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Bolosky et al.

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(54) **SINGLE INSTANCE STORE FOR FILE SYSTEMS**

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

This patent is subject to a terminal disclaimer.

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(51) **Int. Cl.**[7] **G06F 17/30**
(52) **U.S. Cl.** **707/200**; 1/3; 1/10; 1/100; 1/205
(58) **Field of Search** 707/1, 3, 10, 100, 707/200, 205

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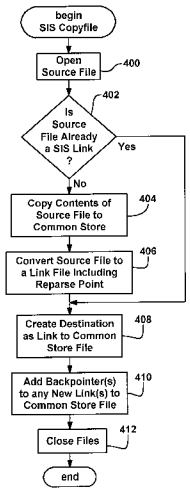
(57) **ABSTRACT**

A method and system for storing the data of files having duplicate content, by maintaining a single instance of the data, and providing logically separate links to the single instance. Files of duplicate content have their data stored in a common store file by a single instance store (SIS) facility, which also converts the original file or files to links to that common store file and creates additional links thereto as needed. The SIS facility may reside above a file system as a filter driver. File system requests directed to the link file (e.g., open, write, read, close and delete) reach the SIS filter, which then transparently handles each request as if the link file was a normal file. To preserve logical separation, writes to a SIS link file are to the link file, and the written portion recorded as dirty. The SIS filter intercepts SIS read requests, and reads clean portions from the common store file and any dirty portions from the link file. When the link file is closed, the common store file also may be closed, and, if the link file has been written, the non-dirtied portions of the link file are filled in with clean data from the common store file, and the link file reconverted to a normal file. Security is provided to prevent unauthorized access to the common store files, as is a volume check facility that repairs any inconsistencies in SIS metadata.

75 Claims, 16 Drawing Sheets



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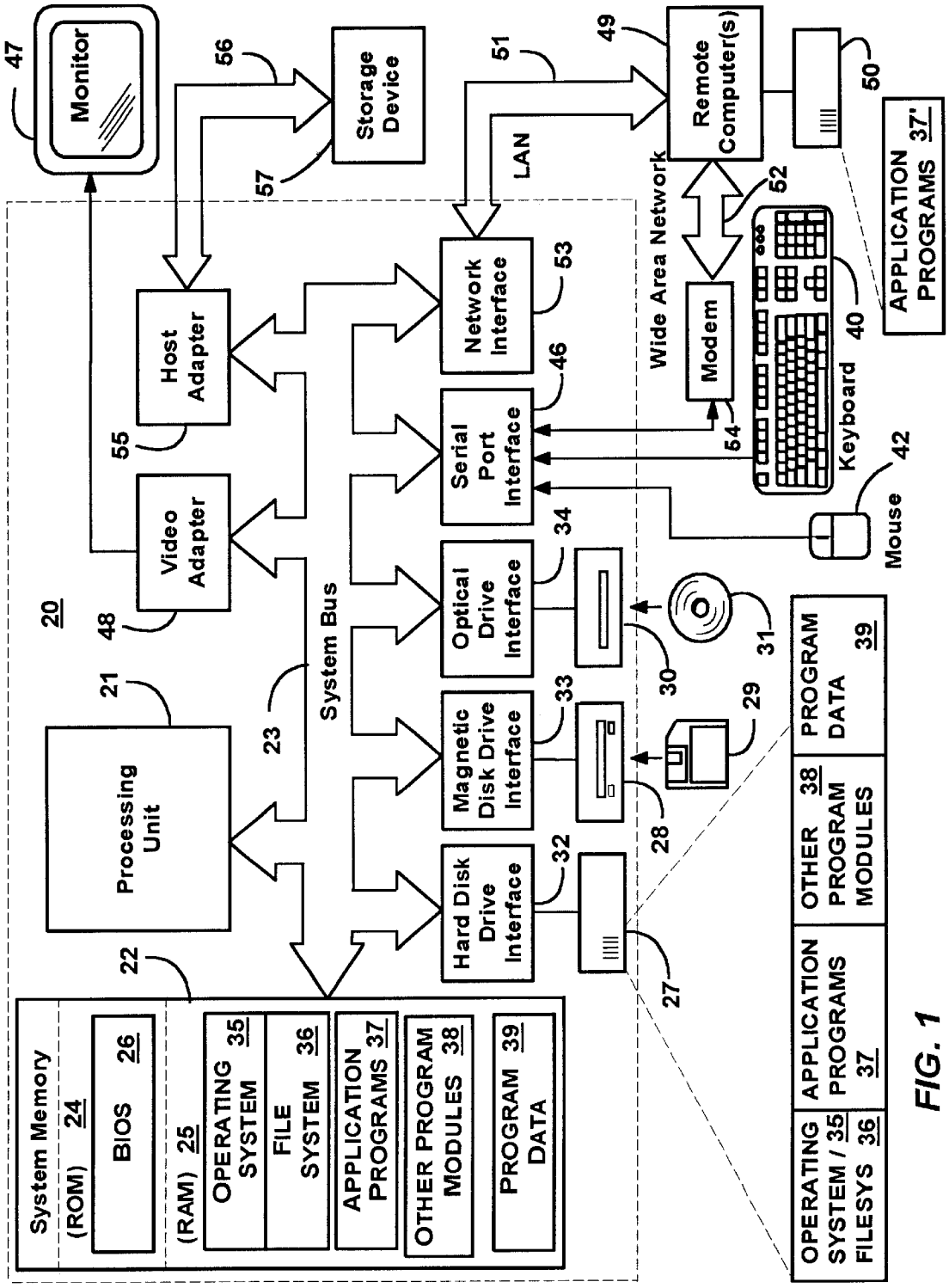

FIG. 1

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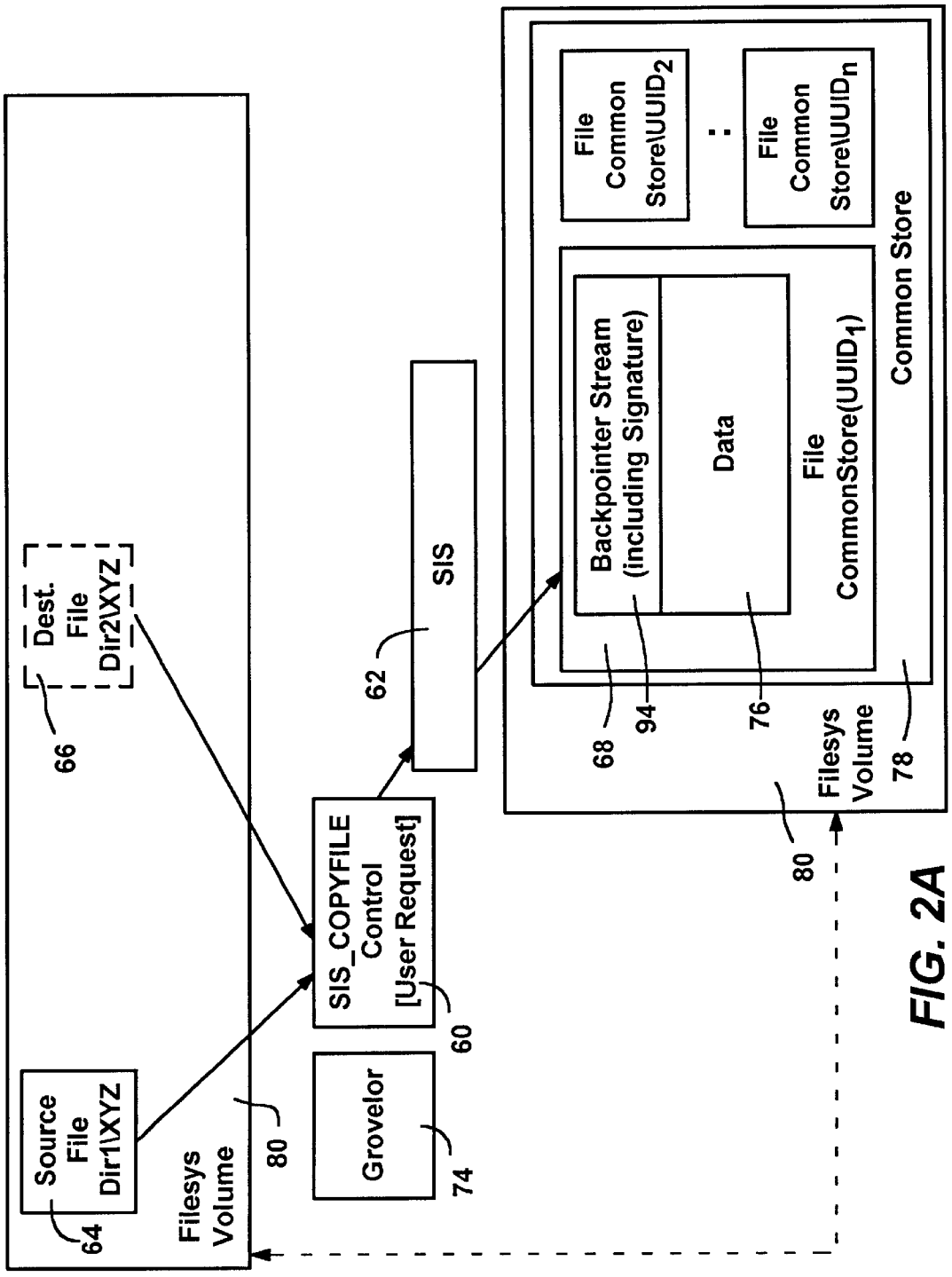

FIG. 2A

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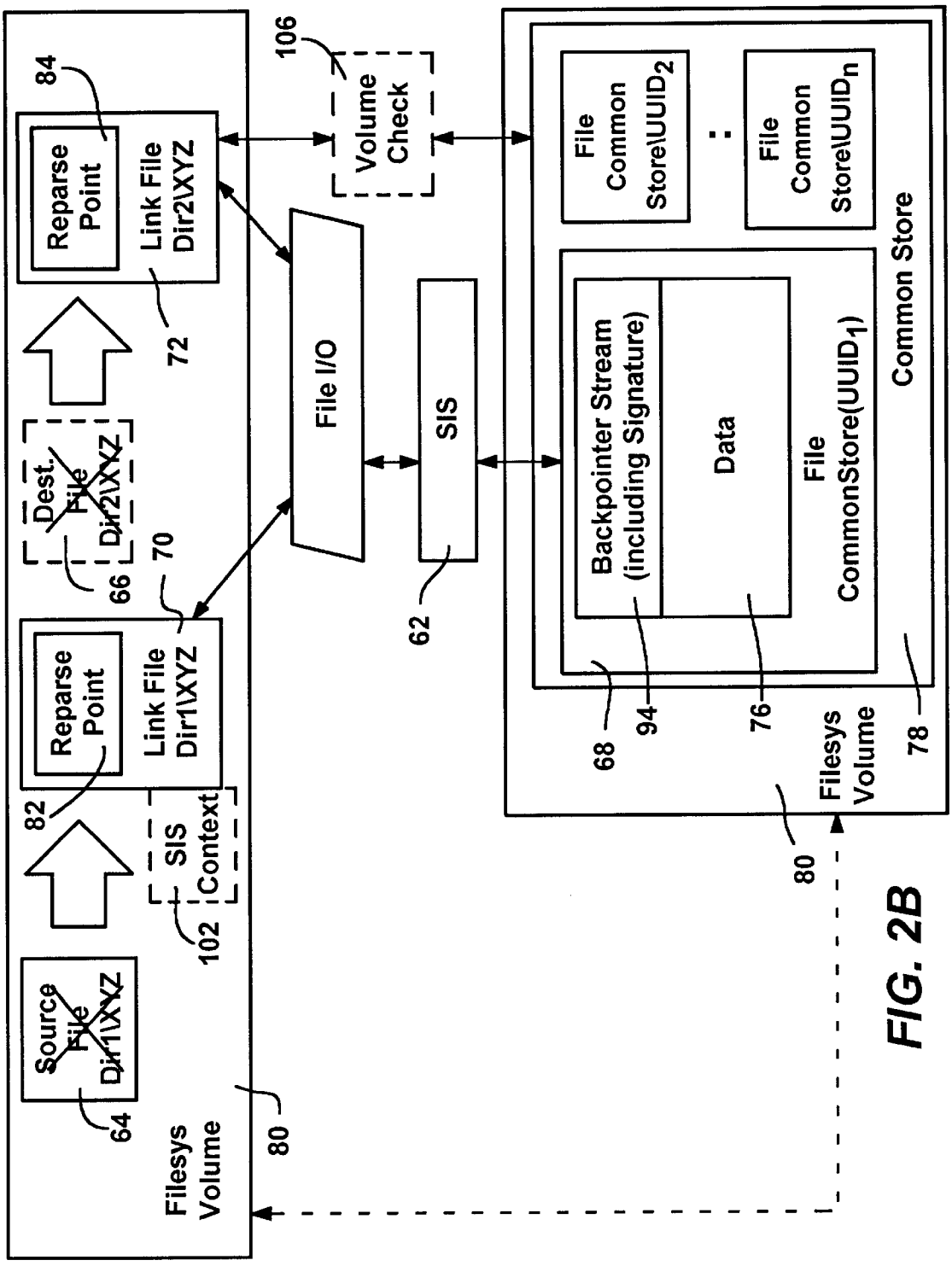

FIG. 2B

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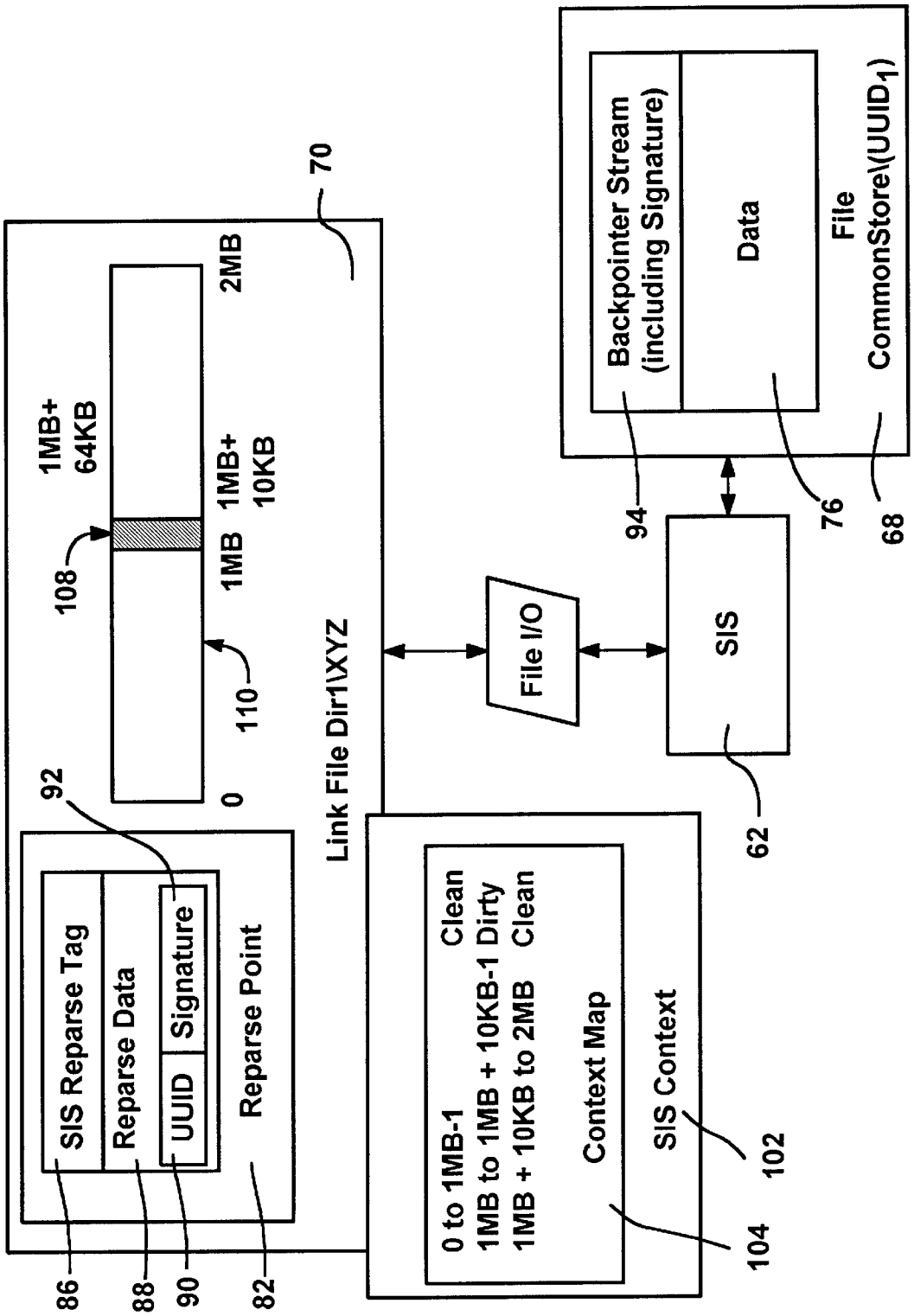

FIG. 3

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