cocinasolar.net. (This comment was introduced on 24th June 2003). The diagram is clear enough, the inner glass bowls are painted black. While outer ones are clear, and in-between them vacuum is created.



Mr. Alex Kee of Malaysia, the inventor of the SK-TF (Solar Kettle-Thermos Flask), who has been advocating solar thermos tubes for water pasteurization, discovered that the stagnation temperature inside the tube could reach up to a high 220° C. He advocates that such tubes could be used for cooking as well. But the problem is small diameter of the tube. If the diameter of the tube is increased then problems like vacuum sealing will have to be encountered. Once this is solved the tube cooker would emerge.

Update(February 2007): Technology to manufacture Solar Thermos Tubes of Outer Diameter/Inner Diameter of 120mm/100mm has now been perfected for commercial product.

Consequently, the **S**a**V**e**T**a**O**: **S**olar **V**acuum **T**ube **O**ven that can bake Tandoor Nan and Pizza will be in the market, soon.

Rathinasamy et al., have designed a rectangular box from sheet glass, (using popular silicon glue used to construct fish tanks) of 50 x 50 x 22 cm, and under this, the cooking vessels coated with suitable black paint are kept, temperature reached is around 110^{o}C (Rathinasamy et al. 1988).

Abou-Hussein had presented another interesting variation. Here, the upper part of the box acts as a reflector. The window of the box which lets the light in is inclined at 45^{o}. The second glass pane is flat and there is ample space between the first and the second glass panes, and this space is used as a reflector. The design is attractive but costly (Bowman, Blatt 1978).

Before one goes further, it is better to get more details regarding construction of box type cooker. In most cases, the box is a double-walled container. Depth of the inner box should not

be more than 10-15 cm. This depth is a critical parameter, whereas the width an d breadth could be of any dimension. The out box is generally 10 cm larger than the inner box. The 10 cm space between these two boxes is filled with insulation, (the width of the gap varies with the type of insulation used). Width would be around 6-9 cm if rock wool is used; it could be a little thinner if fiber glass sheets are used. On the contrary, if low-grade insulation like straw or rice husk is used then the space would be more, about 10-15 cm. Composite insulation has also been suggested by many. In many cases the outer box will be of wood and the inner box of sheet metal. In the design recommended by the Government of India, both the boxes are of 16 gz MS sheet. The shape is invariably rectangular or square, but the author has styled the box with slightly tapered base (Ashok Kundapur 1995). Bowman suggested the use of foam glass (for box), a robust material which also acts as insulation for making the box, and recently, Warenham (1995) used styrofoam for making a lightweight box.

Several types of paints are suggested for the inner surface of the inner box to increase absorptive efficiency; blackboard paint was most popular. Yanthra Vidyalaya, Bardoli, recommends boiler interior paint, while Shanmugam et al. (1982) suggest special absorptive coating which would reduce cooking time by almost half. But if foam-glass is used there is no need for any paint. In some of the the designs, especially that of Musumdar's, the inner as well as the outer box are made of corrugated cardboard. Sharma, Philip (1992) also made a cardboard box cooker and used crumpled old paper for insulation.

Is cardboard box better or Metal box? Happy finding is that both perform well and are capable of cooking food. But according to Nandwani et al (1993) Box cooker made from metal sheets attains higher temperatures and performs better. In terms of percentage Cardboard oven's performance is 15-25% less. But lower cost makes it more popular.

In this box type of cookers, cooking has to be done in special vessels with tight-fitting lids. Round Hindalium boxes which are available easily in the market were found best but a knob has to be fixed for the lid and two *ears* (handles) have to be fixed to the base such that these boxes could be easily handled. A good pair of tongs also becomes essential to handle the hot vessel; author recommends that the tongs should form a part of the solar box-type cookers and the manufacturer should be compelled to provide a good pair of tongs with fairly broad and flat gripping surface.

Most of the designs incorporate a double-glazed door on top of such an insulated box. Slight uneven surface between the upper part of the box and the door could be taken care of by strips of felt/cloth. The Government of India recommends toughened glass for the glazing, but the author found that the ordinary 3 mm glass also works well, however, it is safer to use toughened glass. The space between these two panes of glass is also critical, it should be just about 2 cm.

Fatangare uses Fresnel lens in the lid of such a box. Results are not known, but guess there will be too much of heat on top of the vessel.

This part of the review will not be complete if village level designed Box Type Cookers are mentioned here. The photo bellow is from Africa and a Bamboo Box is used. Similar locally improvised Cookers are in use in other parts of the World.

A visitor to Dr. Kundapur's site wrote that a brief biographical sketches of famous Solar Cooker inventors, designers and propagators should be added. Authors would be be happy if reader could guide them to the source. But here I am happy to include a picture of Mrs. Barbara Kerr along with another Inventor Mrs. Sherry Cole for the benefit of readers.

One more design which caught reviewers eyes in the SCI collection was, Triangular Solar Cooker. Details were not available.

Matt West's Handy Solar Box Cooker based on a recycled gas grill

This solar oven was made from a patio door and an old freezer. Since then I've removed the shelves. The device has no reflectors and still gets hot enough to cook brisket. WARNING: ONE MUST NEVER LEAVE THIS DEVICE UNATTENDED. THIS DEVICE WILL KILL A CHILD IN MINUTES. THIS IS A VERY DANGEROUS DEVICE SUCH AS IT IS. ANY FUTURE DEVICES LIKE THIS MUST HAVE AN EASY WAY TO ESCAPE. THIS IS AN EXTREMELY DANGEROUS DEVICE

Matt West produced this solar oven cart and this huge solar oven to share with you all. Recycle your old gas grill, and you could have a very good Solar Oven Cart.These photos were taken before painting the inside of the ovens with flat black paint. Since then, the larger oven reaches 250 degrees F most days of the year, and sometimes hotter. The smaller oven reaches

Sealing the upper edges is also helpful. I used old garden hose to make the seals.

I have a page of my own at this link: http://solarcooking.wikia.com/wiki/Matt_West

Since painting the ovens black on the inside, the temperatures have risen considerably; around 20 percent hotter. The insulated walls of the old freezer make an excellent oven. The outside walls of the oven stay cool even when the oven is very hot inside.

Insulation, mirrors, and thermal cookware will amplify your results with any solar oven.

I want to put the large oven on a small trailer for demonstrations, and for tilting and turning the oven directly into the sun.

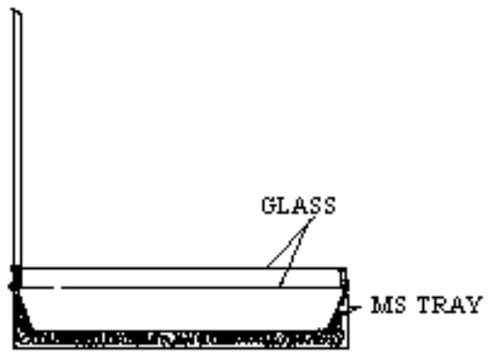
I've made a bunch of jerky with these ovens. You can experiment with a pressure cooker.

Box cookers with reflectors Edit

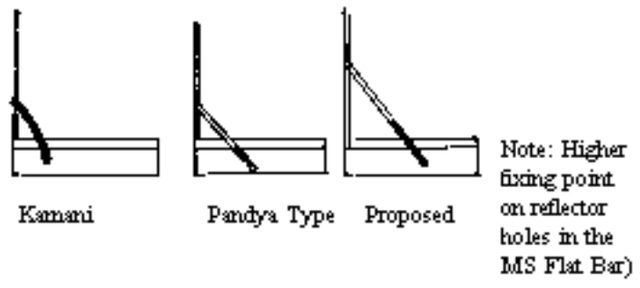
Reflectors were added to increase the efficiency, and hence, the reliability of the simple box-type cooker. There could be one to four or eight such reflectors. Further classification of these designs is based on the number of reflectors.

Box with single reflector Edit

Conceived by M K Gosh in 1945 (Gosh 1973), this cooker, known as the Gosh cooker, has become very popular all over the world. This design was a typical box-type cooker with a double glazed cover (second cover) and a single reflector which doubles as another protective cover (first cover). The reflector could be held at a proper angle by a *kamani* that is a bent iron rod with a slot in it, (popular in the market as a device to hold the steel window panes). Many found this rather cumbersome and even difficult. Pandya (1983) suggested a 2 cm iron flat with a couple of notches at the base. But the author feels that a longer iron flat of 2cm, with a couple of holes in it would be better. Such a bar can be fixed at a higher level on the reflector door for greater stability. Further, in many designs the peg to hold this bar is fixed on to the main box. But the author suggests that this peg should be on the second door/cover which has glazing, an arrangement which would render easier operation and handling of the cooking vessels.



Gosh type Cooker



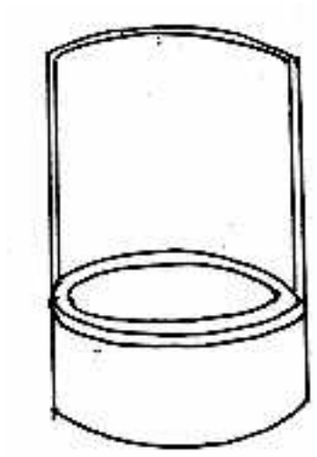
Ways in which the reflector is supported in the box type cooker

The Gosh design has seen many other variations and modifications, Hoda (1979), Garg (1978), Kundapur (1980), Pandya (1983), and scientists of Bardoli (Parikh, Parikh 1976) have suggested several improvements. Garg has fixed the glass door at 45° like that of Abou-Hussein design. Another important variation was the provision of two or three holes in the glazing for easier handling of the cooking vessel (Grupp et al, 1991). Concept VII proposed by the author is yet another variation mostly in design. The inner and outer boxes, made of 18 gx GI sheets are stylized, with 5 cm mineral wool insulation and double glazed second door and a reflector first door made of exterior quality 4 mm plywood. The reflector door was further strengthened with strips of wood on all sides and reinforced with aluminium beading. This design weighed only 14 kg as compared to the 25 kg standard design of the Government of India. Except for the aluminized polyester reflector attached to the door, the cooker lasted for several years. So, with a glass mirror reflector the cooker can be as good as any other box-type cooker.

Phillip et.al (1990) have published one of the best papers describing their attempt to reduce the weight but at the same time trying to maintain the efficiency. But as Bowman suggest to do this Foam Glass is the best alternative.

Encouraged by the performance and ease of the Gosh type of cooker, successful attempts have been made to build large cookers to cook up to 20-25 kg of food (Singh 1993); Nihar et al (1996). Use of an electric booster heater has also been suggested (Arora, Sharma 1993).

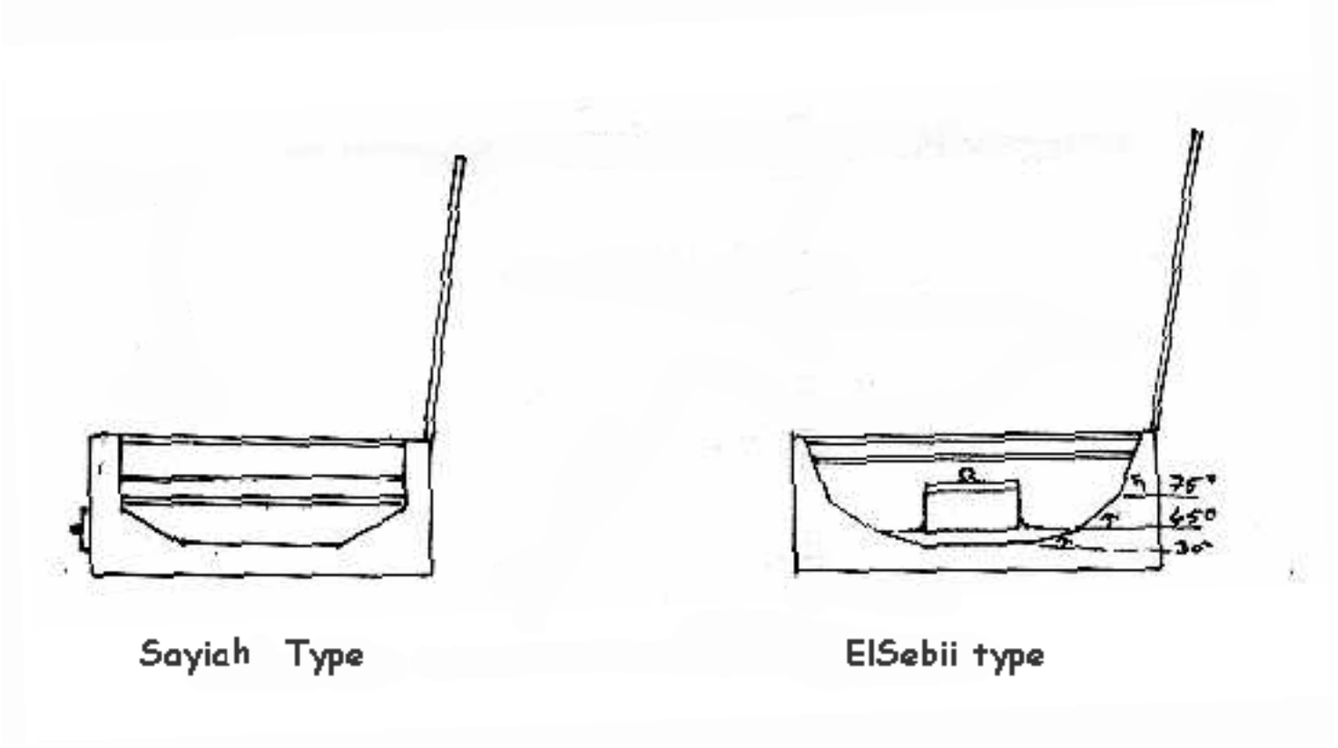
Kishore and Kumar (1994) have presented an interesting variation, the box is round can take only one cooking vessel and this has a small contorted reflector on one side. The reflector seems to have a fixed positon. If the cost of such cooker is low, one can buy three or four such smaller cookers to cook various types of dishes.



Kishore & Kumar type Box

Prof. Sayigh et.al.,(1998) have come out with a new design in which THREE glazing sheets are used, The 2nd and 3rd glazings are just above the cooking box while the first one is placed much above the 2nd. The gap has a reflective coating. The 3rd Glazing is 5 mm thick glass.The box has a drawer for cooking vessel, this is supposed to reduces heat loss. The cooker has one reflector. Overall performance was reported to be very good. The model is being popularized in Indonesia.

Recently, El-Sebail (1994) proposed a new design which appears to be interesting. The box is with double glazing, and the interior has reflector surface set at different angles to focus the sun light on the vessel The vessel is placed on the stand to meet the focus

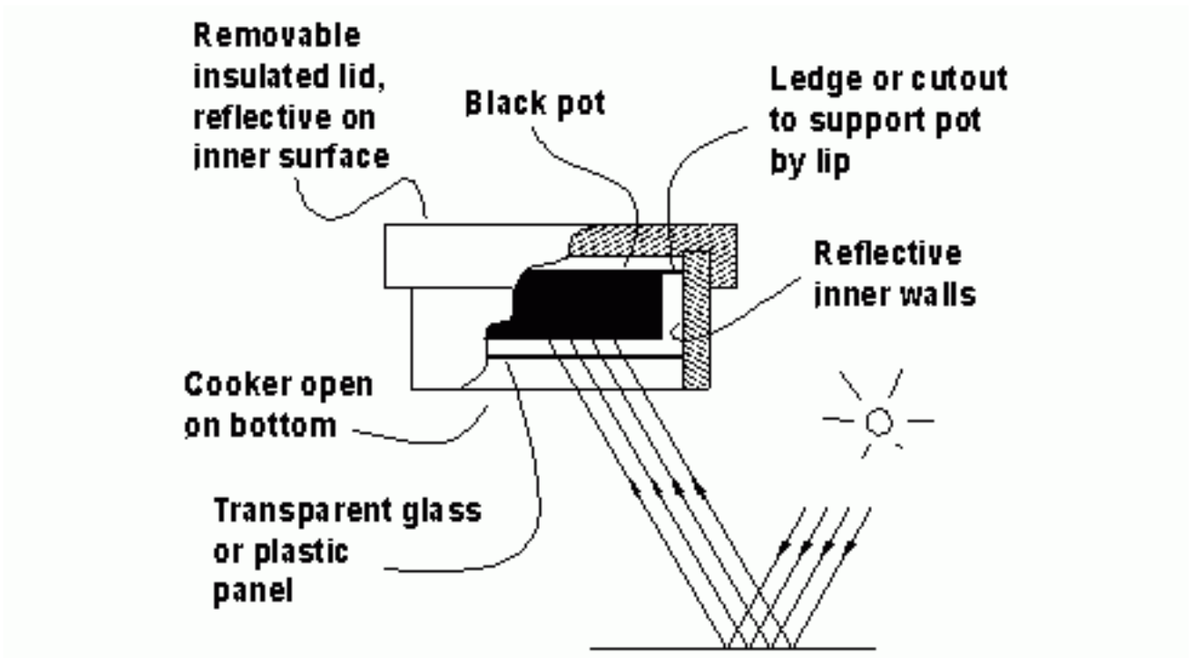


IMPORTANT NOTE

Regarding the insulated Box of Box type Gosh Solar Cookers, Professor Barbera Kerr and several others had suggested using paper balls, straw and a wide variety of materials for making the box and the insulation to go in between. Inventors like Patel (1981, Ref. 74,) had in fact, suggested inverted Glass Jar in-stead of a very heavy and cumbersome insulated Box. In fact, this concept using glass jar around the pot could be traced back to Adam in 18th century. Later Professor Bernard too suggested the use of such a Jar for his CooKit design. Glass Jars are costly and are prone for breakage so Barbera Kerr used clear plastic bags to cover the cooking pots very successfully. Professor Bowman too had realized the importance of the insulation of cooking vessel and he had suggested FOAM GLASS boxes around cooking pots for the FIT designs. Recently Deris uses two such clear jars (glass or heat resistant Polycarbonate jars), inverted over the cooking pots where the light is concentrated by a circle of ordinary mirrors! I guess the solar Cooking can not be made simpler than this.

Syntex Plastics of India has come out with a all plastic solar cooker of this type, of course metal cooking pots inside. They are using PUF insulation,I guess, but the details were not available. The selling cost of Rs. 1000/- is rather high. Mr. Rohatgi has come out with a FRP Cooker.

Mr. David has tried out a new variation of Box. Realizing that lot of heat is lost from the double glazed door of the box, he has tried to INVERT the box, so that the light strikes the vessels from the bottom. The top now has an insulated cover which can be easily lifted to check cooking. Reader is advised to visit his excellent site, listed under links (solar16) of this site.



The inverted solar box cooker

David Delaney, Ottawa, February, 2003

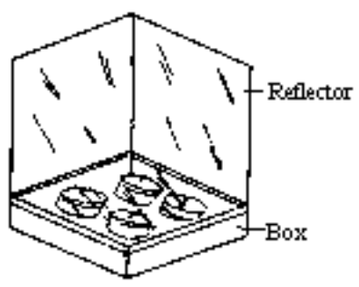
Prof. Ajay Chandak of India has improved upon this concept. He adds three reflectors at the bottom and one reflector on top for better performance. The heat generated broke the glass Prof. Chandak.

Mr. Muhammad Yasin Khan of Pakistan has designed a new type of box cooker. Here he uses a blackened box covered from all 5 sides with double glazing. The assembly is kept on top of a stand. There are two reflectors one at the bottom and another, larger, at the top. Dubbed as Khan's Solar Oven, the innovator reports good results. The design new and original because it uses a box which is heated from 5 sides, and no insulation except double glazing on all sides. The front opening would have a door to the box, which might be insulated.

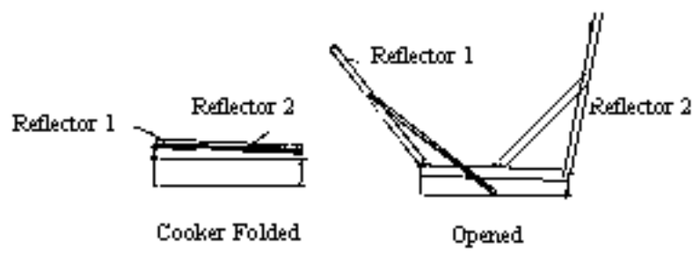
Here is another single-reflector box cooker design, details of which are not known. The front panel of the cooker is glazed and the whole cooker is tilted back so that sun enters through the front and the top panels.

Box with double reflector [Edit]

The Gosh type cooker would work well during summer in most part of India but during winter, at least in north India, additional boosters would be essential and this has resulted in the development of the box-type cookers with double reflectors. Agarwal adds (1981) another reflector at right angles to the first, his drawings do not suggest any mechanisms for tilting, which would be essential. But even without such tilting mechanisms Agarwal reports faster cooking during October. Concept VIII, the author suggests two reflectors, both with tilting facility. This design worked well reducing the cooking time.



Agarwal type

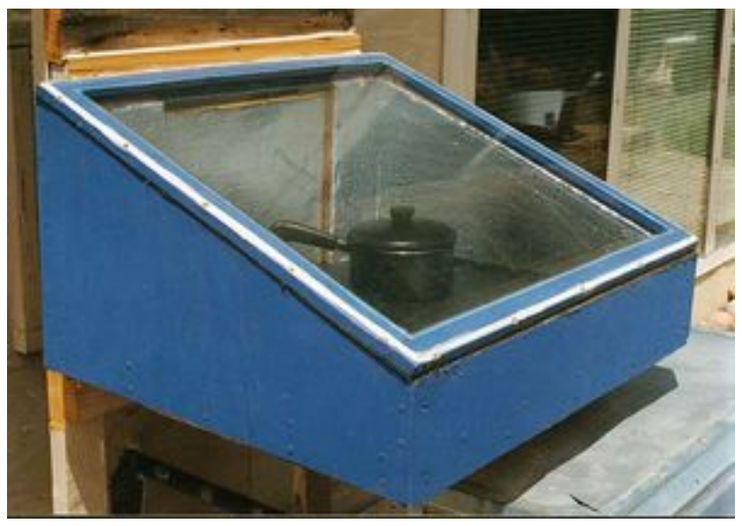


Concept VIII

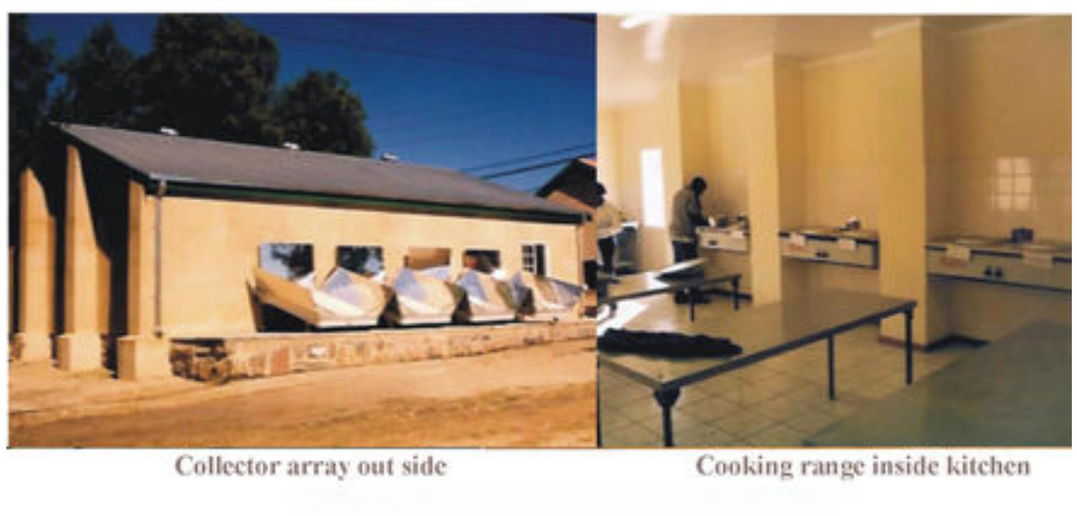
Concept IX, presented by the author in this review envisages incorporating the cooker with two reflectors inside the house as illustrated (Kundapur 1995). Advantages are many and it is very easy to incorporate the cooker in the house. In our country low-roofed huts are common especially in villages, and in all such cases this design could be used.

The author feels that even in multi-storied buildings, such extensions could be provided in every floor at proper height to place this type or other designs of cookers, such that, cooking could be done from inside the house.

The above concept was conceived during 1980's but I do not wish to make any claims on the same. The Wall oven is of this type, but the only difference is that it does not have an external reflector where as my design has two external reflectors. It is suggested that solar Cooker enthusiast and designed Barbara Kerr designed this type of Cooker. Later, probably it was Professor Paul Funk who set it up.



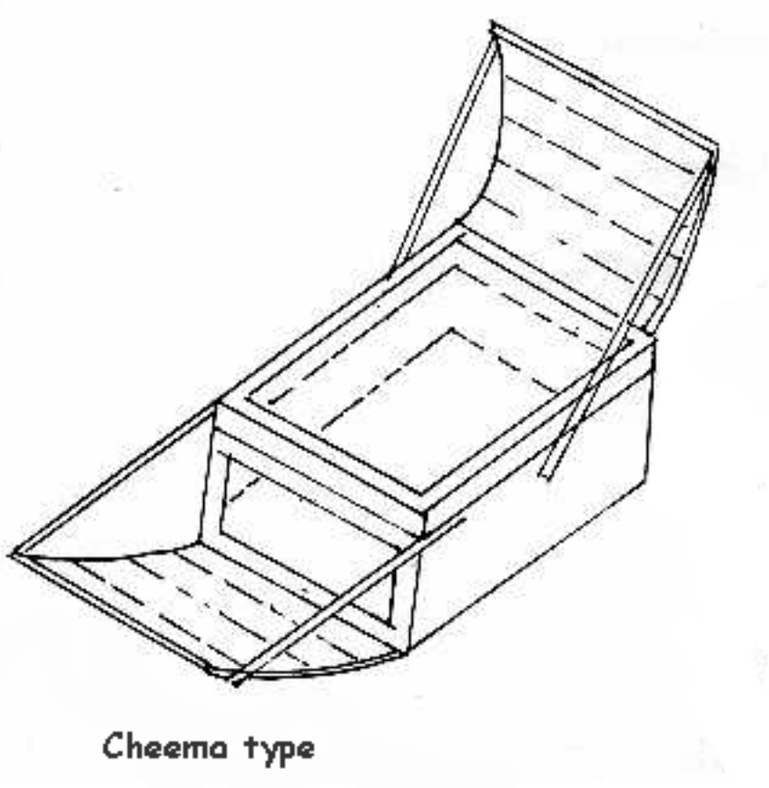
German scientists have extensively worked on thermosiphon type of solar cookers, which can be used indoors as well, the photo shows such a design.



Collector array out side

Cooking range inside kitchen

In cookers with double reflectors, depending on position of reflector and orientation one of the reflectors has to be adjusted seasonally while the other requires daily adjustments. In Cheema's (1984) design, for example, the lid opens to form double reflector one above and another reflecting light into the box from a lower angle. Professor Cheema had presented this interesting variation as early as 1983. The arrangement appears to be interesting and Cheema had reported a stagnant temperature of 206º C compared to 164 º C of ordinary cooker.



Cheema type

Sri. Sankha Subhra Datta of Jalpaiguri, a sub Divisional town of West Bengal, has come out with an ingenious new concept for Box type Solar Cooker (Designed by him in 2002). I consider it as a new major Design on the scene and designate it as BDM 4. It is a rectangular construction with two reflectors, making it possible for trapping maximum solar radiation. For achieving this the Cooker has to be inclined and while doing so to prevent the cooking vessel from spilling over, he has positioned them on tilting stand. There are 4 such stands for 4 cooking vessels of 1 lit capacity. The inventor report that the water reached boiling point with in 105 mins, stagnation temperature recorded was in the range of 148^0C. There is provision of for adding two more reflectors if need be. The cost of construction is estimated at Rs. 2000/-. I am sure this Cooker performs better than regular Ghosh type Box Cooker with one reflector.Following photo sent by the author is good enough to show details. For further details one could contact sankhasubhradutta@yahoo.com

A very attractive design of box cooker has been presented from Poland. The report indicates that it works well.

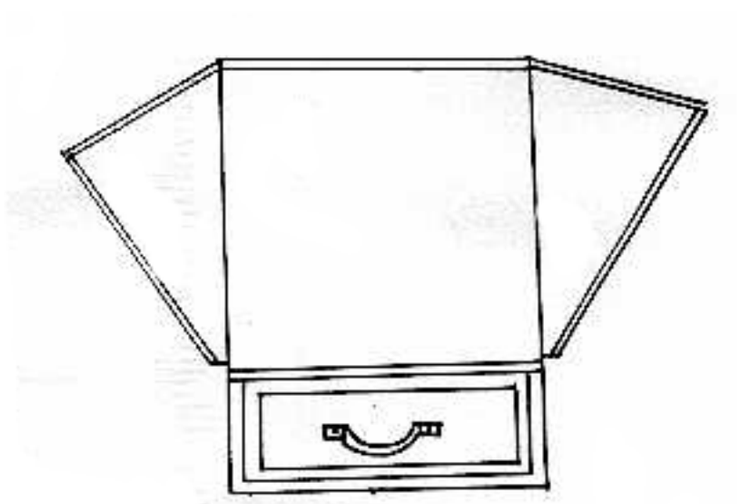
Another very interesting design has been made by Daniel Ochs. It is called as Sun Fire Oven, has TWO roll-able reflectors directing sun light on to a Vacuum tube placed at the center. For more details please visit his site at: http://www.sunfireovens.com/

Box with three reflectors Edit

To improve the performance further three reflector designs were proposed. In Concept X proposed by the author does just that. Two configurations were tried, they did not, however, reduce the cooking time by one thirds, besides, adjustment was also cumbersome. Of the two proposals, the one shown as in configuration 2 was better. The reflectors could be adjusted and tilted individually after setting. The box has to be turned to face the sun. the space between the mirrors could be fitted with triangular mirrors to increase the efficiency further. It is further proposed that these additional mirrors would come as *add-on's* (to reduce cooking time) rather than as part of the cooker.

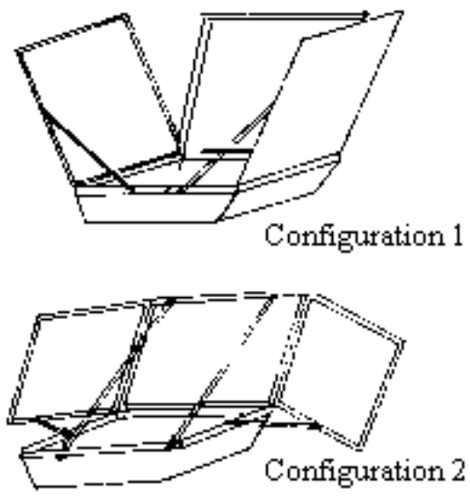
The photo above is of a cooker designed and built by Mark Aalfs in Seattle, Washington. Its extreme width allow it to cook longer without turning to follow the sun.

Better and ideal configuration could be to have a two triangular reflector adjacent to the main reflector as shown in the diagram. As Professor Bowman had observed a triangular reflector casts a better reflection on the cooker.

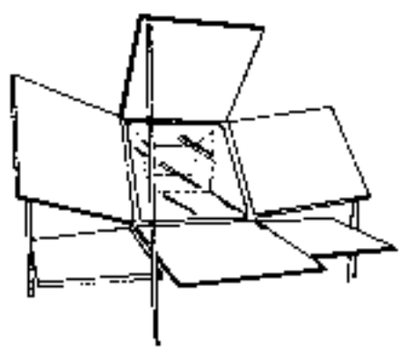


Concept Xa, Three Mirrors

Other possible configurations for three and four reflectors are as follows

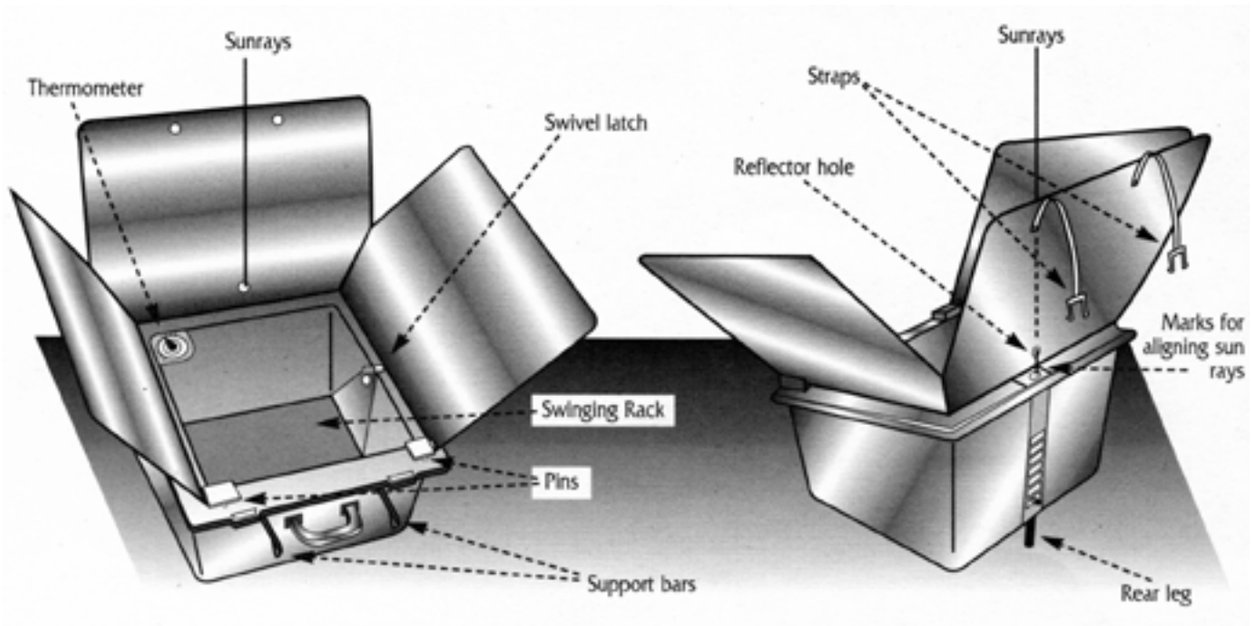


Concept X, Mirror orientation



Halacy type 4 mirrors

A Box type cooker with three reflectors is available in the US market.



The composite image which follows summarizes the designs presented above

Box with four reflectors Edit

Halacy (1974) had gone a step further by suggesting a cooker with four reflectors . Bowman, Blatt (1979), who tried to build such a cooker, found that adjustment of the reflectors took a long time and required several supports. The cooking time was not reduced by one-fourth as compared to the single mirror cooker. However, it is essential that a designer know about the existence of such a design, as it would avoid any further attempts in designing such a cooker.

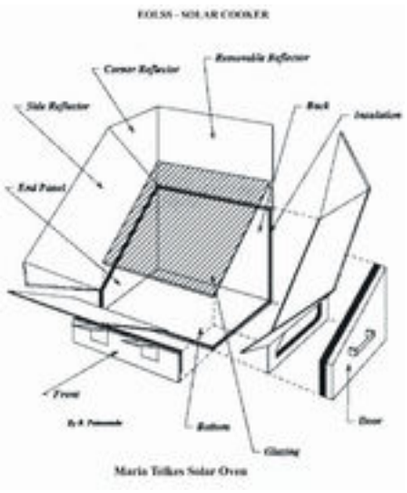
Dan Halacy in his 1959 book, "Fun With the Sun" presented a popularized 4 plus 4 version of Maria Telkes oven. Although this opened up the world of solar cooking to the general public, it still required solid metal-working skills and even suggested that such work might be done "at your local sheet metal shop."

A recent innovation is the Heaven's Flame solar oven. This cardboard box oven was designed by Joseph Radabaugh and popularized in his book Heaven's Flame. Because people remembered the title of the book more often then they did the name of the oven, this is often referred to as the **Heaven's Flame** oven. Unlike the Telkes (and Halacy) variations, it used a steeper angle (~45°) for the reflectors in order to create a set of sturdy, yet collapsible reflectors. A brief set of instructions for this oven can be found on the {C Backwoods Home Magazine website.

A successful commercial 4-reflector oven is the **Global Sun Oven** produced by Sun Ovens International. {C

Box with four plus four reflectors Edit

Maria Telkes, working in 1959, was probably the first person to create a practical oven for serious daily work. Reflectors popularly known as the *Telkes design* which was one of the best in the series and could develop a temperature of 225° C. The box was a rectangular double-walled insulated box with a door on each side. The box had double glazing fixed at the top, and the there were four main reflectors set at an angle of 60° to the horizontal. The corner spaces between these main reflectors were fitted with four triangular mirrors. The insulated box had a cradle frame to hold the cooking vessel and to assist in tilting. The whole cooker was mounted on to an 'A' type frame. Hoda suggests some improvement in the stand to reduce the cost. Cooker designed in Senegal, has a funnel – like reflector. Telkes also suggested a modification such as a box with an aperture set at 45°. Bowman, Blatt (1978) tried to maximize the dimensions of the Telkes cooker. The outer 'A' type of stand was eliminated, but the inner cradle was retained. Alzek reflectors were used instead of glass mirrors. A new type of insulation material foam glass was used to make the box. A temperature of 225° C was reported . The author tried this variation, that is concept XI, here at Udupi, but as foam glass was not available, a box of GI sheets was used and insulated with mineral wool. Regular glass mirrors a transparent PVC sheet was used on top. To effect the tilting, a steel frame support was incorporated. The assembly worked well but compared to the single or double mirrored Gosh type design the cooking time was not reduced to one-fourth as expected.



As the Telkes design was costly but at the same time more efficient, Rose (1981) of VITA designed a cooker based on similar design but with cardboard. Muzumdar (1980) made a similar design also with cardboard, but the box had only a single polyester sheet as glazing, the reflectors were also made of cardboard and coated with aluminized polyester. The cost of the unit was claimed to be just Rs. 95/- ($ 2). Weyer (1980) uses GI sheets as reflectors.

November 2004 issue of Solar Cooker Review (SCR) of Solar Cookers International has many new designs of solar cookers. Eye catching design was from Italy. The designer is Mr. Gianni Crovatto. I would consider it as highly developed Telkis design, and would classify along with it. Professor Bowman probably was first to modify Telkis cooker, then I tried to take off the 'A' Stand and suggested a alternative. Mr. Crovatto, has gone further in making the reflector more elaborate so as to direct more sun rays into the cooking pot. The two pictures enclosed here are from Solar Cookers World Network - Food Processing Action Group. His excellent Web site is found at http://digilander.iol.it/giannicrovatto.

The photo above shows large community Solar Ovens being used in Africa, designed after Telkes.

Many solar cooker enthusiasts have asked me as to the best method of finding out the best angle for reflectors. Whether they are reflecting adequate amount of sun light to the pot and so on. As regards this, many suggestions are there. Best possible answer is of course to test the cooker in a Solar Simulator. {C Professor Bowman had suggested a simple method, though. To peep into the cooker in such a way as to keep your head in the position of sun, - if the Cooking pot 'fills' the reflectors, then the position of reflector is right. {C The other method, though cumbersome, is to use a small Laser light. Flash it over the reflector from all possible positions of Sun, and see where the reflection is falling. Inverted triangular reflector, (with base at top) perform better. While adding more reflectors, one should keep in mind the area also. For better efficiency and performance Sun from a larger area has to be concentrated. In other words there is no point in designing a perfect concentrating array of mirrors for, say half-a-square meter and expect a lot. Getting more power means, capturing/concentrating sun light from larger area.

Box with adjustable perimeter reflectors Edit

{C

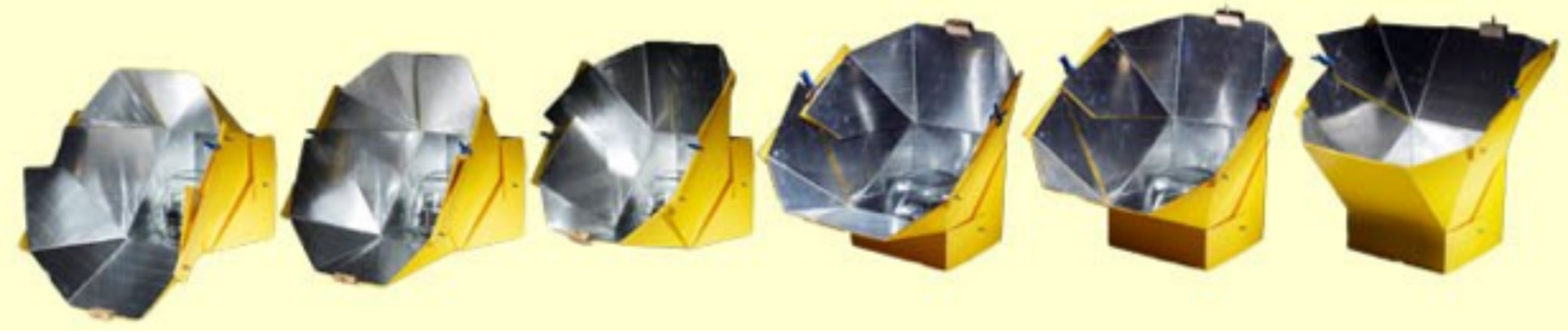
The Sun Scoop, designed by Stephen Harrigan of Solar Clutch, is a light weight box type solar cooker. This waterproof cooker is made from plastic fluteboard (just like corrugated cardboard, but made of plastic).

The Sun Scoop has a simple glass door and uses recycled inner tube material for the seal and hinges. Clasps are simple to make and easily replaced if broken. The reflectors individually snap to the frame work, and those at the corners in front of the oven have several snap locations. This allows the front reflector to be at a more shallow angle when the sun is lower in the sky, or for use in more northern locales. No need to tip the cooker or have the food on a swinging tray.

Sun Scoop box oven

The Sun Scoop collapses for easy portability.

At this point I should mention creation made by Jim La Joie. He calls it as all season Solar cooker, it is also all day Solar cooker. It is a box cooker with adjustable reflectors. The angle of reflectors can be easily adjusted, while the box is stationary. This arrangement avoids use of any cradle like stand in side the box and also for the cooker, making it a wonderful and very useful concept. Ha has a good site and some videos which are very convincing. The photo displays the versatility of the cooker. It is indeed a brilliant idea



Construction plans Edit

- Construction details for the Sun Scoop

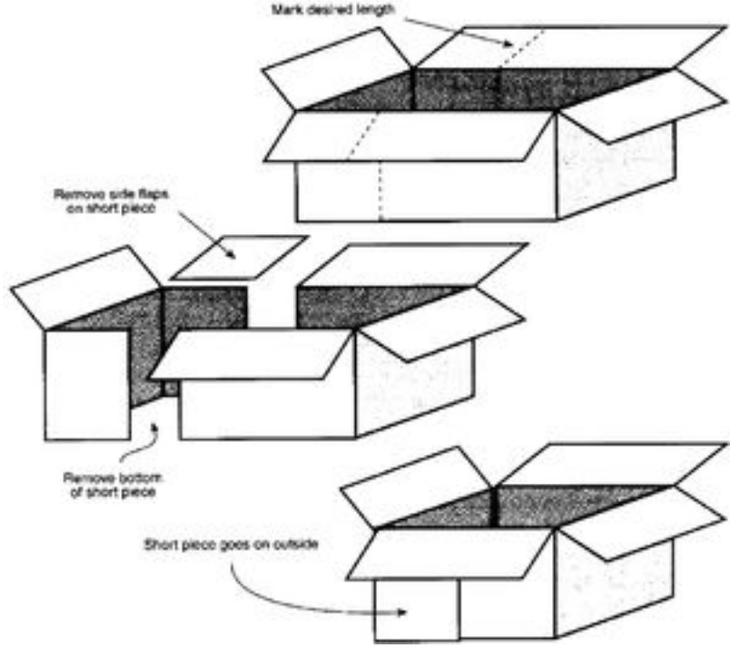
Box cooker construction tips Edit

Making an existing cardboard box smaller Edit

Often constructing inexpensive cardboard designs of solar box cookers will involve cutting down existing cardboard boxes to the proper size. One technique is to remove sections of the top flaps of the box. The illustration shows how once the extra flap material is removed the remaining wall panels can overlap each other and secured.

See also Edit

- All solar box cooker designs on this wiki
- All construction plans for solar box cookers on this wiki
- Sun Scoop
- Solar Box Cooker for Gujarat, India, UC Berkley, CE290 Spring 2009
- Solar Box Cooker, final presentation, UC Berkley, CE290 May 6, 2009
- Solar Box Cooker for the Developing World - *Queen's University*
- Thermodynamic Review of Solar Box Cookers (thesis) - *Petri Konttinen*
- Principles of Solar Box Cooker Design - *Mark Aalfs*
- All solar box cooker designs on this wiki
- All construction plans for solar box cookers on this wiki
- Plans to make wooden box cooker - Amanah Self Help Group 2009
- **July 2006:** Design and Testing of a Box Type Solar Cooker Employing Nontracking Reflectors - *Ishan Purohit*
- **July 2006:** Design and Development of a Large Size Non-Tracking Solar Cooker - *Navratna Nahar*
- **July 2006:** Development of Heat-Box Type Solar Cooker as Educational Material - *Yuichi Nakajo*



Making an existing cardboard box smaller.

External links Edit

- Using a Solar Oven as a Radiant Refrigerator at Night - *Richard McMahon*
- Converting a Box Cooker to Have Round Inner Walls - *Richard McMahon*
- Box cookers tips and tricks
- Solar Box Cooker for Gujarat, India - *Ashok Gadgil*
- Box-type solar cooker for disinfection - *Vikrant Chitnis*
- A Tracking Box Cooker - *Alan Nichols*
- Energy analysis detailing the energy used to construct a box cooker versus the energy saved by its use - *Engineers For a Sustainable World Solar Ovens Team*
- Balancing the Scales: reduction of inequities through the use of solar box cookers - *Bill Sperber*

Articles in other languages Edit

- Chinese: Balancing the scales 取得平衡 利用箱型太阳能烹煮器来减少不公平现象
- French: Rétablir l'équilibre: La réduction des inégalités à travers l'usage des fours solaires - French
- German: Herstellung des Gleichgewichts - German
- Farsi: Balancing the scales متعادل کردن جهان
- Portugese: Igualando as diferenças
- Spanish: Igualando las Diferencias

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