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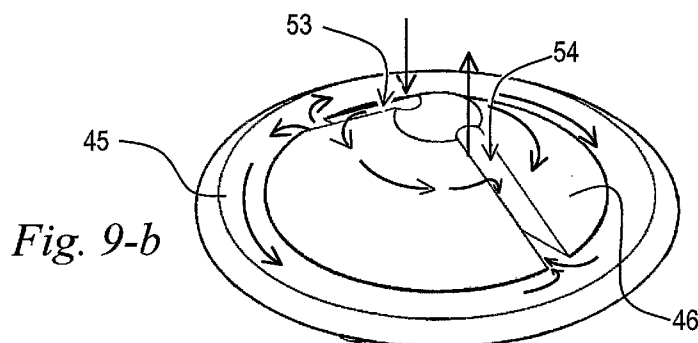
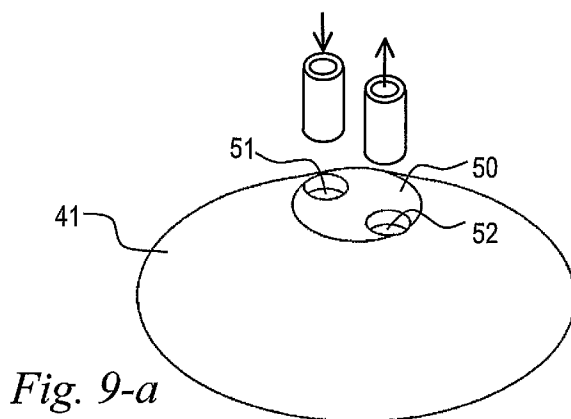
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(54) Title: LIQUID CIRCULATION COOLING SYSTEM FOR ELECTRONIC DEVICES



(57) Abstract: A liquid circulation cooling system for electronic devices comprising pumping means (19), refrigerant liquid cooling means and a heat exchange device (17) in thermal contact with at least one heat-generating electronic device, said heat exchange device (17) comprising a channel through which flows the refrigerating liquid, said channel having a three-dimensional configuration. In a preferred embodiment of the invention, the channel is formed by the gap enclosed by two substantially conical surfaces (41-a, 46) substantially concentric to each other. The walls of the channel may be provided with turbulence inducing elements to enhance the thermal energy transfer to the refrigerating liquid. According to yet another feature of the invention, the efficiency of the thermal energy transfer is enhanced by means of an area increase of the surface in contact with the refrigerant liquid by providing unevenness in said surface. According to a further feature of the invention, said unevenness consists of concave or convex elements provided in said surface. According to another feature of the invention, in preferred embodiments the increase in thermal energy transfer is provided by turbulence-inducing elements provided in the channel through which the refrigerant liquid circulates.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC⁸: **F21V 29/02** (2006.01); **F21K 7/00** (2006.01); **H01K 1/58** (2006.01)

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)

IPC⁸: F21K, F21V, H01K

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)

WPI, EPODOC, Elsevier, IEE, IEEEXplore, Research Disclosure, IBM TDB, Inspec, ElWis

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 293 175 A2 (IVOCLAR VIVADENT) 19 March 2003 (19.03.2003) <i>Figures; Abstract; Paragraphs 7, 17</i>	1-4
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A	US 4 797 736 A (KLOOTS et al.) 10 January 1989 (10.01.1989) <i>Figures; Abstract</i>	1-8
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A	JP 5-275587 A (NEC) 22 October 1993 (22.10.1993) <i>Figures; English Abstract</i>	1-8
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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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

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26 August 2008 (26.08.2008)Date of mailing of the international search report
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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	WO 2000/067048 A2 (PREMIER LASER SYSTEMS) 9 November 2000 (09.11.2000) <i>Figures; Abstract</i> -----	1-8

INTERNATIONAL SEARCH REPORT

Information on patent family members

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