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Iliev et al.

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(54) **AUXILIARY CHANNEL MASKING IN AN AUDIO SIGNAL**

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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 839 days.

(Continued)

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(65) **Prior Publication Data**

(57) **ABSTRACT**

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Related U.S. Application Data

A method is provided for embedding data into an audio signal and determining data embedded into an audio signal. In the method for embedding data into an audio signal, the audio signal is based on a first set of data and includes a phase component. The method modifies at least a portion of the phase component of the audio signal to embed a second set of data into the audio signal. The modified audio signal can be made to differ with respect to the audio signal in a manner at least one of (i) substantially imperceptible and (ii) imperceptible to a listener of the first set of data depending on the extent that the phase component of the audio signal is modified. In the method for determining data embedded into an audio signal, the audio signal is based on a first set of data of an original audio signal and includes a phase component. The method determines a second set of data embedded into the audio signal based on the phase component of the audio signal. The audio signal differs with respect to the original audio signal in a manner that is at least one of (i) substantially imperceptible and (ii) imperceptible to a listener of the first set of data.

(60) Provisional application No. 60/238,009, filed on Oct. 6, 2000.

(51) **Int. Cl.**
G01L 11/00 (2006.01)

(52) **U.S. Cl.** **704/200**; 704/200.1; 704/230;
375/240.03

(58) **Field of Classification Search** 704/200,
704/200.1, 230; 128/746; 395/2.14; 375/240.03
See application file for complete search history.

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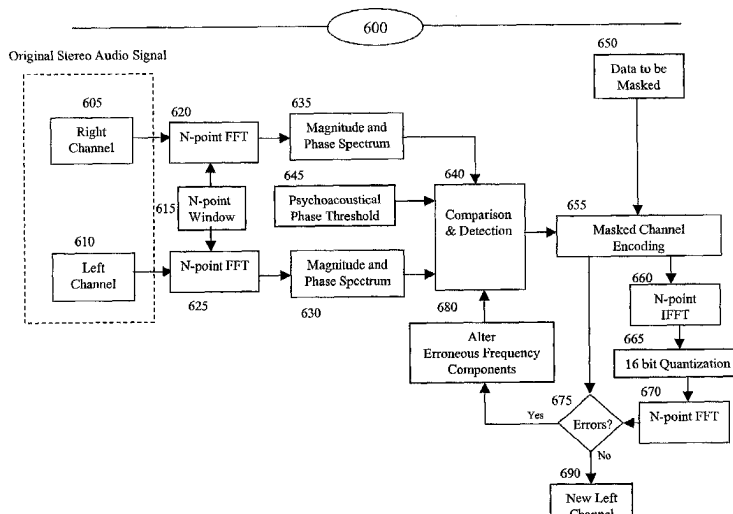
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15 Claims, 11 Drawing Sheets



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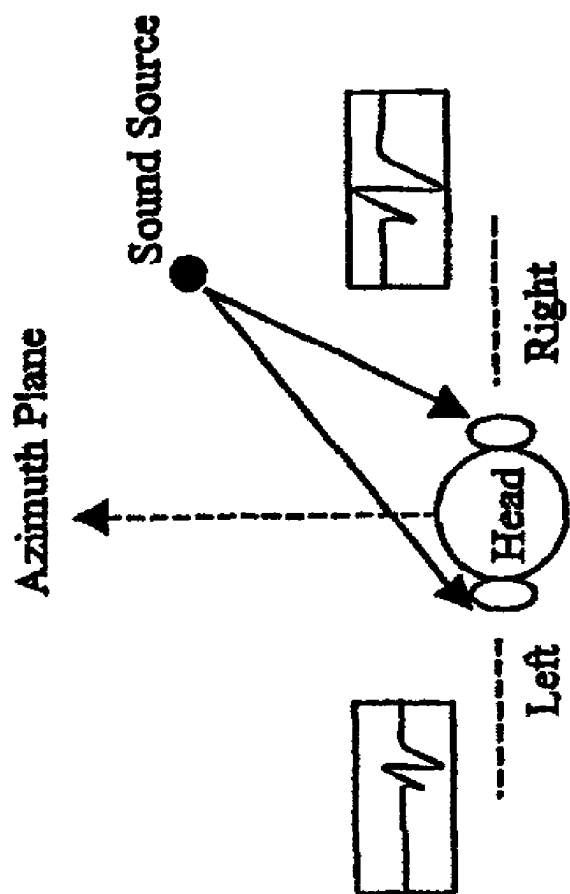


FIG. 1

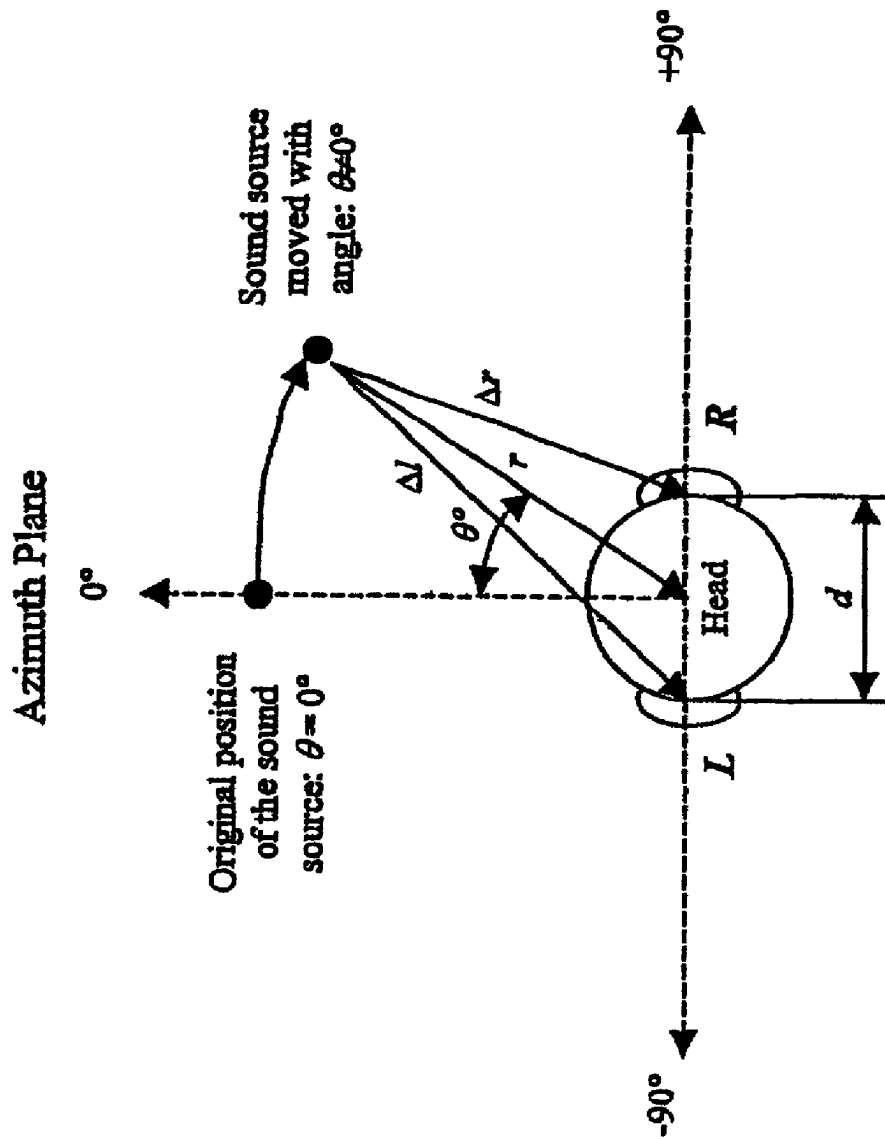


FIG. 2

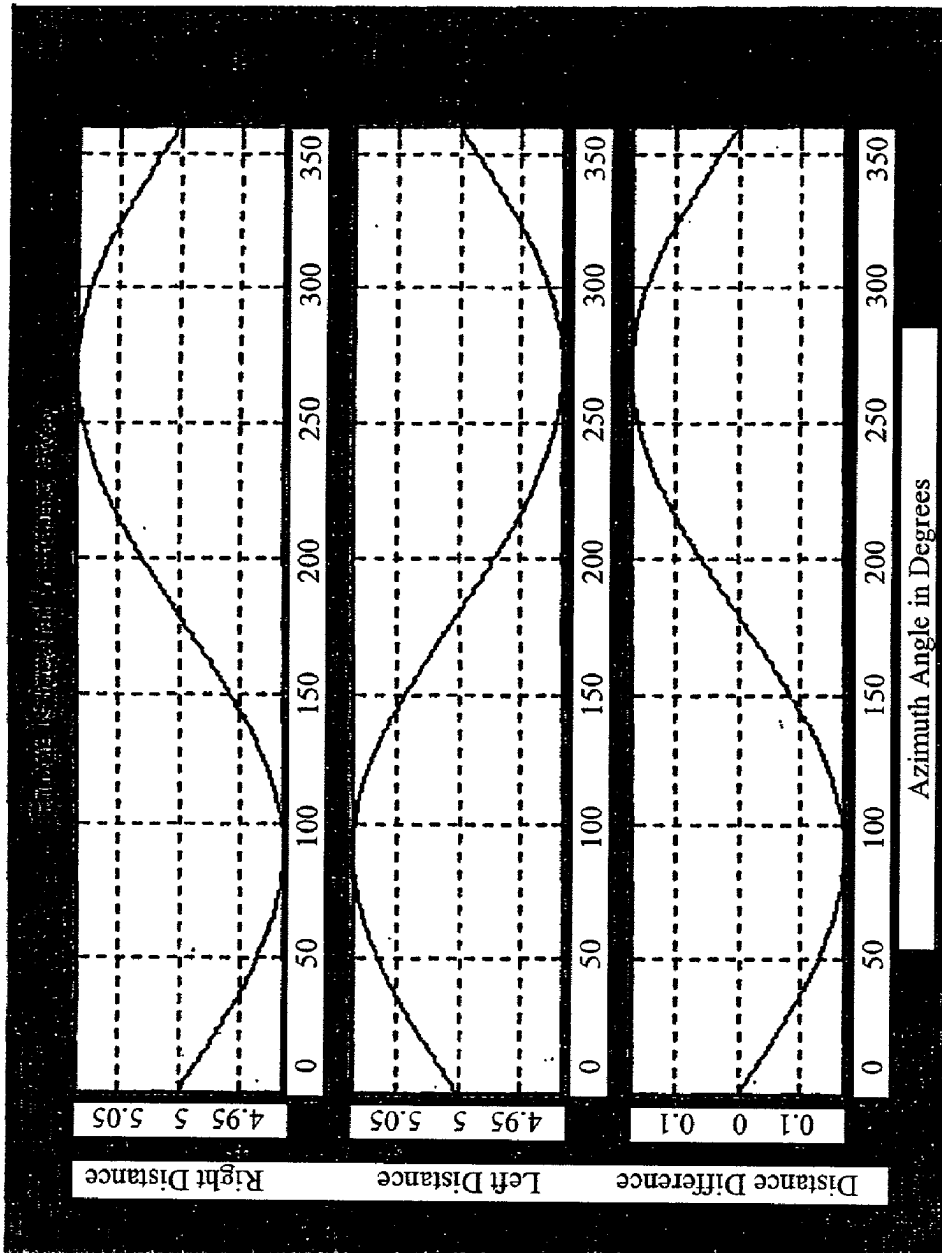


FIG. 3

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