

(12) **United States Patent**  
**Nakamura et al.**

(10) **Patent No.:** **US 7,464,221 B2**  
(45) **Date of Patent:** **Dec. 9, 2008**

(54) **STORAGE SYSTEM, STORAGE DEVICE, AND CONTROL METHOD THEREOF**

(56) **References Cited**

U.S. PATENT DOCUMENTS

(75) Inventors: **Shuji Nakamura**, Kanagawa (JP);  
**Kazuhisa Fujimoto**, Tokyo (JP); **Akira Fujibayashi**, Kanagawa (JP)

2005/0172074 A1\* 8/2005 Sinclair ..... 711/114

FOREIGN PATENT DOCUMENTS

JP 06-324815 11/1994

OTHER PUBLICATIONS

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 114 days.

“Reducing Energy Consumption of Disk Storage Using Power-Aware Cache Management” by Zhu, et al.  
European Patent Search to corresponding EP 06 250 654.8 dated Nov. 21, 2007.

\* cited by examiner

(21) Appl. No.: **11/247,161**

(22) Filed: **Oct. 12, 2005**

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(65) **Prior Publication Data**

US 2007/0050571 A1 Mar. 1, 2007

(57) **ABSTRACT**

(30) **Foreign Application Priority Data**

Sep. 1, 2005 (JP) ..... 2005-252989

(51) **Int. Cl.**

**G06F 13/00** (2006.01)

**G06F 12/14** (2006.01)

(52) **U.S. Cl.** ..... **711/113; 711/154; 711/163**

(58) **Field of Classification Search** ..... **711/103,**

**711/100, 118, 135, 111, 112, 113, 154**

See application file for complete search history.

A storage system including a storage device 1 which includes: media 50 for storing data from a host computer 2; a medium controller 14 for controlling the media; a plurality of channel controllers 11 for connecting to the host computer 2 through a channel; and a cache memory 13 for temporarily storing data from the host computer 2, wherein the media 50 have a restriction on a number of writing times. The storage device 1 includes a bus 123 for directly transferring data from the medium controller 14 to the channel controller 11.

**3 Claims, 17 Drawing Sheets**

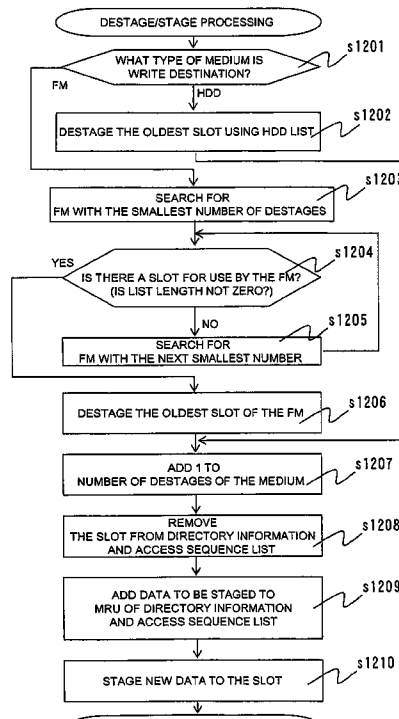


FIG. 1

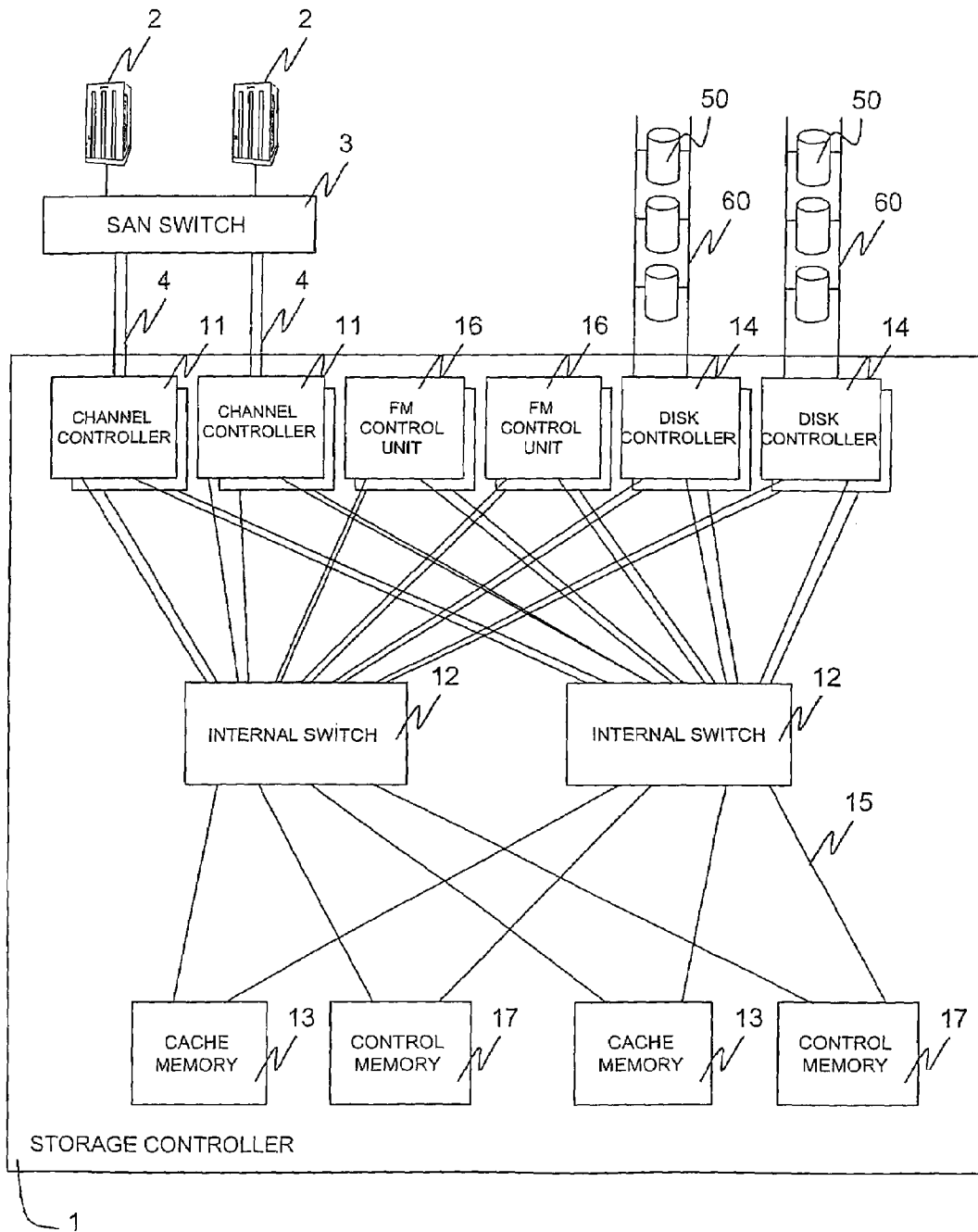
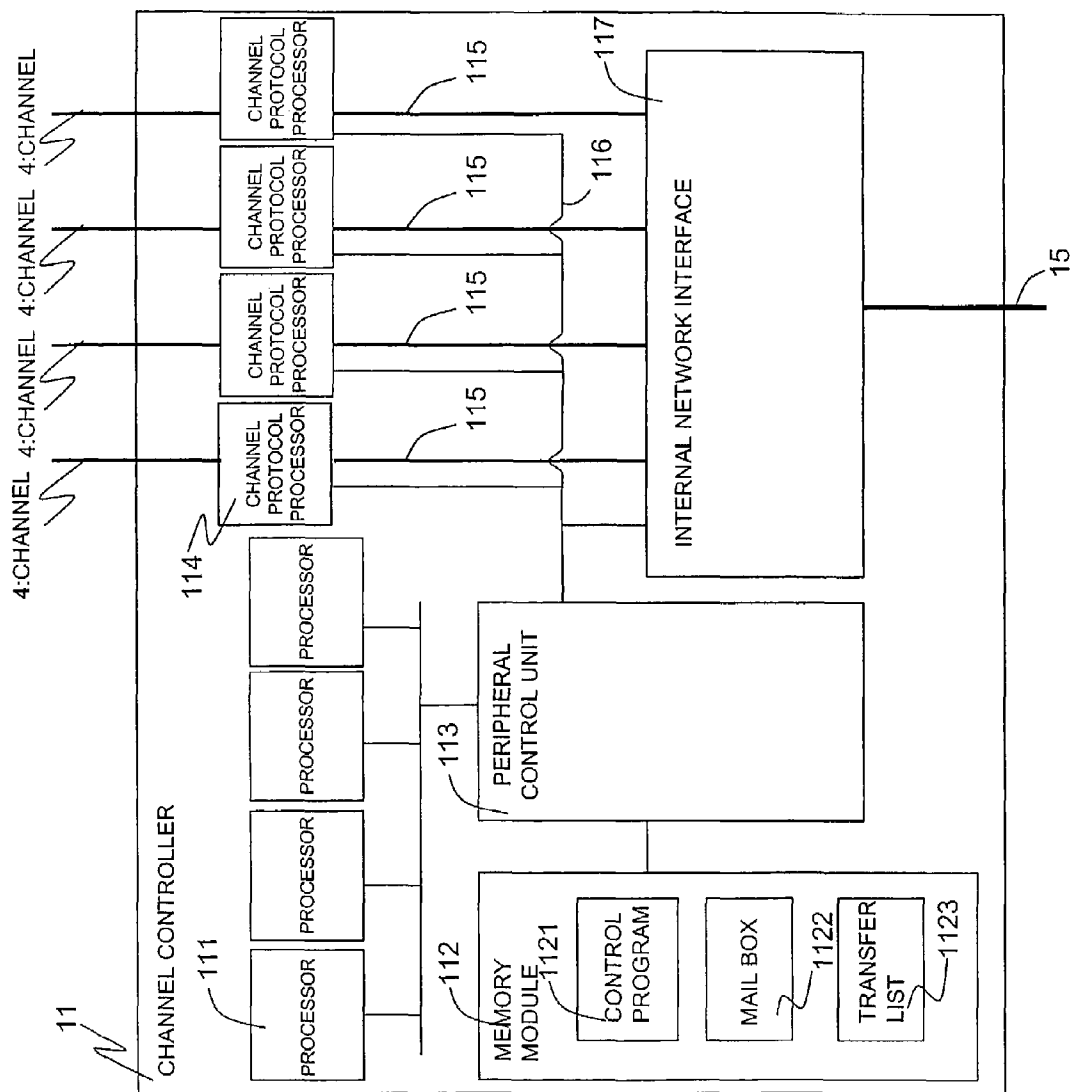


FIG. 2



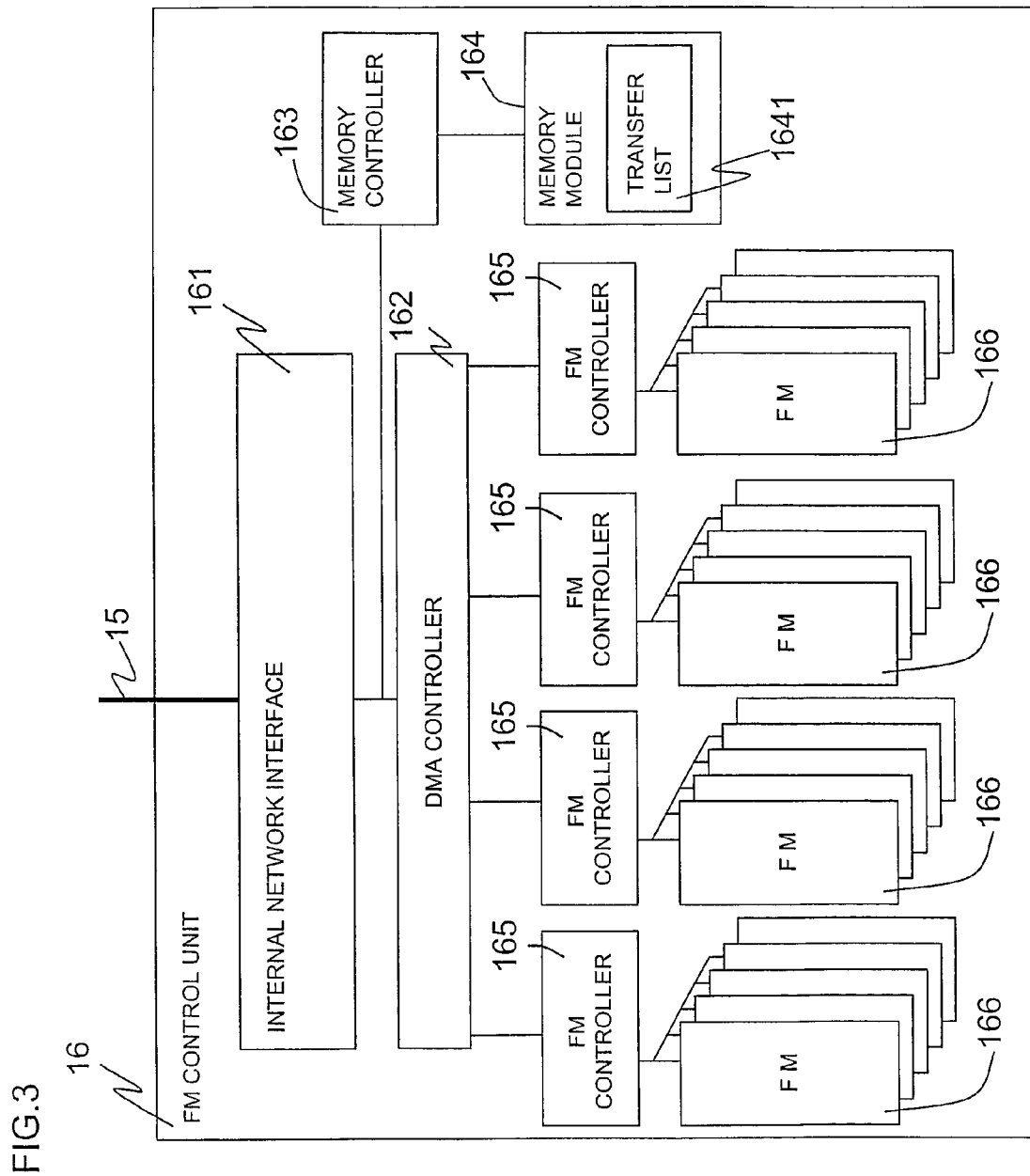
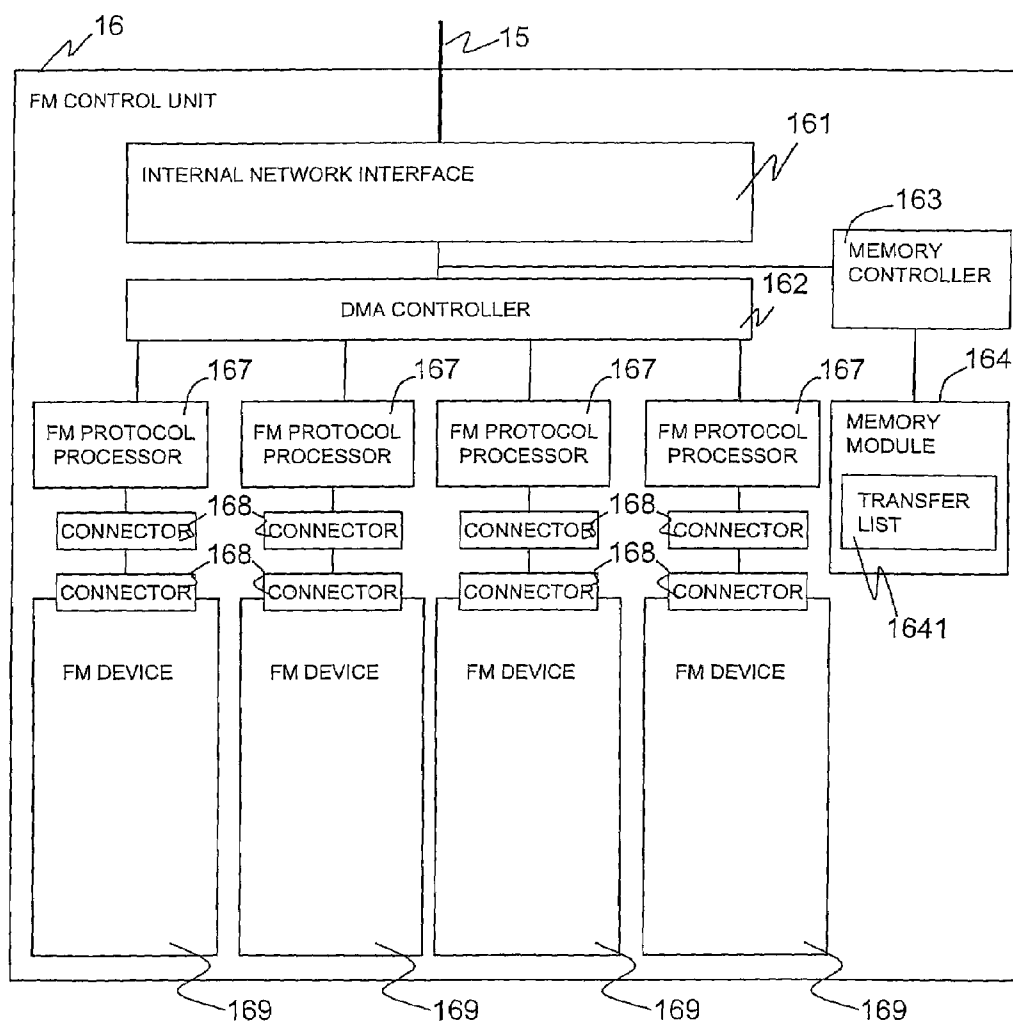


FIG. 4



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