Fresnel solar reflectors

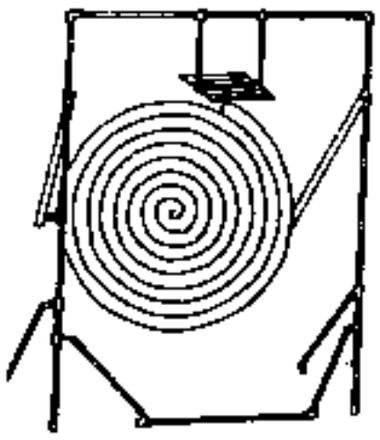
The original author of this article is Dr. Ashok Kundapur. Find more of Dr. Kundapur's work on his website: http://www.solcooker.net/Cindex.htm.

Though the parabolic reflector was a perfect design, even good technicians, more so the villagers, found it difficult to construct parabolic reflectors even with the help of templates. This was how the Fresnel reflectors gained importance. The very first design in this category came from Volunteers in Technical Assistance (VITA) in 1961 . Three to four rings of masonite (hardboard like material) were cut from a 4' x 4' sheet. Aluminized polyester was stuck to this. After which the rings were nailed to specially notched wooden reapers to form a Fresnel concentrator. VITA provided a template of these materials as it was a do-it-yourself project (VITA 1971). The cooking pot was supported on a rod projecting from the center. Adjustments, once in 30 minutes were considered sufficient. Ease of construction and focusing characteristics made this design better than the regular parabolic reflector (VITA 1961). Professor Garg, an Indian designer (Garg et al 1978), suggests further improvements by making the reflector with five to six rings.

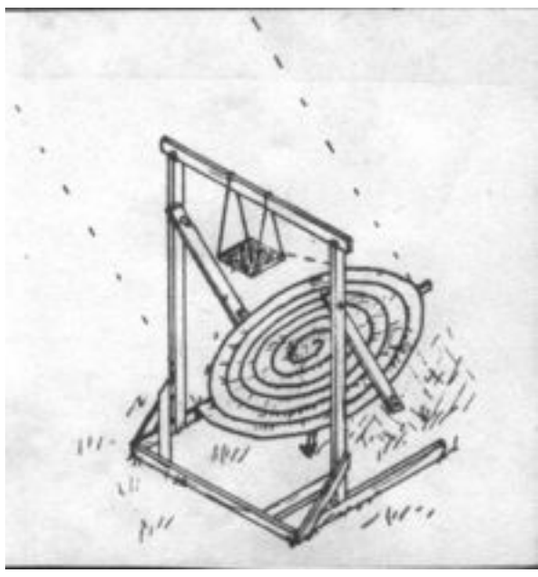
Recently Mr. Ed Norman of Peru has taken keen interest in the VITA design and has revived it. I am yet to get the latest details from him as to the performance.

Mr Juan Urrutia Sanz of Spain has revived VITA cooker, and the photo shows his cooker in front of an imposing building of Madrid, Spain

In a comparative study the VITA design emerged as a top model (Garg 1978). Attracted by the simplicity of the Fresnel geometry, Richard Steenblick developed an ingenious way of making Fresnel concentrator. A single continuous spiral strip of reflector material, with the width determined by using a computer, was wound like a spring and tied to a backing frame, and placed on a suitable support. Solar stalwarts like Edmondson (1981) claim that this design was a boon to solar designers. Reflectors of any size could be easily fabricated. The reviewer tried out this technique but encountered considerable difficulty in cutting and fixing the spiral.



Steenbleek type



Steenblick sketch of frame for fresnel reflector

Dr. Bernie Mueller of Germany who visited my site in March 2003, has directed me to his web site http://www.mueller-solartechnik.com. Some more interesting variation of Fresnel design. The photograph taken from his site gives good details. The linearly arranged Fresnel lens focuses light on to a pot kept at the focal point, about 50 cm away from the mirrors. The design is said to deliver ~300W power. The one which could deliver ~600 W is in the form of Cross says Mr. Muller. He recommends unit with glass mirrors. The standard cooker comes with an aluminium foil reflector.

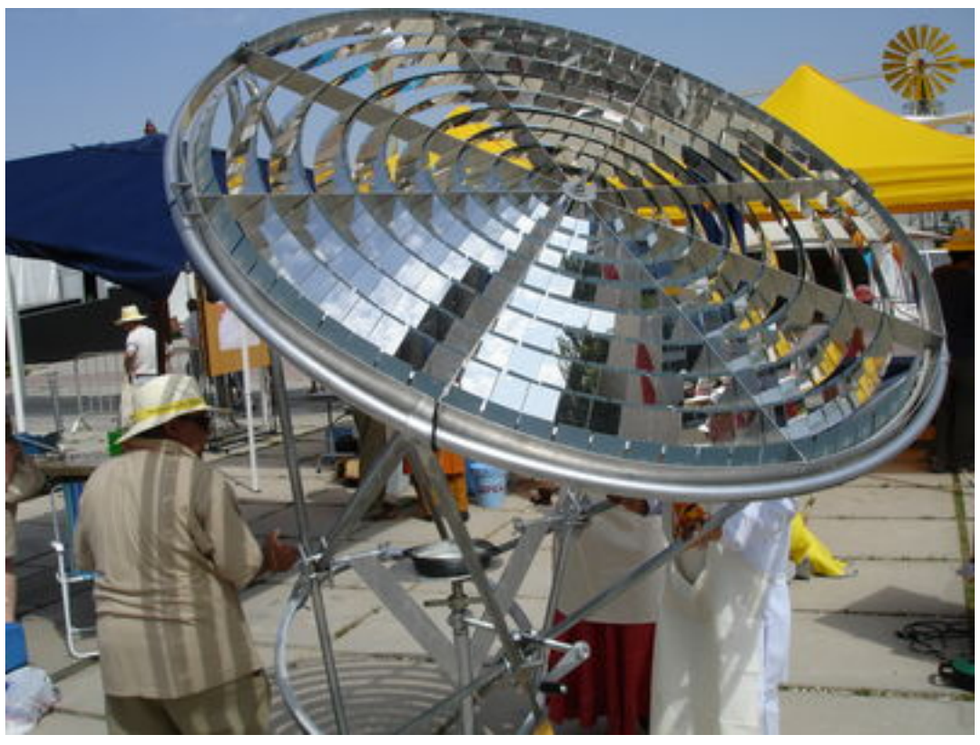
Fatangre's (1992) design is actually a box type design, wherein he incorporates a transparent Fresnel lens in the lid of the Gosh type box (described later).

Another interesting Fresnel arrangement has been described by Bob Culbertson,of US, in which an array of flat mirrors are lined up which focus the sun rays at the bottom. The configuration could be described with the help of forward and backward slashes.

Bob Culbertson's Fresnel box design

This configuration would work, but it may not be possible to divert the focused rays to the base of a pot, for this will be a line focus.

Another new design of Fresnel lens was displayed at the recent Granada exhibition, a photo of which has been kindly sent by Tom Sponheim. Unfortunately, we don't have any further details on this cooker.



Main article: Compendium of solar cooker designs

⇦ *Previous: Parabolic reflectors*

Next: Cylindro-parabolic cookers ⇨

News and recent developments Edit

- **August 2011:** Students at MIT are working on a proposal for a new type of solar powered outdoor grill (The image on the right shows how such a cooker might look.) Based on the technology from MIT professor David Wilson, this grill would collect thermal energy from the sun and store it to allow cooking times for up to twenty five hours at temperatures above 230°C (450°F). Wilson's technology would use a Fresnel solar reflector to harness the sun's energy to melt down a container of Lithium Nitrate. The Lithium Nitrate would serve as a solar battery. Due to its phase change reaction, the thermal energy might be stored for longer periods of time and at higher temperatures, by means of latent heat storage. Heat would then be redistributed through convection, which would allow for outdoor cooking. A Solar Grill Prototype for a Greener Tomorrow, August, 2011 - *BarbequeLovers.com*
- **April 2010:** Patricia McArdle met a group of Navajo high school students who have used designs they found on the internet to make several solar cookers including the Cookit, box cookers and a Fresnel lens solar fryer for making traditional Navajo fry bread. Their Fresnel cooker won second prize two weeks ago at the nationwide Spirit of Innovation contest--beating out some elite science high schools. They and their science teacher, Paul McCarl, working with very limited resources, are now trying to make a large fresnel solar cooker that can be used by Navajo families to make fry bread.

Wilson solar grill potentially may be able to use latent heat storage to cook after sunset. This photograph is a photo montage and doesn't represent an existing cooker!.

Audio and video Edit

- **January 2013:**

Make a Solar Cooking Frame for Cheap (Fresnel Lens Frame)

Grant Thompson describes the steps to create a fresnel lens with a moveable frame.

- **May 2008**

SOLAR COOKING PASTA FRESNEL LENS STOVE OVEN SOLAR POWER Mirror Bouncing

See also Edit

- Solar Water Lens

External links Edit

- The Terra Foundation's data sheet on this cooker

Categories: Compendium of solar cooker designs | Fresnel solar cooker designs | Add category

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