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McLaughlin et al.

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[54] **PARTIAL RESPONSE CODING FOR A MULTI-LEVEL OPTICAL RECORDING CHANNEL**

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[73] Assignees: **Optex Corporation**, Del.; **AT&T Corp.**, N.Y.

[21] Appl. No.: **340,353**

[22] Filed: **Nov. 22, 1994**

[51] **Int. Cl.**[6] **G11B 7/00**

[52] **U.S. Cl.** **369/116**; 369/59; 341/59; 371/37.1; 360/40

[58] **Field of Search** 369/94, 116, 59, 369/124; 341/59; 371/37.1, 37.8, 43; 360/40

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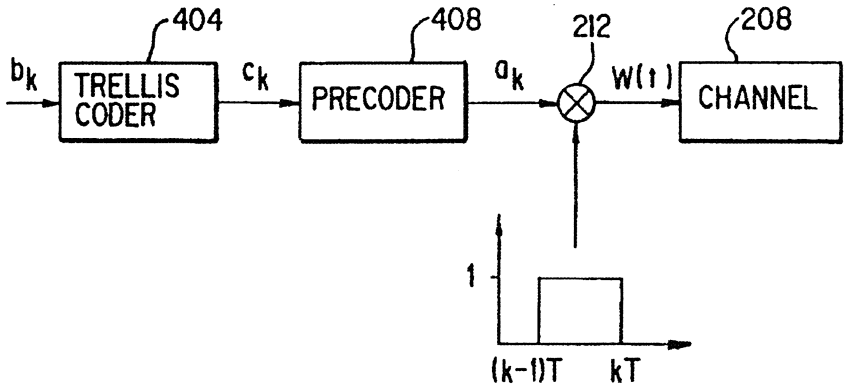
Primary Examiner—Loha Ben

Attorney, Agent, or Firm—Sterne, Kessler, Goldstein & Fox

[57] **ABSTRACT**

A system and method for recording multi-level data to a multi-amplitude recording channel encodes binary data to form multi-level data. The multi-level data are recorded to the storage media for later recall. The system utilizes linear, multi-amplitude recording media which allows data to be stored as multi-level data—requiring fewer 'bits' to represent the same number of symbols. To obtain greater data density in the storage media, a diffraction limited write laser is utilized, resulting in a smaller write-spot size. Because the read laser is of a longer wavelength, its diffraction limited spot size is larger. As a result, more than one mark is read at a given read time resulting in a inter-symbol interference. Trellis coded modultation techniques are adopted to convert the binary input data into M-ary data having M levels. Further coding is then performed to compensate for the effects of the inter-symbol interference. This is accomplished by precoding the data using a Tomlinson-Harashima precoder. The precoding results in multi-level data (of m levels, where $m \leq \infty$).

18 Claims, 5 Drawing Sheets



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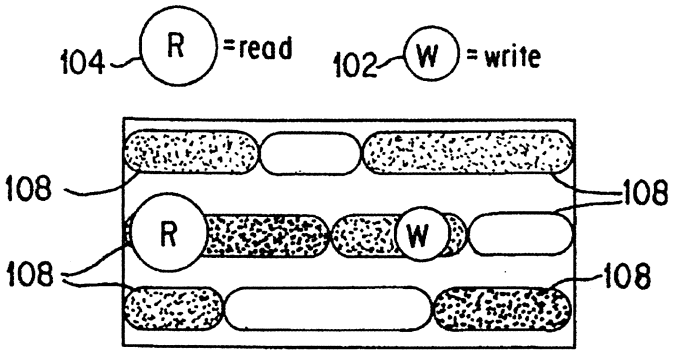

FIG. 1

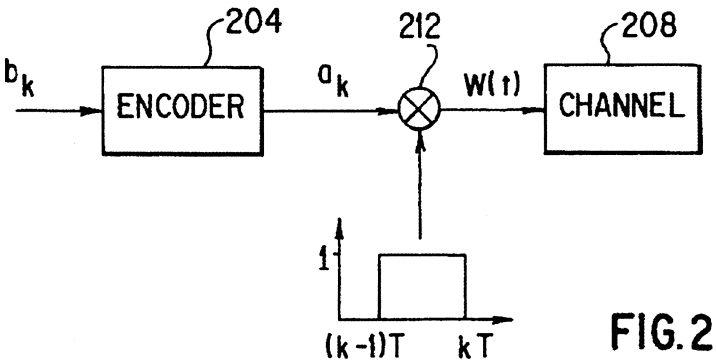

FIG. 2

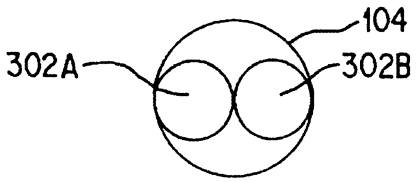

FIG. 3A

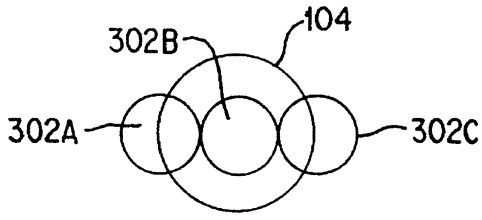

FIG. 3B

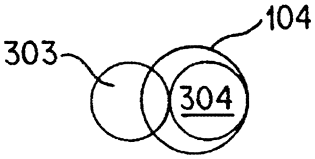

FIG. 3C

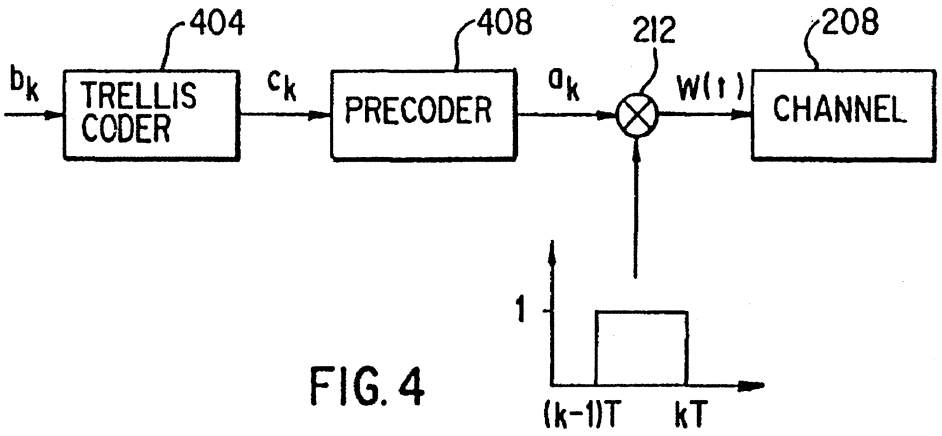

FIG. 4

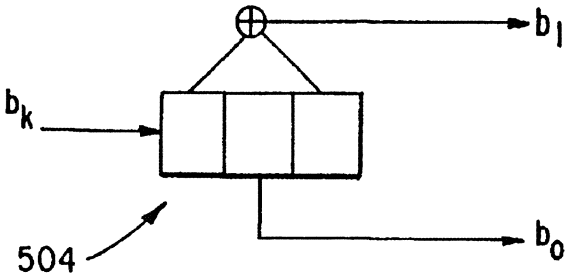

FIG. 5A PRIOR ART

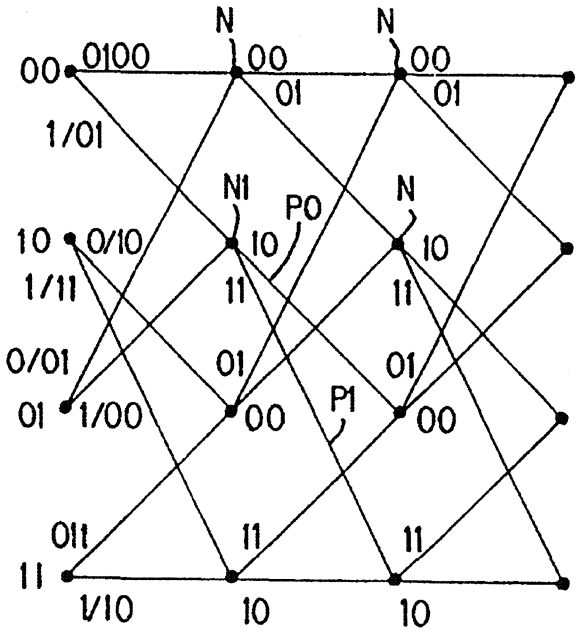

FIG. 5B

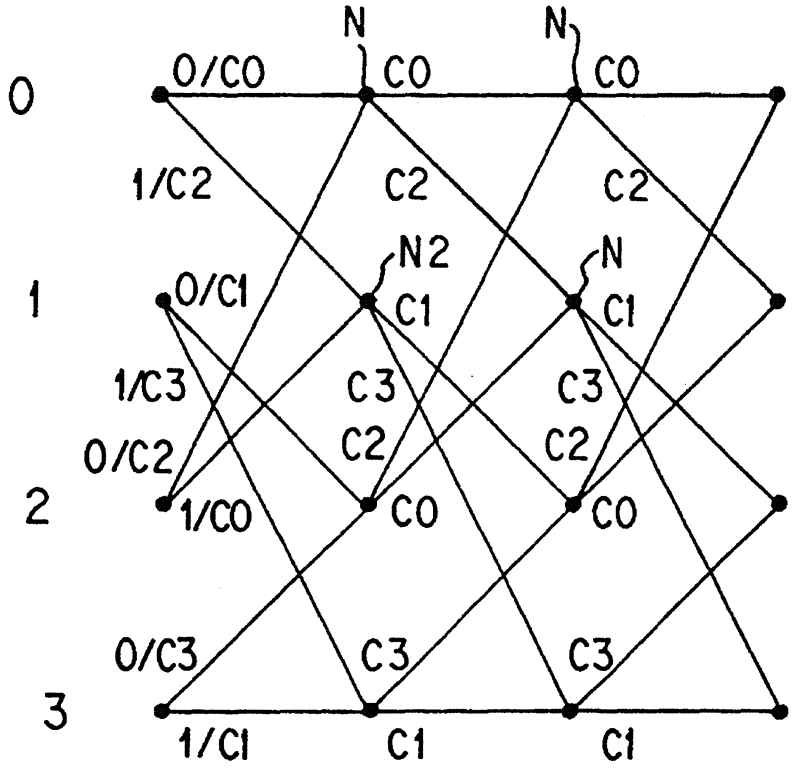

FIG. 6A

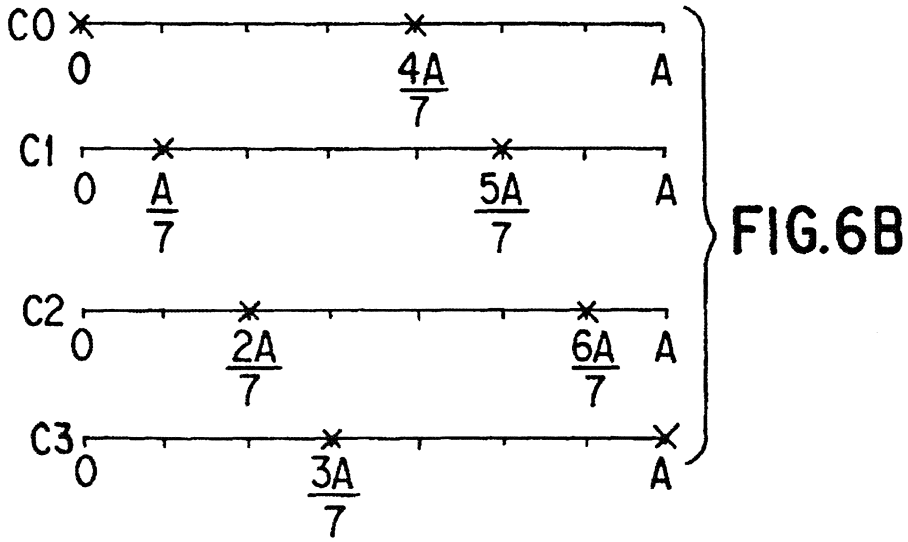

FIG. 6B

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