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Suzuki et al.

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(54) **CODE DIVISION MULTIPLE ACCESS MOBILE COMMUNICATION SYSTEM**

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(58) **Field of Search** 370/328, 329, 370/335, 336, 342, 350, 441, 503, 514, 515

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,969,159 A 11/1990 Belcher et al. 375/1
6,018,667 A * 1/2000 Ghosh et al. 370/335
6,167,037 A * 12/2000 Higuchi et al. 370/335
6,208,632 B1 * 3/2001 Kowalski et al. 370/335

FOREIGN PATENT DOCUMENTS

EP	693834 A1	1/1996
JP	61-248698	5/1986
JP	8-79131	3/1996

* cited by examiner

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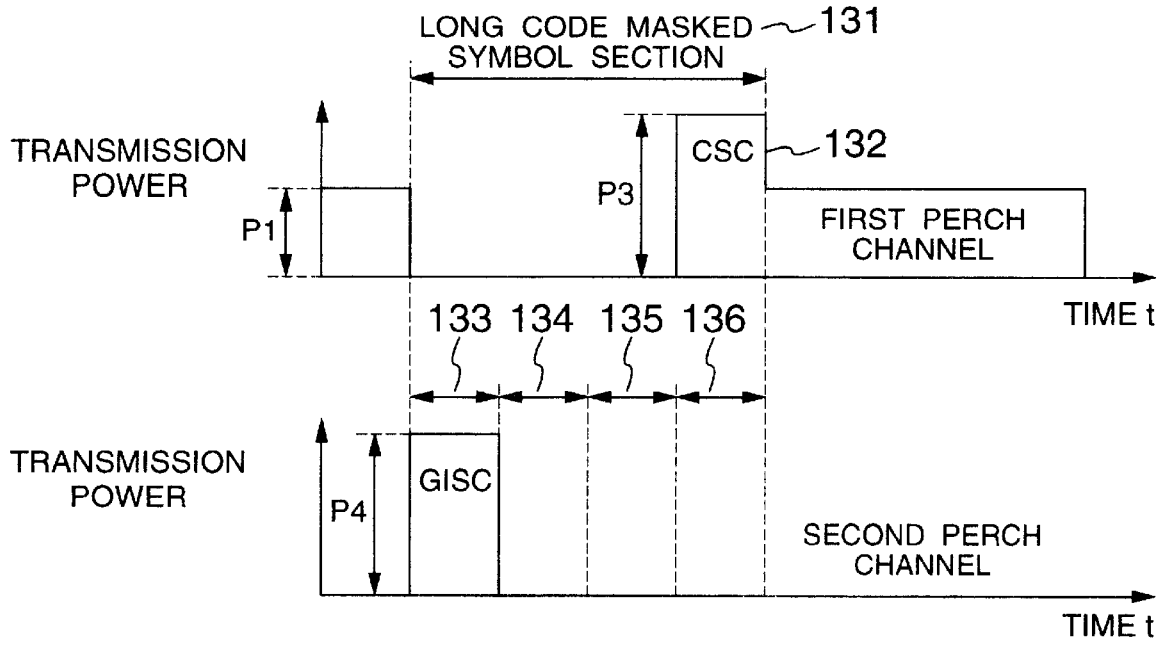
(57) **ABSTRACT**

In a mobile communication system using a code division multiple access (CDMA) method, spreading code detection and frame/slot timing synchronization (cell search) is conducted by using a long code masked symbol. The spreading factor of the long code masked symbol is set to a value lower than spreading factors of other ordinary symbols. As a result, it becomes possible to reduce the circuit scale and power dissipation of the mobile terminal and raise the speed of cell search.

12 Claims, 11 Drawing Sheets