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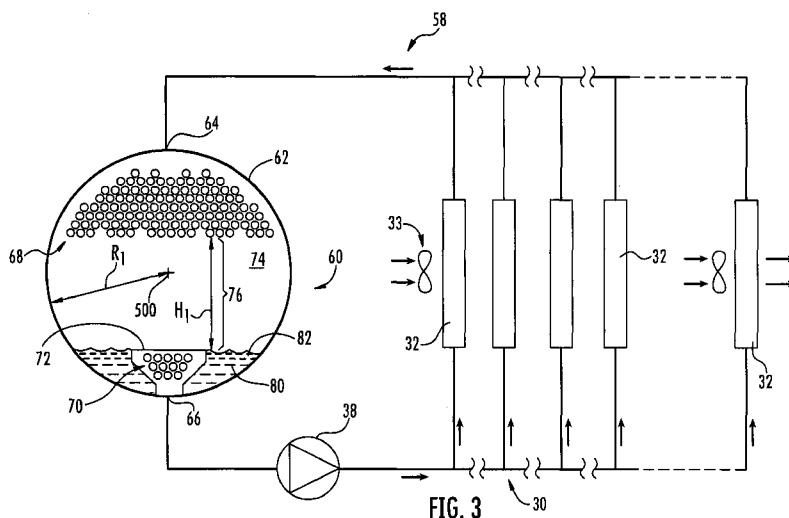
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(54) Title: CONDENSER/ACCUMULATOR AND SYSTEMS AND OPERATION METHODS



(57) Abstract: A condenser/accumulator (60) has a shell (62). A coolant flowpath extends from a coolant (144) inlet to a coolant outlet (146). An upper tube bundle (68) is within the shell, a first branch of the coolant flowpath passing through tubes of the upper tube bundle. A lower tube bundle (70) is within the shell, a second branch of the coolant flowpath passing through tubes of the lower tube bundle. A refrigerant flowpath extends from a refrigerant inlet (64) to a refrigerant outlet (66) and is in heat transfer relation with the coolant flowpath. There is a vertical gap (76) between the upper tube bundle and the lower tube bundle and comprising at least 50% of a free volume of a refrigerant space within the shell.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/001465

A. CLASSIFICATION OF SUBJECT MATTER
 INV. F25B39/04 F25B9/00 F28B1/02 F28D7/16 F25B40/02
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 ADD.
 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)
 F25B F28B F28D
 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 practicable, search terms used)
 EPO-Internal, 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	DE 695 04 456 T2 (YORK INT CORP [US]) 28 January 1999 (1999-01-28)	1-9
Y	page 1, line 4 - page 2, line 32; figures 1-3 page 4, line 1 - page 5, line 29	10-14, 16,17,19
X	----- WO 2009/089100 A1 (JOHNSON CONTROLS TECH CO [US]; WELCH ANDREW M [US]) 16 July 2009 (2009-07-16) paragraphs [0007], [0026] - [0035]; figures 3,4,7	1-9
X	----- WO 2009/009164 A1 (LIEBERT CORP [US]; SPEARING IAN [US]) 15 January 2009 (2009-01-15)	15,18
Y	paragraphs [0014], [0027] - [0035]; figures 1,2,3	10-14, 16,17,19
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Gasper, Ralf
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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009/178789 A1 (LUO ZHONG [CN] ET AL) 16 July 2009 (2009-07-16) paragraphs [0029] - [0038]; figures 5,6 -----	1-19
A	DE 43 15 924 A1 (FORSCHUNGSZENTRUM FUER KAELTET [DE]) 17 November 1994 (1994-11-17) column 1, line 33 - column 2, line 66 -----	10-19
A	US 2005/120737 A1 (BORROR STEVEN A [US] ET AL) 9 June 2005 (2005-06-09) paragraph [0015] - paragraph [0022]; figures 1-3 -----	1-19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2011/001465

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:

see additional 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 an 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.:

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-17

directed to a condenser/accumulator and a corresponding method to operate

2. claims: 18, 19

directed to a method to operate a cooling system

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2011/001465

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 69504456	T2	28-01-1999	AU 688107 B2 05-03-1998
			AU 3315695 A 16-05-1996
			CA 2158595 A1 11-05-1996
			CN 1147622 A 16-04-1997
			DE 69504456 D1 08-10-1998
			DE 69504456 T2 28-01-1999
			EP 0711971 A2 15-05-1996
			JP 3744987 B2 15-02-2006
			JP 8261601 A 11-10-1996
			US 5509466 A 23-04-1996

WO 2009089100	A1	16-07-2009	US 2010275643 A1 04-11-2010
			WO 2009089100 A1 16-07-2009

WO 2009009164	A1	15-01-2009	CN 101688708 A 31-03-2010
			EP 2162689 A1 17-03-2010
			JP 2010533280 A 21-10-2010
			US 2009013716 A1 15-01-2009
			US 2011120164 A1 26-05-2011
			WO 2009009164 A1 15-01-2009

US 2009178789	A1	16-07-2009	CN 101338959 A 07-01-2009
			US 2009178789 A1 16-07-2009
			WO 2009088754 A1 16-07-2009

DE 4315924	A1	17-11-1994	NONE

US 2005120737	A1	09-06-2005	CN 1890515 A 03-01-2007
			EP 1723371 A2 22-11-2006
			EP 2314956 A1 27-04-2011
			HK 1095624 A1 12-03-2010
			JP 2007514121 A 31-05-2007
			US 2005120737 A1 09-06-2005
			US 2012324930 A1 27-12-2012
			US 2013000335 A1 03-01-2013
			WO 2005057097 A2 23-06-2005
