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(12) United States Patent Conley

(54) PARTIAL BLOCK DATA PROGRAMMING AND READING OPERATIONS IN A NON-VOLATILE MEMORY

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This patent is subject to a terminal dis-

claimer.

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(51) **Int. Cl.**

G06F 9/24 (2006.01)

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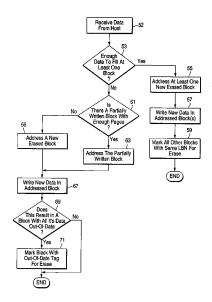
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(57) ABSTRACT

Data in less than all of the pages of a non-volatile memory block are updated by programming the new data in unused pages of either the same or another block. In order to prevent having to copy unchanged pages of data into the new block, or to program flags into superceded pages of data, the pages of new data are identified by the same logical address as the pages of data which they superceded and a time stamp is added to note when each page was written. When reading the data, the most recent pages of data are used and the older superceded pages of data are ignored. This technique is also applied to metablocks that include one block from each of several different units of a memory array, by directing all page updates to a single unused block in one of the units.

106 Claims, 9 Drawing Sheets





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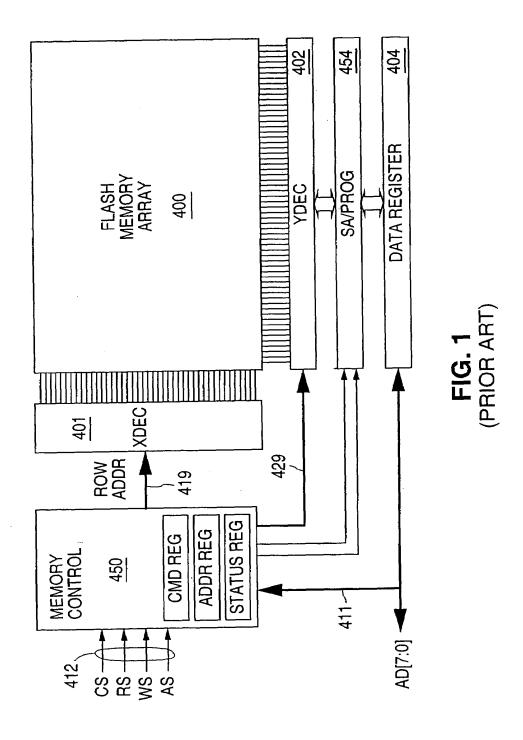
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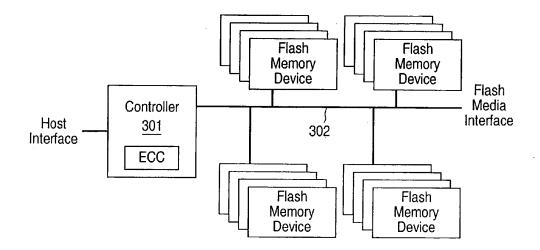


FIG. 2 (PRIOR ART)

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Original Block 11		With New Block 15	

FIG. 5A FIG. 5B

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