

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
6 March 2003 (06.03.2003)

PCT

(10) International Publication Number
WO 03/019682 A3

(51) International Patent Classification⁷: **H01L 35/30**,
F25B 21/02

(21) International Application Number: PCT/IL02/00676

(22) International Filing Date: 15 August 2002 (15.08.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
145095 23 August 2001 (23.08.2001) IL

(71) Applicant (for all designated States except US): **ELAS-THERMO LTD.** [IL/IL]; 8 Hartom st., P.O. Box 45010, 91450 Jerusalem (IL).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **ZAIDMAN, Michael** [IL/IL]; 215/2 Hatzaber st., 93856 Jerusalem (IL).

(74) Agent: **NOAM, Meir**; P.O.B 34335, 91342 Jerusalem (IL).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

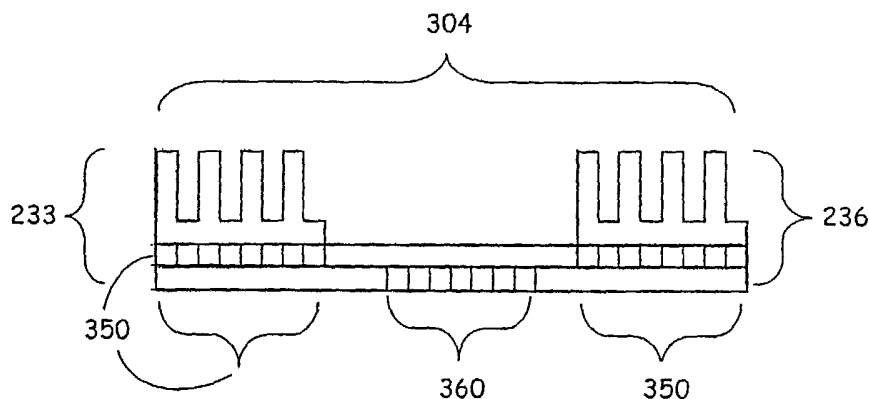
Published:

— with international search report

(88) Date of publication of the international search report:
2 October 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A THERMOELECTRIC DEVICE FOR COOLING



(57) Abstract: A thermoelectric device useful for cooling comprising: a plurality of N-type thermoelectric semiconductor elements; a plurality of P-type thermoelectric semiconductor elements; metal junctions between horizontally adjacent semiconductor elements; special layers between vertically adjacent N-type thermoelectric semiconductor elements and between vertically adjacent P-type thermoelectric semiconductor elements; a cold pole; at least two heat sinks; and a source of direct current power interconnected so as to pump electrons from the N-type semiconductors to the P-type semiconductors, or to pump holes from the P-type semiconductors to the N-type semiconductors, such that the heat buildup is distributed among more than one heat sink.



WO 03/019682 A3

INTERNATIONAL SEARCH REPORT

Intern Application No
PCT/IL 02/00676

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L35/30 F25B21/02

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 7 H01L F25B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 03, 30 March 2000 (2000-03-30) & JP 11 340525 A (MATSUSHITA ELECTRIC WORKS LTD), 10 December 1999 (1999-12-10) abstract	1-7
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 22, 9 March 2001 (2001-03-09) & JP 2001 147054 A (HONDA MOTOR CO LTD), 29 May 2001 (2001-05-29) abstract	1,5-7
X	EP 0 342 166 A (URBANO BARBABELLA ;POLCHI FRANCO (IT)) 15 November 1989 (1989-11-15) the whole document	1-3,5-7
	--- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* 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 document 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

13 March 2003

Date of mailing of the international search report

21/03/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Kirkwood, J

INTERNATIONAL SEARCH REPORT

Inter: I Application No

PC1/PL 02/00676

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 726 193 A (NANCARROW GREGORY J ET AL) 23 February 1988 (1988-02-23) the whole document ----	1-3,5-7
X	US 5 355 678 A (BEITNER SHLOMO) 18 October 1994 (1994-10-18) figures 4,5 ----	1-3,5-7
X	US 4 338 944 A (ARKANS EDWARD J) 13 July 1982 (1982-07-13) figure 2 ----	1-3,5-7
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 12, 3 January 2001 (2001-01-03) & JP 2000 252527 A (MATSUSHITA ELECTRIC WORKS LTD), 14 September 2000 (2000-09-14) abstract ----	1-7
A	US 2 932 953 A (JOHN BECKET FREDERICK ET AL) 19 April 1960 (1960-04-19) the whole document -----	1-7

INTERNATIONAL SEARCH REPORT

Inter-Application No

PC1/IL 02/00676

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 11340525	A	10-12-1999	NONE	
JP 2001147054	A	29-05-2001	NONE	
EP 0342166	A	15-11-1989	IT 1235000 B BR 8902202 A EP 0342166 A2	16-06-1992 02-01-1990 15-11-1989
US 4726193	A	23-02-1988	NONE	
US 5355678	A	18-10-1994	NONE	
US 4338944	A	13-07-1982	AR 224822 A1 AU 541533 B2 AU 7062781 A BE 889249 A1 BR 8103399 A CA 1155028 A1 DE 3122617 A1 ES 8203599 A1 FR 2484250 A1 GB 2077595 A ,B IT 1142536 B JP 57022751 A MX 154175 A ZA 8103655 A	15-01-1982 10-01-1985 24-12-1981 16-10-1981 24-02-1982 11-10-1983 08-04-1982 16-07-1982 18-12-1981 23-12-1981 08-10-1986 05-02-1982 01-06-1987 30-06-1982
JP 2000252527	A	14-09-2000	NONE	
US 2932953	A	19-04-1960	GB 798882 A	30-07-1958