

Dedication

This work is dedicated to:

The Soule of my father,

The Soule of my Mother,

The sisters and brothers,

the beloved country the Sudan.

Acknowledgemen

t

I could hardly find the suitable words or terms to express my deepest and sincere gratitude and thanks to my supervisor Dr. khalifa Ahmed khalifa for his kind help and support. I also wish to thank Dr.Ali Ahmed Hasabo for his kind, invaluable help and care; I also wish to thank the manager of The Energy Research Institute for providing an intensive training in the field of solar energy that contributed greatly to the successful completion of this study.

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الخلاصة

تهدف هذه الدراسة إلى تطوير موقد صندوقي شمسي محسن يمكن استخدامه في الطهي وحفظ الطعام دافئاً وصحيّاً. إن المنشومة قد تم تصميمها وتصنيعها واختبارها بورشة مركز أبحاث الطاقة / وزارة العلوم والتكنولوجيا بسوها السودان. إن هذا التصميم يتوافق مع مشكلة تلوث البيئة وندرة حطب الوقود بالمدن والارياف. وكذلك يعتبر تطبيقاً حقيقياً لاستخدامات الطاقة المتجددة.

إن هذا التصميم يتميز ببساطة واقتصادية والاستدامة والفاءة. وأنه يتكون من المكونات التالية:

1- صندوق خارجي صندوق داخلي بالأبعاد التالية:

أ/ الصندوق الخارجي 900 مم \times 400 مم

ب/ الصندوق الداخلي 850 مم \times 350 مم

2- عاكسين يغطي الوجه الخارجي لكل منهما مرآة مستوية بسمك 2 مم لهما زواية ميلان قابلة للتعديل هذه الزاوية يمكن أن تتراوح ما بين 15° إلى 45° طبقاً لحركة أشعة الشمس أثناء اليوم وفصول السنة.

3- غطاء زجاجي مزدوج الطبقه للسماح بمرور أشعة الشمس من خلاله.

4- سطح ماص مصنوع من رقائق معدنية بسمك 2 مم. وقد تم طلاءه باللون الأسود لزيادة امتصاص الطاقة الشمسية.

5-الياف زجاجية بسمك 5 مم تم استعمالها كمادة عازلة وقد اثبتت الاختبارات أنه يمكن الحصول على متوسط أعلى لدرجة الحرارة بقيمة 63 درجة مئوية مقارنة بالدرجة المتحصل عليها بالموقد التقليدي والبالغ قدرها 41 درجة مئوية.

Abstract

The aim of this study was to develop a modified box –type solar stove that can be used by family for cooking and keeping food warm and healthy. The system had been designed, constructed and tested in the workshop of the Energy Research institute, Ministry of Science and Technology at Soba, Sudan. The design is expected to solve the problem of environment and scarcity of fire wood in both rural and urban areas. Also it is a real application of renewable energy usage.

The design was simple, economic, durable and efficient. It consists of the following components:

1- Outer and inner boxes with the following dimensions.

- a. Outer box: 900 mm × 40 mm
- b. Inner box: 850 mm × 350 mm

2 - Two reflectors, the outer face of each one has a plane mirror of 2mm thick the inclination angle is adjustable. It can range from 15^0 to 45^0 according to the movement of the sun rays during the day time and the season.

3- A double layer glass cover to allow sun rays passing through.

4- An absorber plate made of metal sheet of 2mm thickness. It was painted in black to increase solar energy absorption.

5- A fibre glass of 5cm thickness was used as an insulator.

The test revealed that higher average body temperature of $63(^{\circ}\text{C})$ was obtained compared with $41(^{\circ}\text{C})$ for conventional stoves.