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Stewart

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(54) **HARDWARE ACCELERATION OF BOOT-UP UTILIZING A NON-VOLATILE DISK CACHE**

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(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(52) **U.S. Cl.** **711/113**; 711/133; 711/144; 713/2
(58) **Field of Search** 711/113, 133, 711/144; 713/2

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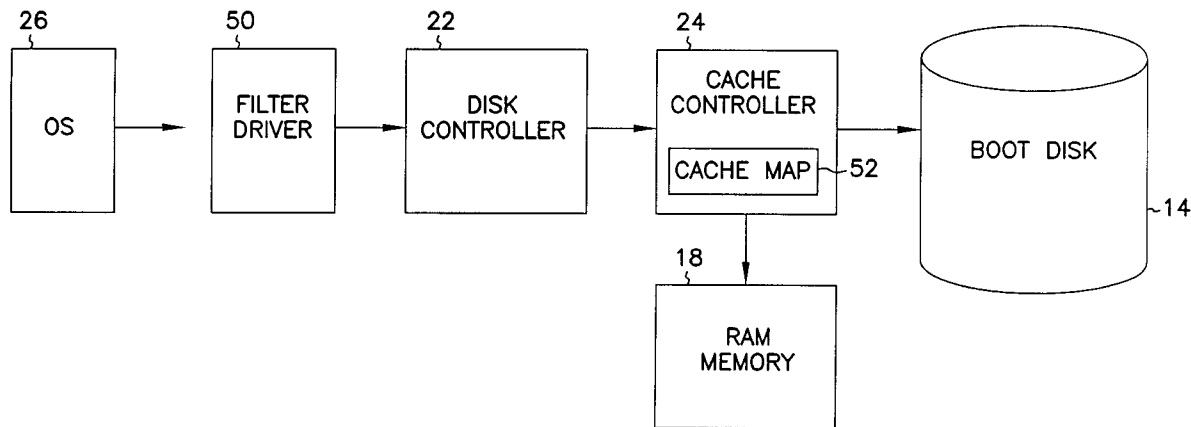|					
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(57) **ABSTRACT**

A computer system includes a nonvolatile memory positioned between a disk controller and a disk drive storing a boot program, in a computer system. Upon an initial boot sequence, the boot program is loaded into a cache in the nonvolatile memory. Subsequent boot sequences retrieve the boot program from the cache. Cache validity is maintained by monitoring cache misses, and/or by monitoring writes to the disk such that a write to a sector held in the cache results in the cache line for that sector being invalidated until such time as the cache is updated. A filter driver is provided to monitor writes to the disk and determine if a cache line is invalidated.
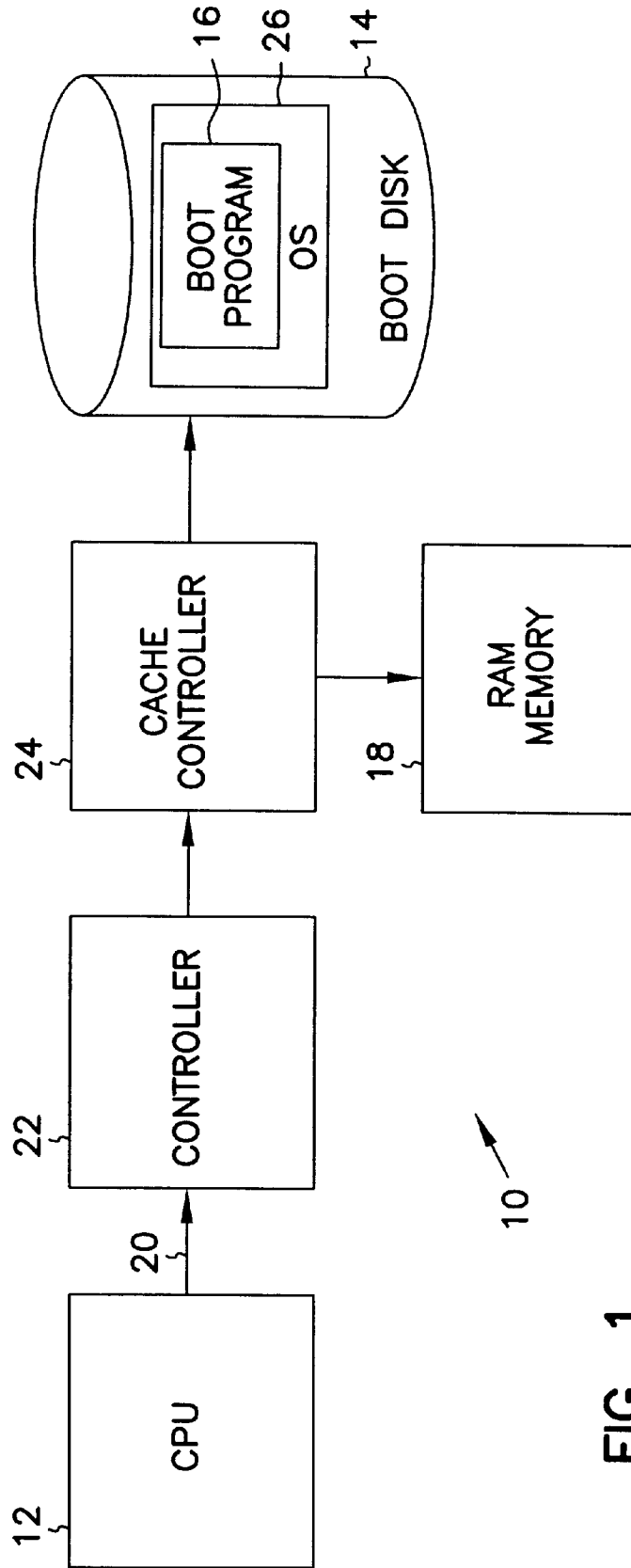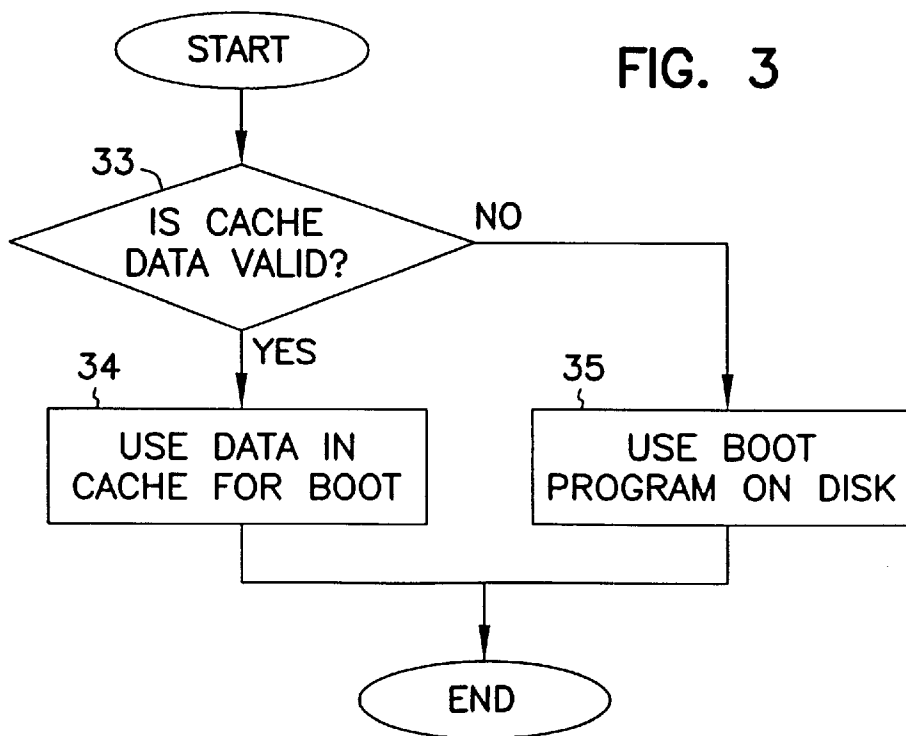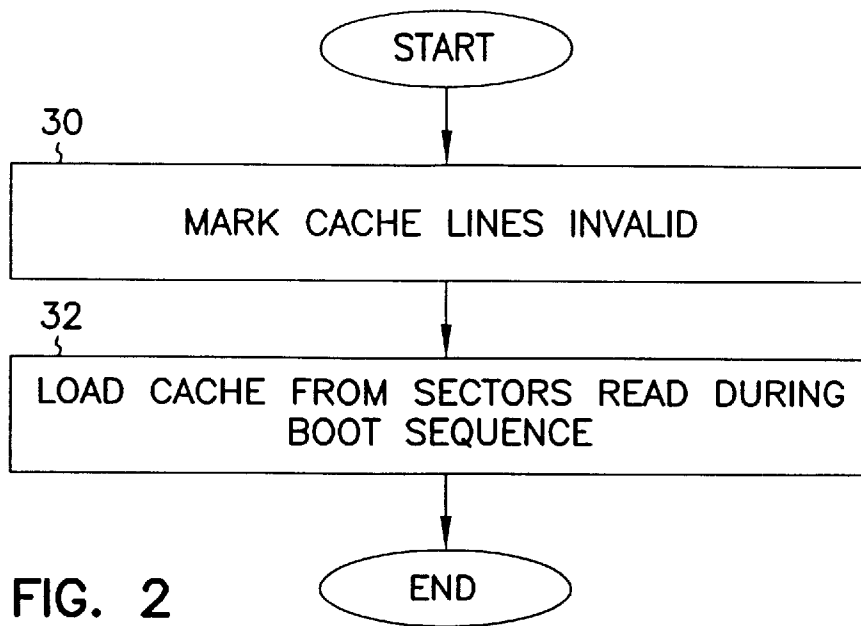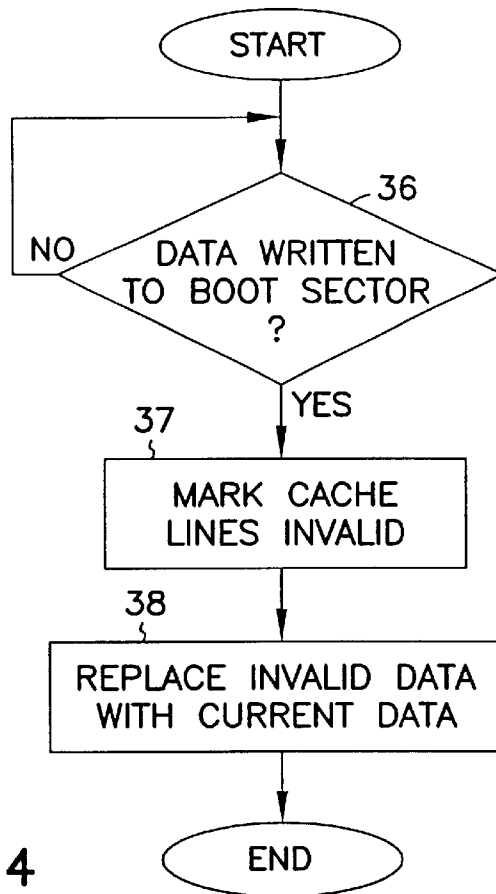
38 Claims, 5 Drawing Sheets

FIG. 1

START

30

MARK CACHE LINES INVALID

32

LOAD CACHE FROM SECTORS READ DURING BOOT SEQUENCE

END

FIG. 2

START

FIG. 3

33

IS CACHE DATA VALID?

NO

YES

34

USE DATA IN CACHE FOR BOOT

35

USE BOOT PROGRAM ON DISK

END

START

DATA WRITTEN TO BOOT SECTOR ? — 36

NO

YES

37
MARK CACHE LINES INVALID

38
REPLACE INVALID DATA WITH CURRENT DATA

END

FIG. 4

START

40
DETECT CACHE MISSES

41
AGE CACHE TO INVALIDATE LINES OF CACHE

END

FIG. 5

BOOT DISK

~14

CACHE
CONTROLLER

24

CACHE MAP

52

18

RAM
MEMORY

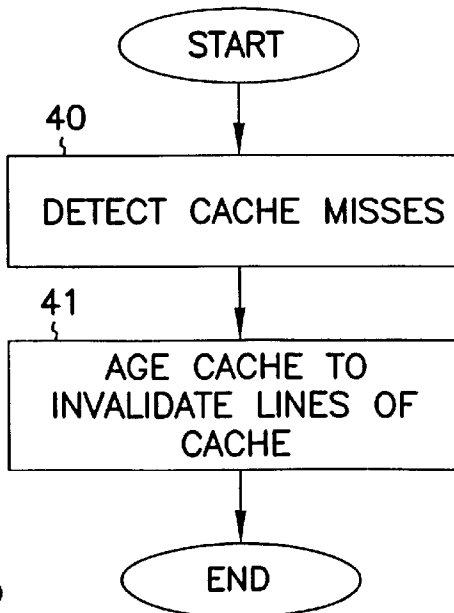DISK
CONTROLLER

22

FILTER
DRIVER

50

OS

26

FIG. 6

DOCKET ALARM
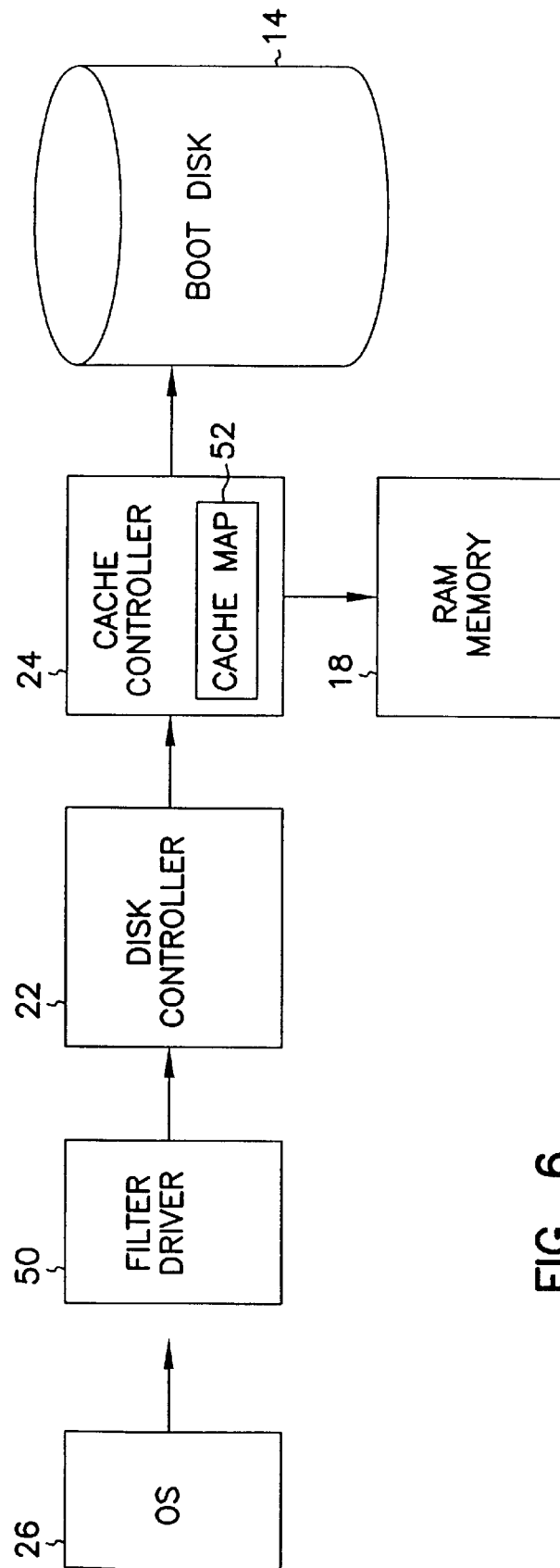
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