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Bessette et al.

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(54) **PERCEPTUAL WEIGHTING DEVICE AND METHOD FOR EFFICIENT CODING OF WIDEBAND SIGNALS**

6,006,174 A * 12/1999 Lin et al. 704/201
6,064,962 A * 5/2000 Oshikiri et al. 704/262
6,192,334 B1 2/2001 Nomura
6,449,590 B1 * 9/2002 Gao 704/219

(75) Inventors: **Bruno Bessette**, Rock Forest (CA);
Redwan Salami, Sherbrooke (CA);
Roch Lefebvre, Canton de Magog (CA)

FOREIGN PATENT DOCUMENTS

EP 0 465 057 A1 1/1992
EP 0465057 A 1/1992
EP 0732686 A 9/1996
EP 0 732 686 A2 9/1996
JP 02-012300 A 1/1990
JP 03-116199 A 5/1991
JP 6-348300 A 12/1994
JP 10-282997 A 10/1998
WO WO 96/21220 7/1996

(73) Assignee: **Voiceage Corporation**, Quebec (CA)

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OTHER PUBLICATIONS

“Predictive Coding of Speech Signals and Subjective Error Criteria” by Bishnus S. Atal et al., IEEE Transaction ASSP, vol. 27, No. 3, pp. 247–254 Jun. 1979.

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* cited by examiner

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Primary Examiner—Tālivaldis Ivars Šmits
Assistant Examiner—James S. Wozniak
(74) *Attorney, Agent, or Firm*—Birch, Stewart, Kolasch & Birch, LLP

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Oct. 27, 1998 (CA) 2252170

ABSTRACT

(51) **Int. Cl.**⁷ **G10L 19/04**

(57) **ABSTRACT**
A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal pre-emphasis filter, a synthesis filter calculator, and a perceptual weighting filter. The signal pre-emphasis filter enhances the high frequency content of the wideband signal to thereby produce a pre-emphasized signal. The signal pre-emphasis filter has a transfer function of the form: $P(z)=1-\mu z^{-1}$, wherein μ is a pre-emphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the pre-emphasized signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the pre-emphasized signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: $W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$ where $0<\gamma_2<\gamma_1\leq 1$.

(52) **U.S. Cl.** **704/200.1; 704/219; 704/262; 704/224**

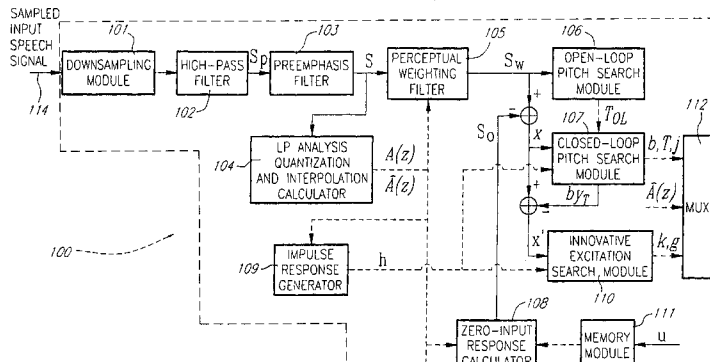
(58) **Field of Search** **704/222, 201, 704/219, 262, 224**

References Cited

U.S. PATENT DOCUMENTS

4,932,061 A 6/1990 Kroon et al.
5,307,441 A * 4/1994 Tzeng 704/222
5,359,696 A * 10/1994 Gerson et al. 704/223
5,444,816 A 8/1995 Adoul et al.
5,519,807 A 5/1996 Cellario et al.
5,664,055 A * 9/1997 Kroon 704/223
5,699,482 A 12/1997 Adoul et al.
5,701,392 A 12/1997 Adoul et al.
5,754,976 A 5/1998 Adoul et al.
5,963,898 A 10/1999 Navarro et al.

49 Claims, 4 Drawing Sheets



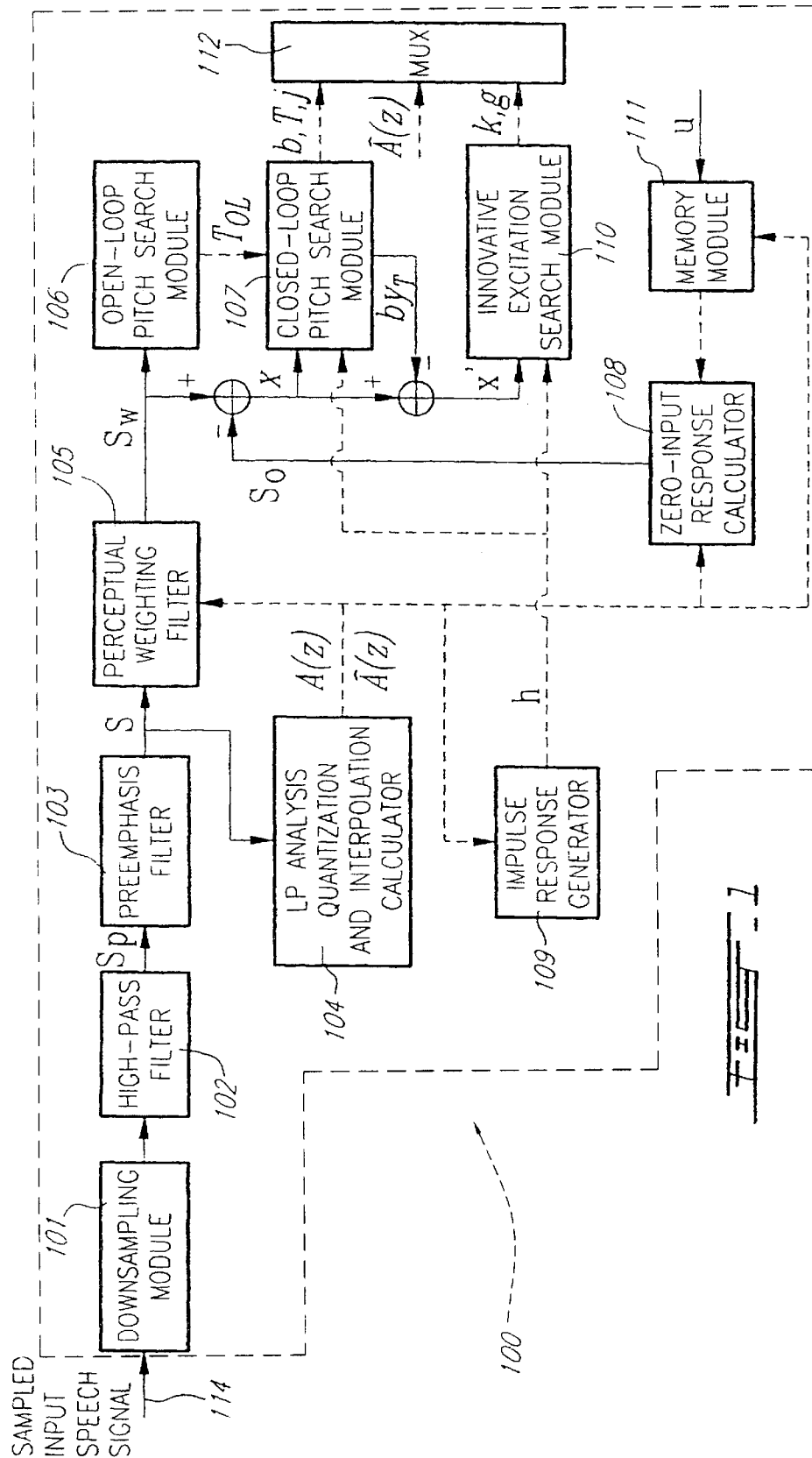


FIG. 1

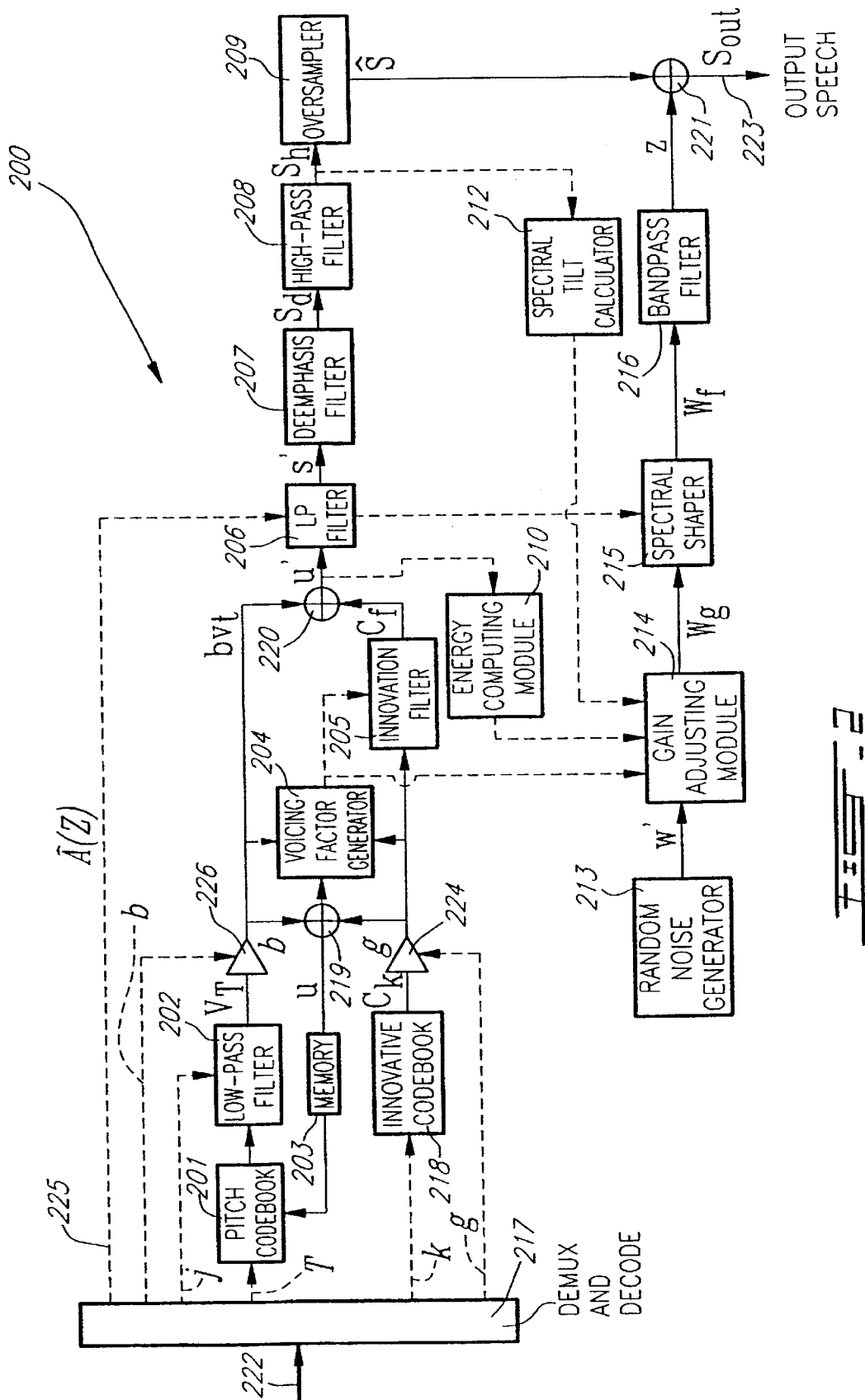
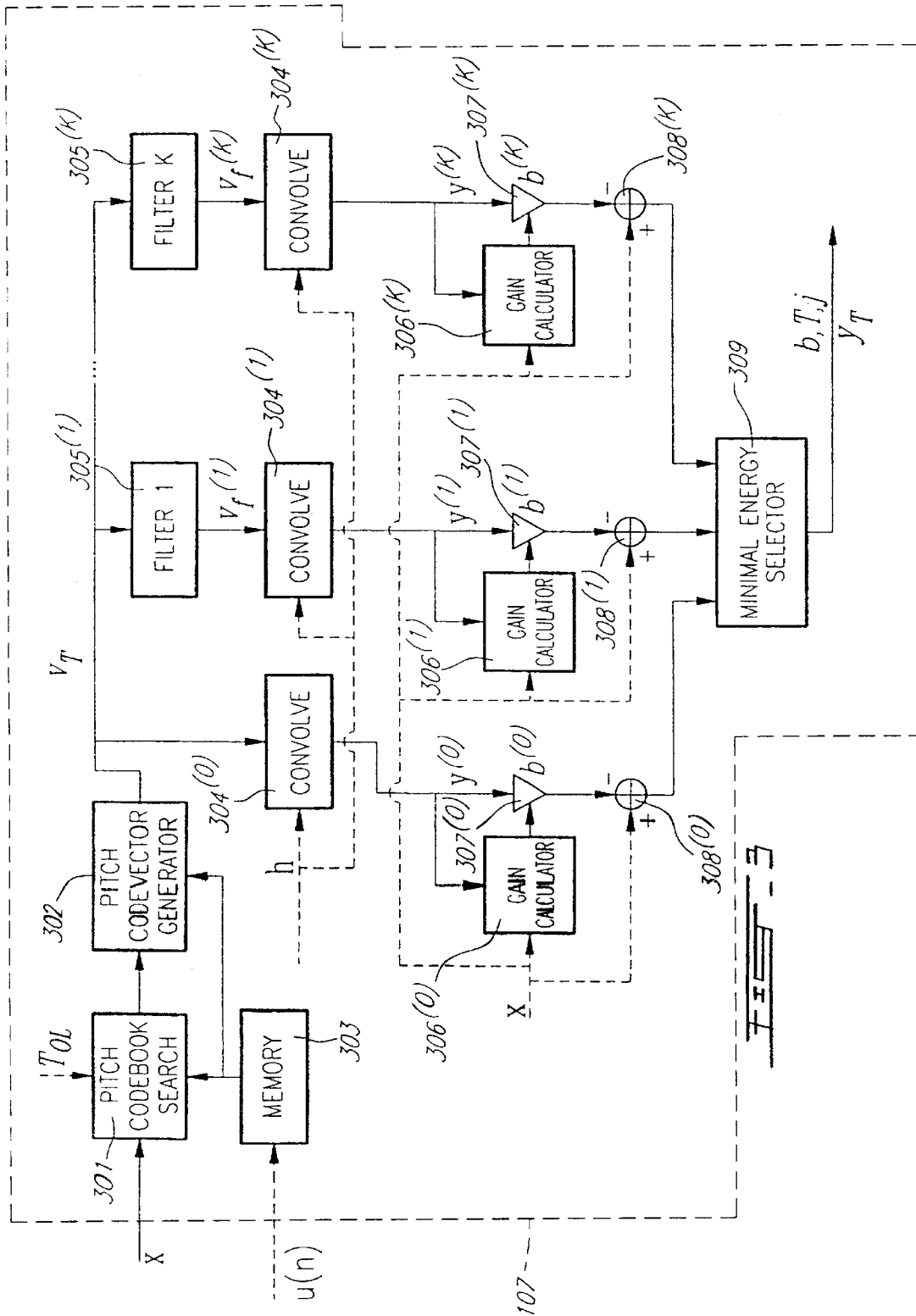
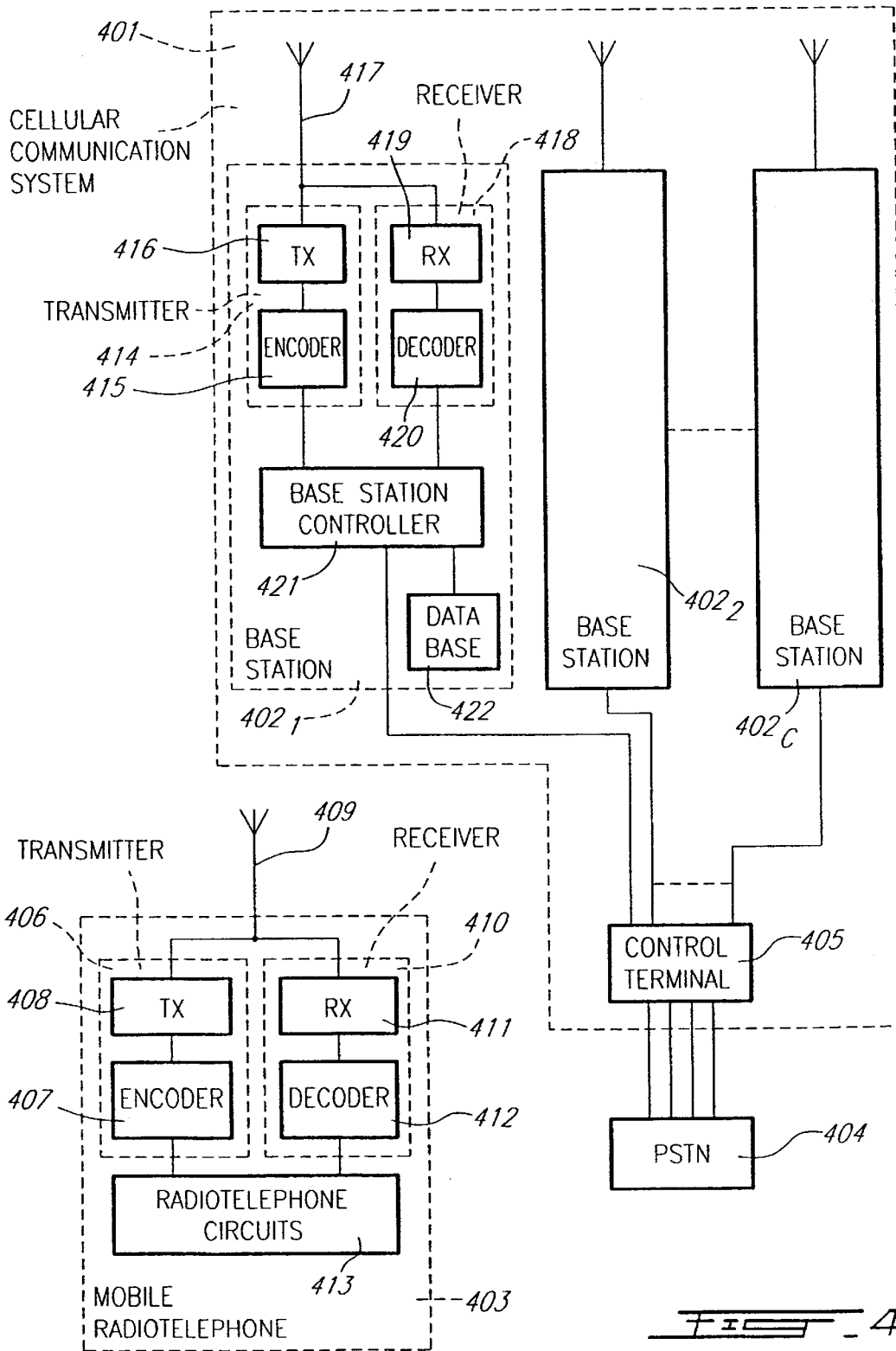


FIG. 2





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