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Declarations under Rule 4.17:

— as to the identity of the inventor (Rule 4.17(i))

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(54) Title: COMPUTING DEVICE COOLING SYSTEM ACCESS ASSEMBLY

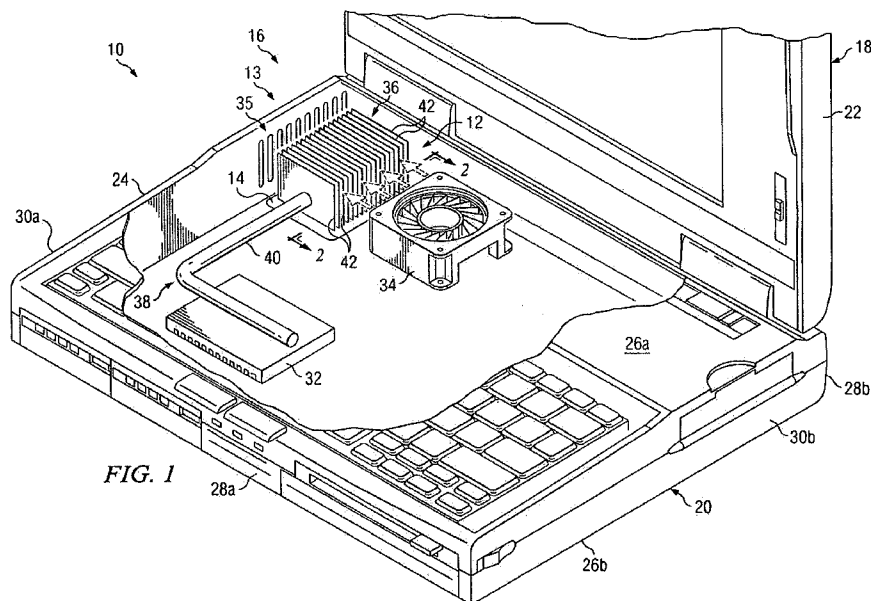


FIG. 1

(57) Abstract: A computing device (10) comprising a heat exchanger (36) and an access door (14) disposed on a housing (24) of the computing device (10) and the access door (14) aligned with at least a portion of the heat exchanger (36) to facilitate access to the heat exchanger (36).

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- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- Published:**
- *with international search report*

COMPUTING DEVICE COOLING SYSTEM ACCESS ASSEMBLY

BACKGROUND

[0001] Computing devices, such as laptop or notebook computers, comprise cooling systems to dissipate thermal energy generated by the computing device. Such cooling systems oftentimes include an air circulation device to force cooling air through a heat exchanger to dissipate heat from one or more computer operational components. However, in operation, dust and other unwanted particulates collect inside the cooling system and, specifically, on or inside the heat exchanger, thereby decreasing the efficiency of heat dissipation by the heat exchanger.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] FIGURE 1 is a diagram illustrating a computing device in which an embodiment of a cooling system access assembly is employed to advantage; and

[0003] FIGURE 2 is diagram of a section view of the computing device of FIGURE 1 taken along the line 2—2 of FIGURE 1.

DETAILED DESCRIPTION OF THE DRAWINGS

[0004] Various embodiments and the advantages thereof are best understood by referring to FIGURES 1 and 2, like numerals being used for like and corresponding parts of the various drawings.

[0005] FIGURE 1 is a diagram illustrating a computing device 10 comprising a cooling system 12 in which an embodiment of an access assembly 13 is employed to advantage. In the embodiment illustrated in FIGURE 1, computing device 10 comprises a laptop or notebook computer 16; however, it should be understood that computing

device 10 may comprise any type of computing device such as, but not limited to, a tablet personal computer, a personal digital assistant, a desktop computer or any other type of portable or non-portable computing device. In the embodiment illustrated in FIGURE 1, computing device 10 comprises a display member 18 rotatably coupled to a base member 20. Display member 18 and base member 20 each comprise a housing 22 and 24, respectively, formed having a number walls. For example, housing 24 comprises a top wall/working surface 26a, a bottom wall 26b, a front wall 28a, a rear wall 28b and a pair of side walls 30a and 30b.

[0002] In the embodiment illustrated in FIGURE 1, cooling system 12 is disposed within housing 24 of base member 20 and is configured to dissipate and/or otherwise remove thermal energy from an internal area of base member 20, such as dissipating thermal energy generated by one or more computer operational components 32 disposed within housing 24. It should be understood that all or a portion of cooling system 12 may be otherwise located (e.g., within display member 18 of computing device 10 or within both display member 18 and base member 20).

[0003] In the embodiment illustrated in FIGURE 1, cooling system 12 comprises an airflow device or cooling fan 34, a heat dissipating element 35 configured as a heat exchanger 36, and a heat transport element 38 thermally coupling at least one computer operational component 32 to heat exchanger 36. Heat transport element 38 may comprise any type of thermally conductive element for transferring heat from operational component 34 to heat exchanger 36. For example, in some embodiments, heat transport element 38 comprises a heat pipe 40 filled with a vaporizable liquid to increase heat transfer performance. In the embodiment illustrated in FIGURE 1, heat exchanger 36 comprises a plurality of fins 42 to facilitate thermal energy dissipation from heat exchanger 36. In operation, cooling air is directed from cooling fan 34 through fins 42 of heat exchanger 36 to dissipate thermal energy generated by operational component(s) 32 and/or otherwise dissipate thermal energy from within housing 24.

[0005] In the embodiment illustrated in FIGURE 1, cooling system access assembly 13 comprises a door 14 to provide access to the interior area of housing 24 and aligned with heat exchanger 36 to facilitate access to heat exchanger 36. According to some embodiments, access door 14 is openable relative to at least one of the plurality of walls 26a, 26b, 28a, 28b and sidewalls 30a and 30b to facilitate access to heat exchanger 36 through the wall that the access door is coupled thereto. For example, in the embodiment illustrated in FIGURE 1, access door 14 is disposed on bottom wall 26b adjacent to heat exchanger 36 to facilitate access to heat exchanger 36 through wall 26b; however, it should be understood that access door 14 may be otherwise disposed adjacent to heat exchanger 36 (e.g., top wall 26a, front wall 28a, rear wall 28b and/or sidewalls 30a and/or 30b). In operation, access door 14 is openable and/or removable from bottom wall 26b to facilitate direct access to fins 42 of heat exchanger 36 to enable extraction of impurities such as sand, dust, hair, and/or any other debris deposited on and/or between fins 42 resulting from the flow of cooling air through heat exchanger 36.

[0006] In the embodiment illustrated in FIGURE 1, access door 14 is sized such that a perimeter of access door 14 is located substantially equal to or greater than the locations/dimensions of fins 42 such that upon removal of access door 14 from bottom wall 26b, access to each fin 42 is provided to facilitate the extraction of impurities from heat exchanger 36. According to some embodiments, access door 14 may be aligned with only a portion of fins 42 and/or multiple access doors 14 may be aligned with different portions of heat exchanger 36 to facilitate access thereto.

[0007] FIGURE 2 is a diagram of a section view of computing device 10 of FIGURE 1 taken along the line 2—2 of FIGURE 1. In the embodiment illustrated in FIGURE 2, access door 14 is coupleable to bottom wall 26b of housing 20 via a plurality of screws 46 and 48. According to some embodiments, access door 14 is detachable from housing 24; however, it should be understood that access door may be otherwise coupled to housing 24 (e.g., pivotably coupled to housing 24 via a hinge, etc.).

According to some embodiments, bottom wall 26b comprises a recess 44 to receive access door 14 to enable access door 14 to rest flush (flush or substantially flush) with bottom wall 26b. However, it should be understood that the interface between access door 14 and housing 24 may be otherwise configured.

[0006] Thus embodiments of assembly 13 provide a cooling system access door 14 to facilitate direct access to heat exchanger 36 to enable removal of debris, sand, dust, hair deposited on and/or between fins 42 as a result of the flow of cooling air through heat exchanger 36.

WHAT IS CLAIMED IS:

1. A computing device (10), comprising:
a heat exchanger (36); and
an access door (14) disposed on a housing (24) of the computing device (10),
the access door (14) aligned with at least a portion of the heat exchanger (36) to
facilitate access to the heat exchanger (36).
2. The computing device (10) of Claim 1, wherein the access door (14) is
coupleable to a bottom wall (26b) of the housing (24).
3. The computing device (10) of Claim 1, wherein the access door (14) is at
least partially aligned with a plurality of fins (42) of the heat exchanger (36).
4. The computing device (10) of Claim 1, wherein the access door (14) is
sized to correspond to a size of the heat exchanger (36).
5. The computing device (10) of Claim 1, wherein the access door (14) is
detachable from the housing (24).
6. A method of manufacturing a computing device (10), comprising:
providing a heat exchanger (36) within a housing (24) of the computing device
(10); and
coupling an access door (14) to the housing (24), the access door (14) aligned
with at least a portion of the heat exchanger (36) to facilitate access to the heat
exchanger (36).

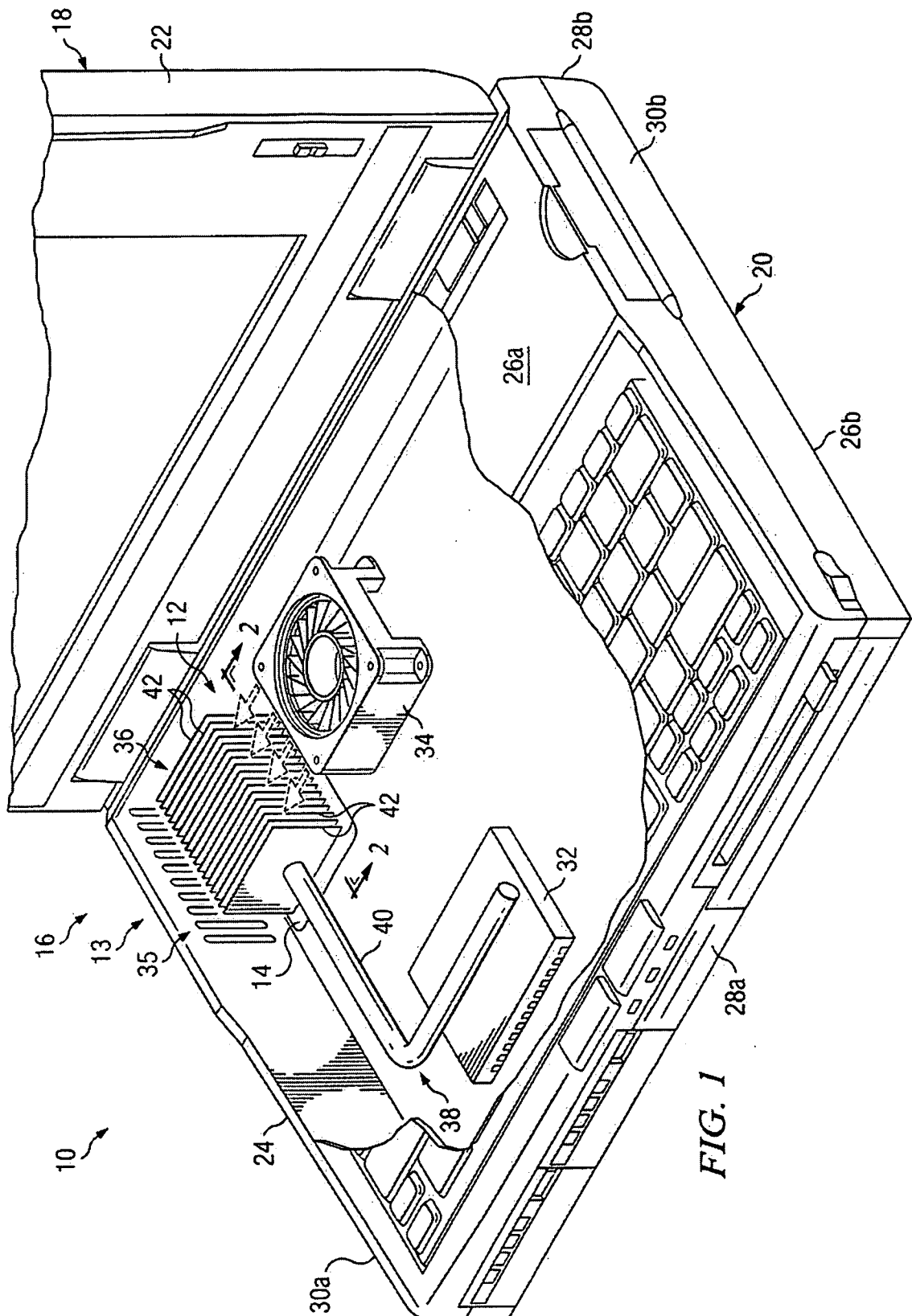
7. The method of Claim 6, further comprising locating the access door (14) to a bottom wall (26b) of the housing (24).

8. The method of Claim 6, further comprising locating the access door (14) adjacent a plurality of fins (42) of the heat exchanger (36).

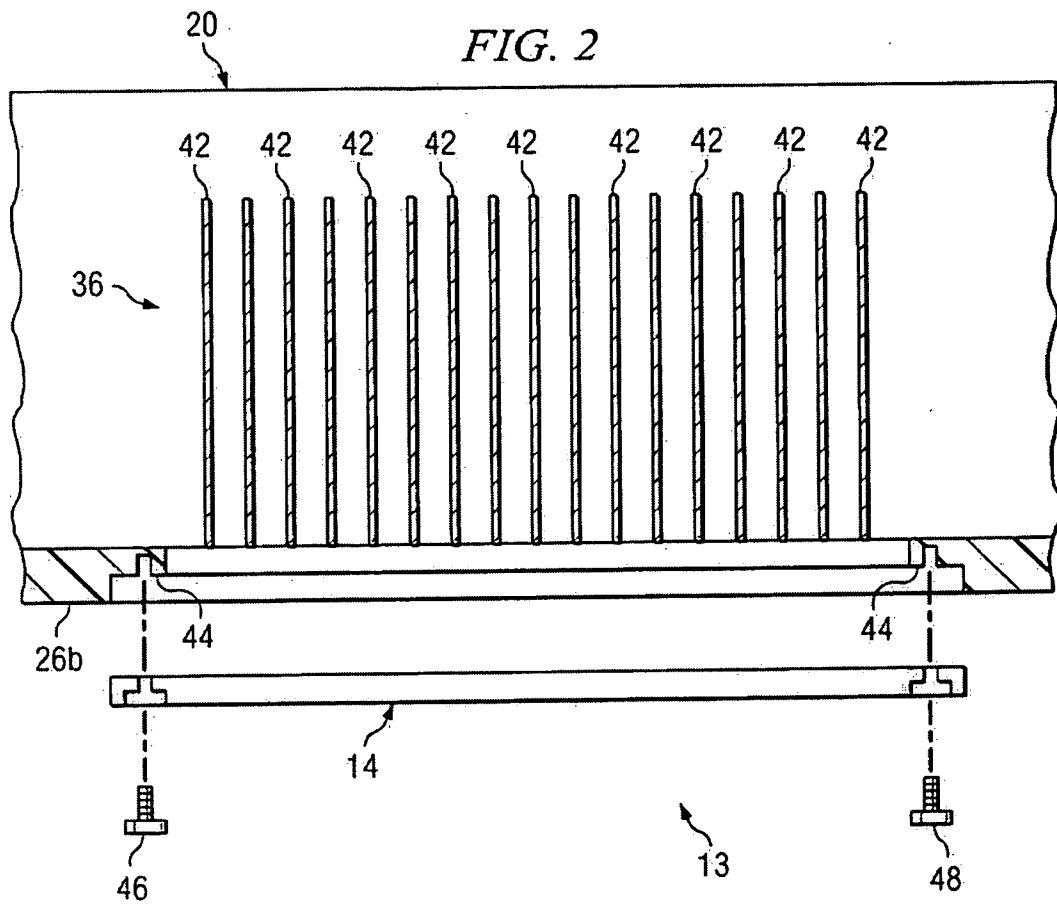
9. The method of Claim 8, wherein the access door (14) is sized to correspond to a size of the heat exchanger (36).

10. The method of Claim 6, further comprising configuring the access door (14) to be detachable from the housing (24).

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/006815**A. CLASSIFICATION OF SUBJECT MATTER****G06F 1/20(2006.01)i**

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 8 G06F 1/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS (KIPO internal), "heat exchanger" "access door" and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2006-0017400 A (DONG-A UNIVERSITY) 23 February 2006 See abstract, claim 1 and figures 1-6.	1-10
A	US 2003-0056941 A1 (LAI et al.) 27 March 2003 See abstract, claims 1-6 and figures 1-7.	1-10
A	US 2002-0024795 A1 (RAKESH BHATIA et al.) 28 February 2002 See abstract, claims 1-22 and figures 1-5.	1-10
A	US 2004-0114325 A1 (RICKARD C. LOFTMAN et al.) 17 June 2004 See abstract, claims 1-24 and figures 1-3.	1-10
A	US 2004-0125558 A1 (ERIC DISTEFANO) 01 July 2004 See abstract, claims 1-29 and figures 1-3.	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2008/006815

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