United States Patent [19]

Immink et al.

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[45] **Date of Patent: Feb. 19, 1985**

[54] METHOD OF CODING BINARY DATA

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[73] Assignee: **Sony Corporation,** Tokyo, Japan

[21] Appl. No.: **286,982**

[22] Filed: **Jul. 27, 1981**

[51] **Int. Cl.**³ **H03K 13/02**

[52] **U.S. Cl.** ..... **375/25;** 375/106; 340/347 DD

[58] **Field of Search** ..... 375/18, 19, 25, 106, 375/112; 340/347 DD; 360/40, 48; 371/55, 57; 358/13

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Primary Examiner—Robert L. Griffin

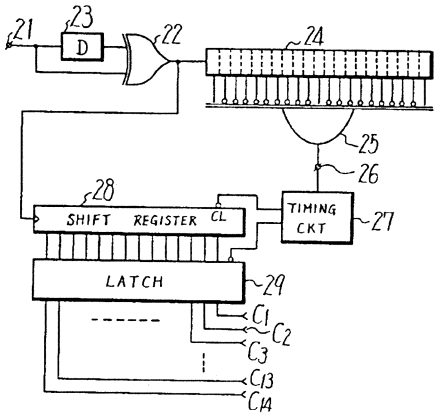
Assistant Examiner—Stephen Chin

Attorney, Agent, or Firm—Lewis H. Eslinger; Alvin Sinderbrand

[57] **ABSTRACT**

A system for block encoding words of a digital signal achieves a maximum of error compaction and ensures reliability of a self-clocking decoder, while minimizing any DC in the encoded signal. Data words of m bits are translated into information blocks of n_1 bits ($n_1 > m$) that satisfy a (d,k)-constraint in which at least d "0" bits, but no more than k "0" bits occur between successive "1" bits. The information blocks are catenated by inserting separation blocks of n_2 bits therebetween, selected so that the (d,k)-constraint is satisfied over the boundary between any two information words. For each information word, the separation block that will yield the lowest net digital sum value is selected. Then, the encoded signal is modulated as an NRZ-M signal in which a "1" becomes a transition and a "0" becomes an absence of a transition. A unique synchronizing block is inserted periodically. A decoder circuit, using the synchronizing blocks to control its timing, disregards the separation blocks, but detects the information blocks and translates them back into reconstituted data words of m bits. The foregoing technique can be used to advantage in recording digitized music on an optical disc.

13 Claims, 10 Drawing Figures



EXHIBIT

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FIG. 1A

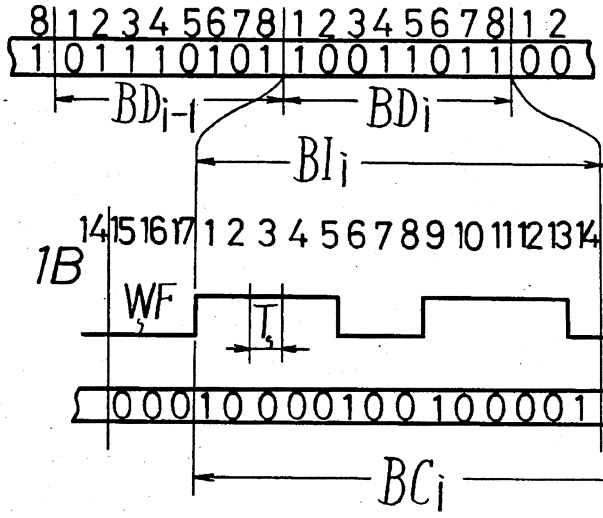

FIG. 1B

FIG. 2A

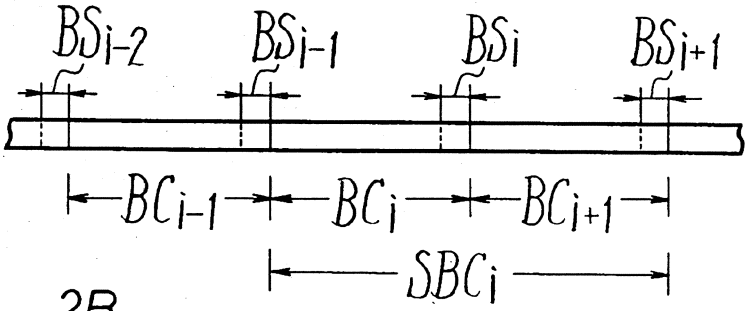

FIG. 2B

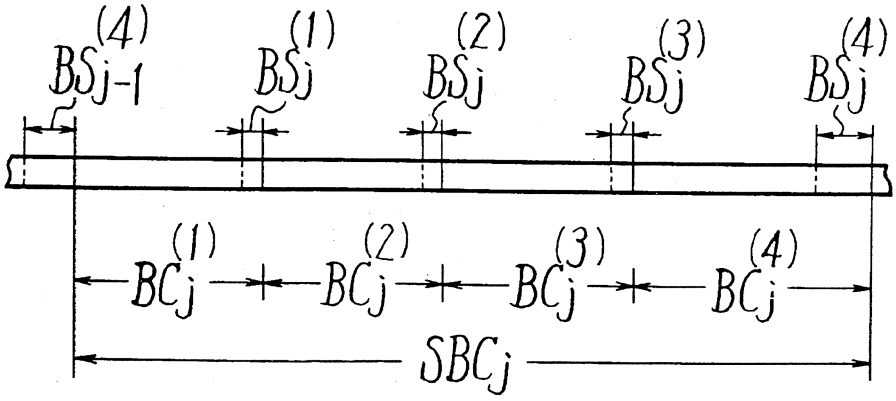

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FIG. 3

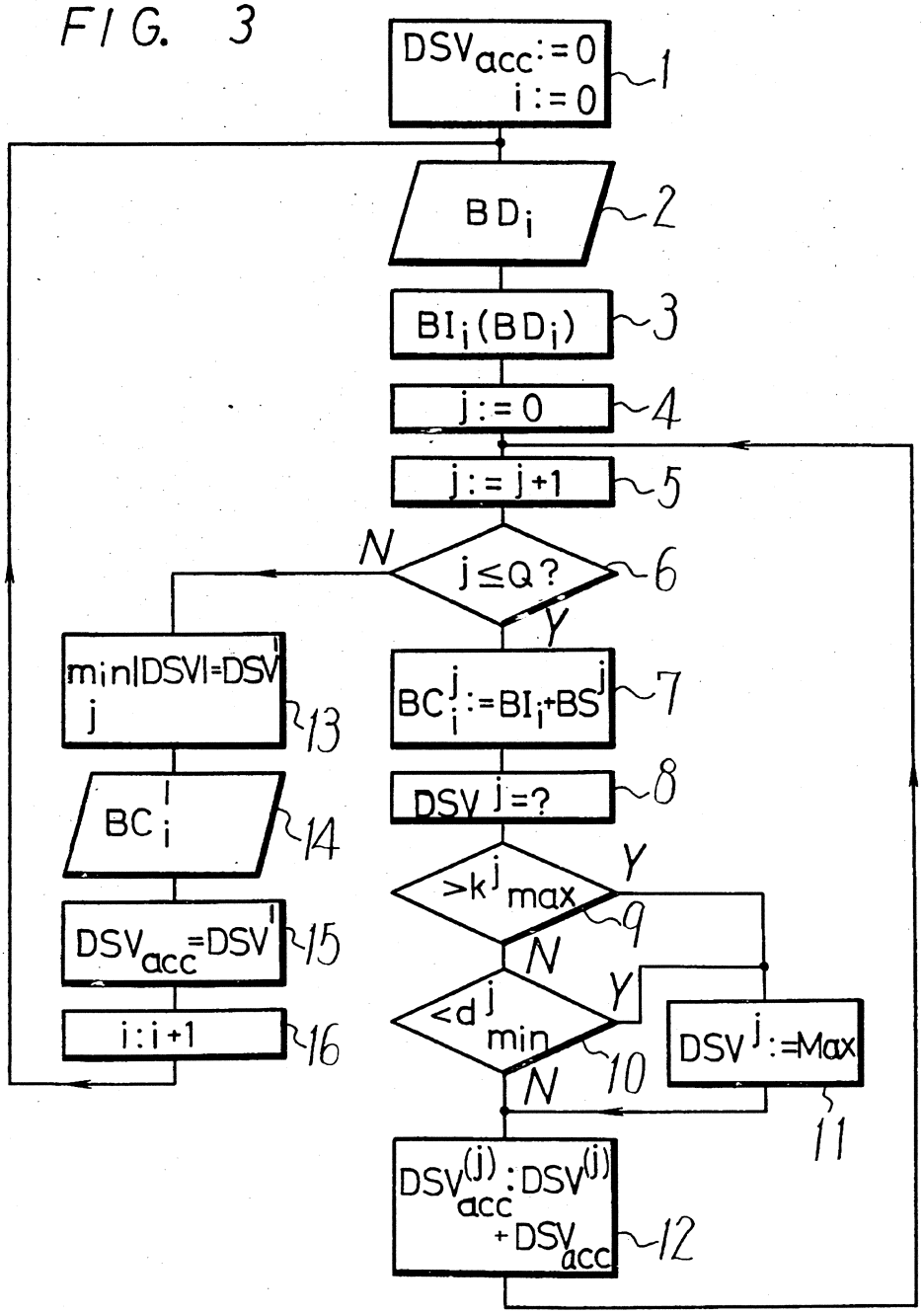

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FIG. 4

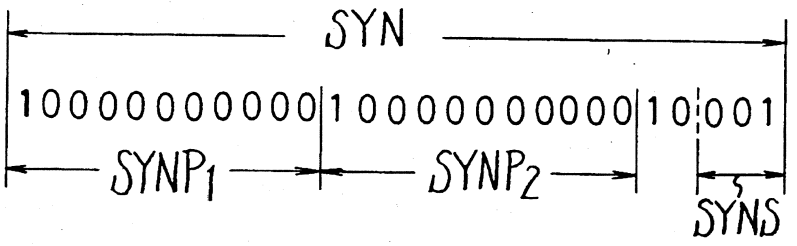

FIG. 6

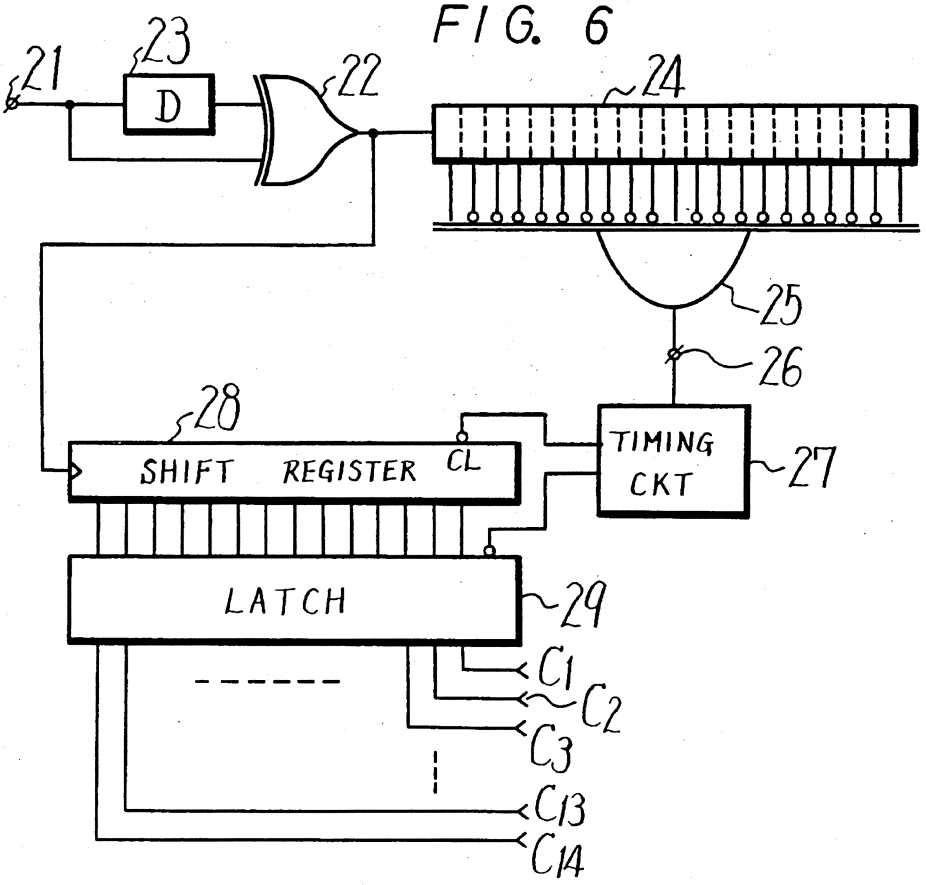

FIG. 7

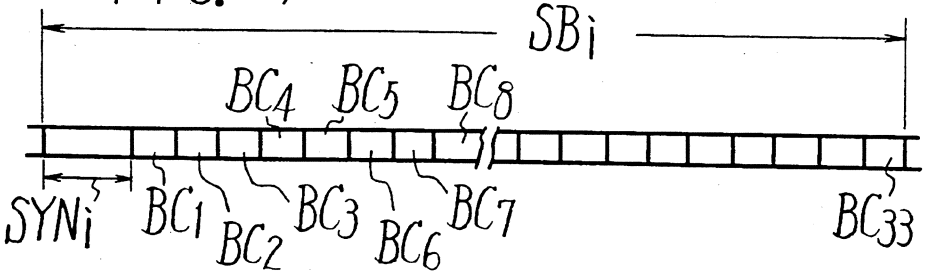

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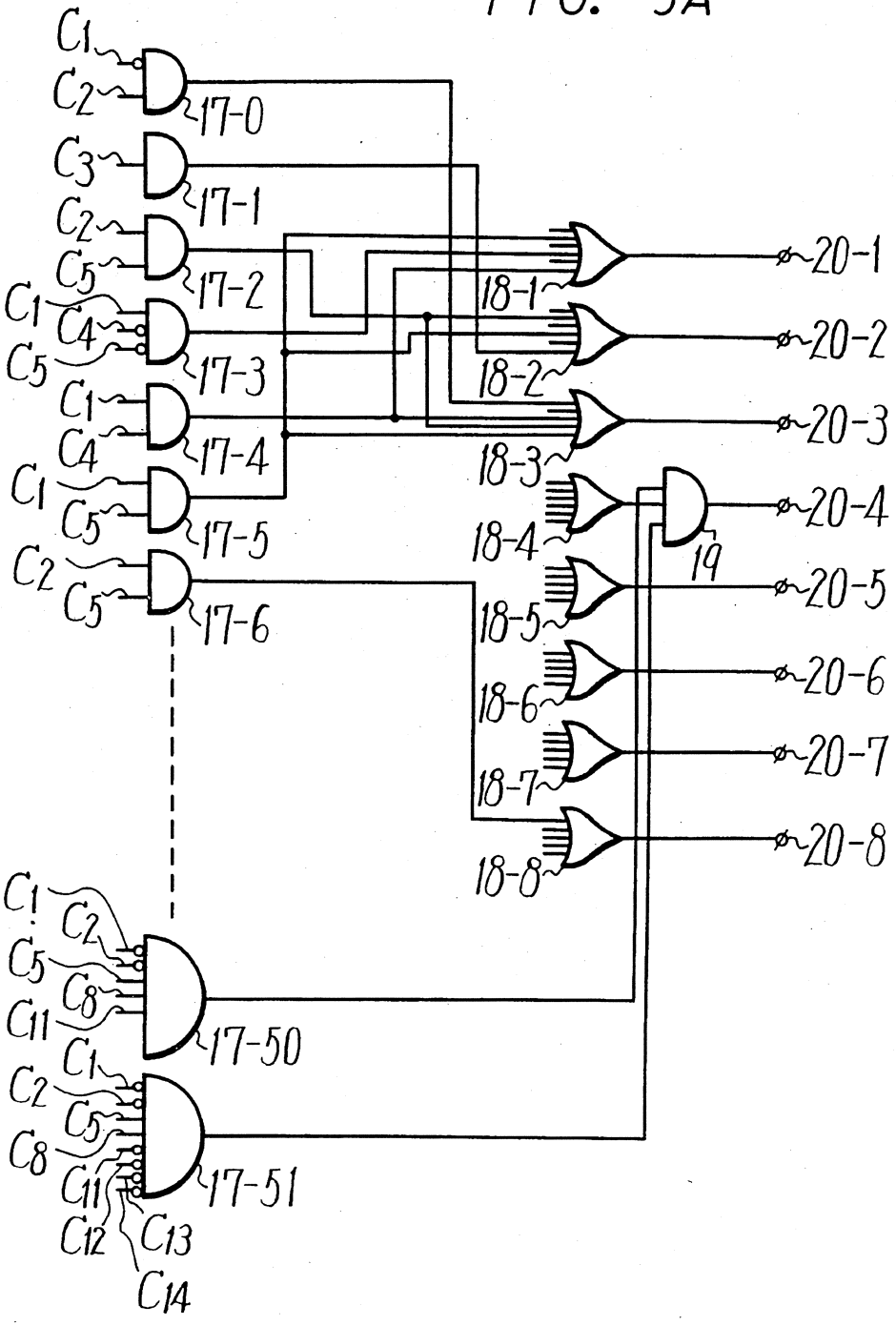
FIG. 5A



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