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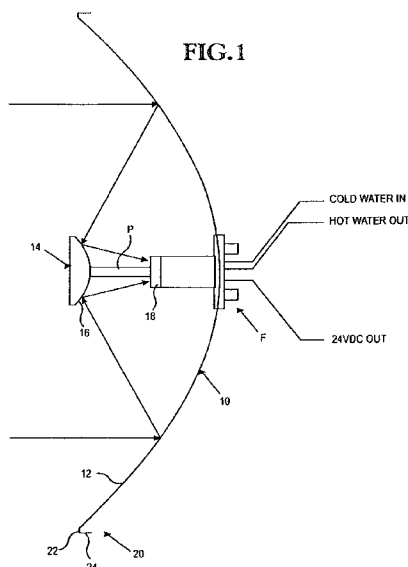
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Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
25 September 2008

(54) Title: CONVERSION OF SOLAR ENERGY TO ELECTRICAL AND/OR HEAT ENERGY



(57) Abstract: A parabolic primary mirror (10) has a concave specular surface (12) that is constructed and positioned to receive solar energy and focus it towards a focal point. A secondary mirror (14) having a convex specular surface (16) is constructed and positioned to receive focused solar energy from the primary mirror and focus it onto an annular receiver (18). The annular receiver (18) may include an annular array of optical elements (100) constructed to receive solar energy from the secondary specular surface (14) and focus it onto a ring of discrete areas. A ring of solar-to-electrical conversion units are positioned on the ring of discrete areas. A sun sensor that allows accurate solar tracking to keep mirror system aligned with the sun.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 08/50392

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H01L 31/00 (2008.04)

USPC - 136/256

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - H01L 31/00 (2008.04)

USPC - 136/256

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 136/243, 252, 256; Backward/forward citation searches, Text Search

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWEST (PGPB, USPT, USOCR EPAB, JPAB); Terms: annul\$2 near2 beam and mirror and (photovoltaic cell); Google ("solar collector cassegrain")

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,249,516 A (Stark) 10 February 1981 (10.02.1981) fig. 27 and col 29, In 5- col 30, In 5	1-22 and 38-41
Y	US 4,746,370 A (Woolf) 24 May 1998 (24.05.1998) figs. 1-4 and col 4, In 50-67	1-22, 38, 40, 41
Y	US 4,419,532 A (Severns) 06 December 1983 (06.12.1983) fig. 1 and col 3, In 10-45	3, 9-11, 14
Y	US 4,074,704 A (Gellert) 21 February 1978 (21.02.1978) figs. 1-4 and col 3, In 15-65	39 and 41

☐

Further documents are listed in the continuation of Box C.

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* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

09 July 2008 (09.07.2008)

Date of mailing of the international search report

18 JUL 2008

Name and mailing address of the ISA/US

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 08/50392

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Group I: Claims 1-22, 38-41.

Group II: Claims 23-37.

Group III: Claims 42-46.

---see extra sheet---

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-22, 38-41

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/US 08/50392

Box No. III: Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-22, 38-41: drawn to a solar/light energy collection system, comprising: a primary mirror having a concave; and a secondary mirror having a convex surface constructed and positioned to receive focused light energy from the primary mirror and focus it onto an annular receiver, and an energy concentrator.

Group II: Claims 23-37: drawn to a mirror, comprising: a thin metal body having a curved surface; a polymer layer on said curved surface; a reflective metal layer on the polymer layer; and a thin glass layer on the metal layer; said layers providing the mirror with a specular surface.

Group III: Claims 42-46: drawn to a sun position sensor, comprising: a base; a cylindrical shadow shield extending upwardly from the base; a sensor support having a lower portion connected to the base inside the shadow shield and an upper portion in the form of a truncated pyramid; four photovoltaic cells mounted on the support, one on each the sloping side of the truncated pyramid; and four photovoltaic cells mounted on the outer surface of the shadow shield ninety degrees apart.

The inventions listed as Groups I - III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Groups II and III do not include the inventive concept of first and second mirrors for solar energy collection, as required by Group I.

Groups I and III do not include the inventive concept of the specific mirror structure including metal and glass layers, as required by Group II.

Groups I and II do not include the inventive concept of a sun position sensor with photonic cells, as required by Group III.

Groups I - III therefore lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.