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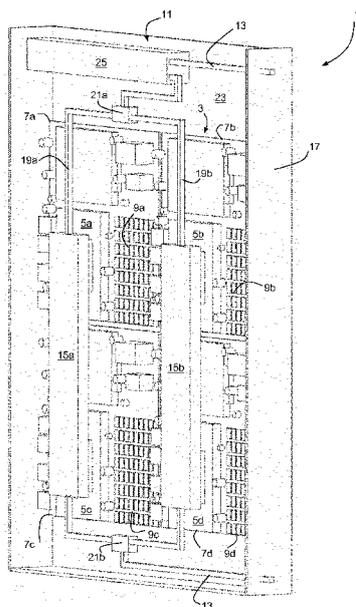


Fig. 1

(57) Abstract: Disclosed is a heating apparatus for a domestic or commercial building. The apparatus comprises a computer system for installation in the building, the computer system including a data store, a program store storing processor implementable instructions, and at least one processor coupled to the data and program stores for implementing the stored instructions to thereby produce thermal energy. The apparatus further comprises a thermal energy distribution assembly arranged for transferring the thermal energy away from the computer system for heating purposes, the thermal energy distribution assembly comprising a piped fluid circuit and at least one first heat exchanger connected to the piped fluid circuit for transferring the thermal energy from the processor to a fluid of the piped fluid circuit. The piped fluid circuit may be arranged such that, before passing through the first heat exchanger, thermal energy is transferred to the fluid from thermal energy-generating ancillary components of the computer system. The apparatus may be operated such that, in response to the determination of a need for an increased heating temperature, at least one of a rate at which the computer system produces the thermal energy and a rate at which the thermal energy distribution assembly transfers thermal energy away from the processor is controlled, such that the temperature of the processor increases.



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/077229

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24D12/00 G06F1/20 H05K7/20
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)
F24D H05K G06F
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

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/008483 A1 (CHEON KIOAN [US]) 15 January 2004 (2004-01-15)	1-3,6-14
A	paragraphs [0029] - [0081]; figures -----	4,5
X	EP 2 058 724 A2 (FUJITSU SIEMENS COMPUTERS GMBH [DE]) 13 May 2009 (2009-05-13)	1-3,6-14
A	paragraphs [0006] - [21.32]; figures -----	4,5
A	US 2009/218078 A1 (BRUNSWILER THOMAS J [CH] ET AL) 3 September 2009 (2009-09-03)	1-14
A	paragraphs [0027] - [0043]; figures 1,9,10 -----	
A	DE 10 2016 204175 A1 (THOMAS-KRENN AG [DE]) 14 September 2017 (2017-09-14)	1-14
	page 2/18 - page 8/18; figures -----	
	-/--	

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

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

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

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search 19 February 2019	Date of mailing of the international search report 10/05/2019
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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/077229

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 2005/243517 A1 (MALONE CHRISTOPHER G [US] ET AL) 3 November 2005 (2005-11-03) paragraphs [0022] - [0028]; figure 3B -----	1-14
A	WO 2010/019517 A1 (GREEN REVOLUTION COOLING INC [US]; BEST CHRISTIAAN [US]; GARNETT MARK) 18 February 2010 (2010-02-18) abstract; figures 3,4 -----	1-14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2018/077229

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.:

1-14

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: 1-14

A heating apparatus for a domestic or commercial building and its use wherein a piped fluid circuit is arranged such that, before passing through a first heat exchanger to receive thermal energy from a processor of a computer system, thermal energy is transferred to the fluid from thermal energy-generating ancillary components of the computer system, and wherein the thermal energy is transferred from the ancillary components of the computer system by a bulk dielectric fluid in which the ancillary components are immersed.

The resulting effect is that the processor is cooled by means of a heat exchanger (and thus with a higher heat transfer rate) whilst ancillary components with less heat production and/or higher heat tolerance are cooled by a dielectric fluid in which they are immersed. This results in a reasonably priced manufacturing cost for the processor and the ancillary components.

2. claims: 15-28

A method of heating and a heating apparatus for a domestic or commercial building with a heat producing computer system, wherein in response to the determination of a need for an increased heating temperature, to least one of a rate at which the computer system produces the thermal energy and a rate at which the thermal energy distribution assembly transfers thermal energy away from the processor, is controlled such that the temperature of the processor increases.

The resulting effect is that if an increased heating temperature is determined, the temperature is in fact increased by either controlling the computer system and/or the thermal energy distribution assembly in order to satisfy the higher temperature demand.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2018/077229

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004008483	A1	15-01-2004	NONE

EP 2058724	A2	13-05-2009	CN 101430591 A 13-05-2009
		DE 102007062143 B3	14-05-2009
		EP 2058724 A2	13-05-2009
		US 2009114370 A1	07-05-2009

US 2009218078	A1	03-09-2009	CN 101960408 A 26-01-2011
		EP 2263135 A2	22-12-2010
		JP 5414702 B2	12-02-2014
		JP 2011514594 A	06-05-2011
		US 2009218078 A1	03-09-2009
		US 2010241278 A1	23-09-2010
		US 2010246117 A1	30-09-2010
		WO 2009107015 A2	03-09-2009

DE 102016204175	A1	14-09-2017	DE 102016204175 A1 14-09-2017
		WO 2017157939	A1 21-09-2017

US 2005243517	A1	03-11-2005	GB 2413707 A 02-11-2005
		JP 2005317013	A 10-11-2005
		US 2005243517	A1 03-11-2005

WO 2010019517	A1	18-02-2010	AU 2009282170 A1 18-02-2010
		AU 2015200871	A1 12-03-2015
		AU 2017213536	A1 31-08-2017
		CA 2731994	A1 18-02-2010
		CN 102160171	A 17-08-2011
		EP 2321849	A1 18-05-2011
		MY 156969	A 15-04-2016
		US 2011132579	A1 09-06-2011
		US 2015013940	A1 15-01-2015
		US 2015013960	A1 15-01-2015
		US 2015043165	A1 12-02-2015
		US 2015049432	A1 19-02-2015
		US 2015195953	A1 09-07-2015
		US 2016014932	A1 14-01-2016
		US 2018317346	A1 01-11-2018
		WO 2010019517	A1 18-02-2010
