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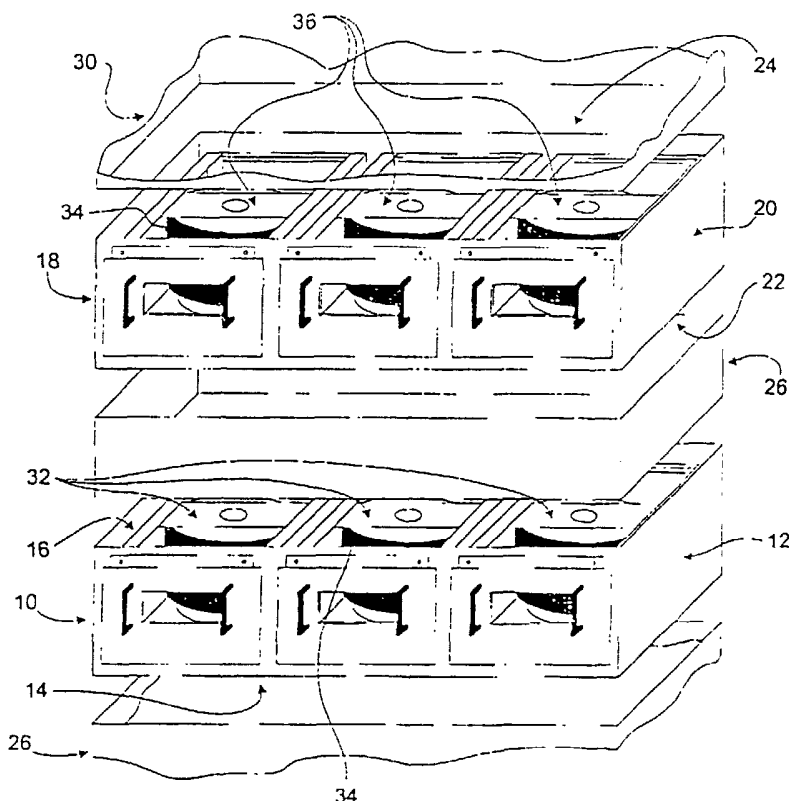
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[Continued on next page]

(54) Title: SERIES-PARALLEL FAN SYSTEM



(57) Abstract: An apparatus and method for providing a supply of air to cool electrical devices is provided. The apparatus comprises a two fan housings (32, 36), each containing a number of fans (34) arranged to blow air in a parallel fashion. The exhaust of one housing (16) is connected to the intake of the other housing (22) by a balancing plenum (26). The apparatus provides a sufficient supply of cooling air when one or more of the fans (34) is inoperable. The device being cooled may be the power bridge of an exciter for a power generation system. A method for providing a supply of air to electrical devices is also provided.



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INTERNATIONAL SEARCH REPORT

International application No.  
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| <p><b>A. CLASSIFICATION OF SUBJECT MATTER</b><br/>                 IPC(7) :H05K 7/20<br/>                 US CL :Please See Extra Sheet.<br/>                 According to International Patent Classification (IPC) or to both national classification and IPC</p>  |  |  |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |
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| <p><b>B. FIELDS SEARCHED</b><br/>                 Minimum documentation searched (classification system followed by classification symbols)<br/>                 U.S. : 29/592.1; 62/259.2; 165/80.3,121-126.104.33; 174/16.1;361/687,695-697,717-720;454/184</p>  |  |  |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |
| <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br/>                 NONE</p>   |  |  |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |
| <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br/>                 NONE</p>  |  |  |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |
| <p><b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b></p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>US 5,949,646 A (LEE et al.) 07 September 1999 (07.09.1999), COLS. 1-9.</td> <td>1-40</td> </tr> <tr> <td>A</td> <td>US 4,774,631 A (OKUYAMA et al.) 27 September 1988 (27.09.1988), COLS. 3-7.</td> <td>1-40</td> </tr> <tr> <td>A</td> <td>US 5,572,403 A (MILLS) 05 November 1996 (05.11.1996), COLS.6-10.</td> <td>1-40</td> </tr> </tbody> </table>  |  |  | Category*                                | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No.   | A  | US 5,949,646 A (LEE et al.) 07 September 1999 (07.09.1999), COLS. 1-9. | 1-40   | A  | US 4,774,631 A (OKUYAMA et al.) 27 September 1988 (27.09.1988), COLS. 3-7. | 1-40   | A   | US 5,572,403 A (MILLS) 05 November 1996 (05.11.1996), COLS.6-10. | 1-40                                      |  |  |  |  |  |  |
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| <p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.</p>   |  |  |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |
| <table border="1"> <tr> <td>* Special categories of cited documents:</td> <td>"T"</td> <td>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</td> </tr> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"X"</td> <td>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</td> </tr> <tr> <td>"E" earlier document published on or after the international filing date</td> <td>"Y"</td> <td>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</td> </tr> <tr> <td>"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)</td> <td>"&amp;"</td> <td>document member of the same patent family</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td></td> <td></td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> <td></td> </tr> </table> |  |  | * Special categories of cited documents: | "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 | "A" document defining the general state of the art which is not considered to be of particular relevance | "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 | "E" earlier document published on or after the international filing date | "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 | "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) | "&"  | document member of the same patent family | "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 |  |  |
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| "A" document defining the general state of the art which is not considered to be of particular relevance   | "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   |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |
| "E" earlier document published on or after the international filing date   | "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 |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |
| "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)  | "&"  | document member of the same patent family  |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |
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| "P" document published prior to the international filing date but later than the priority date claimed   |  |  |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |
| <p>Date of the actual completion of the international search<br/>07 OCTOBER 2002</p>   |  | <p>Date of mailing of the international search report<br/>18 DEC 2002</p>  |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |
| <p>Name and mailing address of the ISA/US<br/>                 Commissioner of Patents and Trademarks<br/>                 Box PCT<br/>                 Washington, D.C. 20231<br/>                 Facsimile No. (703) 305-3230</p>   |  | <p>Authorized officer <i>Sham S. Hoppa</i><br/>                 GREG THOMPSON<br/>                 Telephone No. (703) 308-22249</p>   |  |  |   |  |  |  |  |  |  |   |  |   |  |  |  |  |  |  |

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