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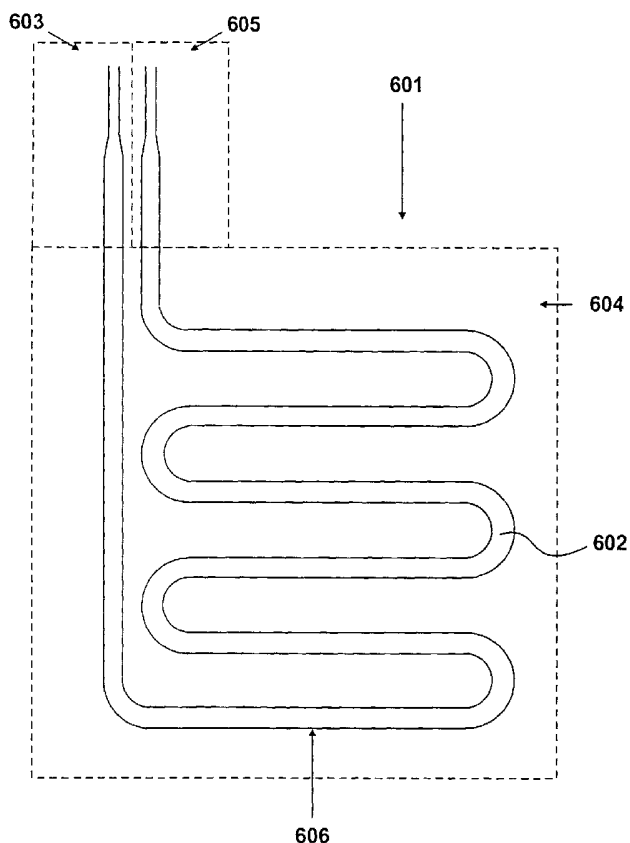
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- (71) Applicant (for all designated States except US): **BUNDY A/S** [DK/DK]; Romersvej 7-9, DK 7430 Ikast (DK).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **LIENGARD, Niels** [DK/DK]; Harbyvej 15, DK-8680 Ry (DK).
- (74) Agent: **BURRINGTON, Alan, Graham, Headford**; Atkinson Burrington, 25-29 President Buildings, President Way, Sheffield S4 7UR (GB).
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[Continued on next page]

(54) Title: REFRIGERATION UNIT, HEAT TRANSFER ELEMENT AND METHOD OF MANUFACTURING A HEAT TRANSFER ELEMENT



(57) Abstract: A heat transfer element (601) for use within a refrigeration system comprising heat transfer tubing (602) comprising an inlet portion (603) for receiving a refrigerant, a heat transfer portion (604) comprising an oblong cross-section and an outlet portion (605). In the preferred embodiment the heat transfer tubing (603) is fabricated from an aluminium alloy, and the inlet portion (603) and the outlet portion (604) comprise a connection member fabricated from copper. In the preferred embodiment the heat transfer element (601) comprises a serpentine shape (606). In alternative embodiments the heat transfer tubing (603) is fabricated from aluminium, steel or copper. Associated methods of manufacturing a heat transfer element (601) are disclosed.



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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.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 02/03183

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 F25B39/00 F25D23/06 F28F1/02 B23P15/26

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 F25B F25D F28F B23P F28D B21D

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 423 500 A (LINGEMANN HELMUT GMBH & CO) 24 April 1991 (1991-04-24) abstract; figure 5	1-11
X	---	12-17, 20,22, 29-41
Y	US 3 849 854 A (DOUGLAS R ET AL) 26 November 1974 (1974-11-26) abstract; figures 1-3	5-8
X	---	18,19, 21,23-30
Y	US 5 722 254 A (WOLTZ JAMES D ET AL) 3 March 1998 (1998-03-03) column 3, second paragraph column 2, line 31-46 figures 1-5	1-6
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☒ 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

26 November 2002

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15. 01. 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

ANNETTE RIEDEL/JA A

INTERNATIONAL SEARCH REPORT

Intel bnal Application No
PCT/IB 02/03183

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 644 829 A (MASON MURRAY R ET AL) 8 July 1997 (1997-07-08) the whole document ---	9-11
A	US 5 425 414 A (BRADLEY JR WILSON E ET AL) 20 June 1995 (1995-06-20) column 1, paragraph 4; figures 3A-3C ---	5
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 11, 3 January 2001 (2001-01-03) & JP 2000 222070 A (MITSUBISHI ELECTRIC CORP), 11 August 2000 (2000-08-11) abstract; figure 6 ---	30
A	FR 2 640 034 A (RAFFEL SARREBOURG SARL ETS) 8 June 1990 (1990-06-08) figures ---	1-43
A	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 05, 31 May 1999 (1999-05-31) & JP 11 051511 A (SANYO ELECTRIC CO LTD), 26 February 1999 (1999-02-26) abstract ---	1-43
A	EP 0 125 642 A (ZANUSSI A SPA INDUSTRIE) 21 November 1984 (1984-11-21) abstract; figure 3 ---	1-32
A	US 6 006 567 A (BROWN JAMES H ET AL) 28 December 1999 (1999-12-28) figures 6A-6C -----	1-43

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 02/03183

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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.: 42, 43
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:
see FURTHER INFORMATION sheet PCT/ISA/210
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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

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 an additional fee, this Authority did not invite payment of any additional fee.
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.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 42,43

Claims 42 and 43 do not comply with the criteria set forth in Article 6(PCT), stating that the claim or claims shall define the matter for which protection is sought. According to Rule 6.2(a) claims shall not, except where absolutely necessary, rely, in respect of the technical features of the invention, on references to the description or drawings. In particular, they shall not rely on such references as: "as described in part ... of the description", or "as illustrated in figure ... of the drawings. In this case, there appears to be no such necessity to rely on the drawings.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 02/03183

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