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United States Patent [19]
Huang et al.

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[45] **Date of Patent:** ***Jun. 27, 2000**

[54] **BEAM SCANNING REFLECTARRAY ANTENNA WITH CIRCULAR POLARIZATION** 4,804,899 2/1989 Wurdack 343/757
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[75] Inventors: **John Huang**, Arcadia; **Ronald J. Pogorzelski**, Santa Barbara, both of Calif.

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[73] Assignee: **California Institute of Technology**, Pasadena, Calif.

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[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

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[21] Appl. No.: **08/891,631**

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[22] Filed: **Jul. 11, 1997**

Related U.S. Application Data

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Assistant Examiner—James Clinger

Attorney, Agent, or Firm—Fish & Richardson P.C.

[60] Provisional application No. 60/022,743, Jul. 24, 1996.

[51] **Int. Cl.**⁷ **H01Q 19/06**

[57] **ABSTRACT**

[52] **U.S. Cl.** **343/700 MS; 343/754; 343/757; 343/821**

A novel means of scanning a circularly polarized reflectarray antenna. The reflectarray is an array of metallic elements arranged on a surface designed to compensate for the various path lengths of the optical rays from an illuminating feed to the reflecting surface and then to the antenna aperture. With appropriate design, the phase in the aperture can be made to vary linearly in any desired direction and also to produce a radiated beam normal to the constant phase surface. In the case of circular polarization, this path length compensation can be accomplished by rotation of the individual elements.

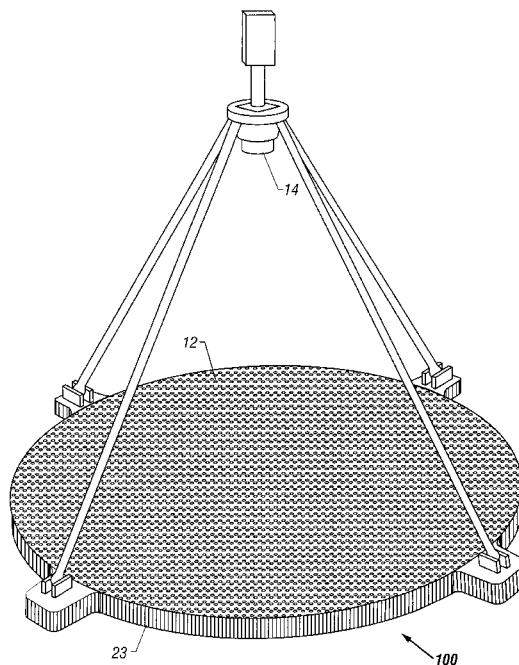
[58] **Field of Search** 343/700 MS, 757, 343/758, 759, 761, 763, 766, 895, 909

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24 Claims, 5 Drawing Sheets



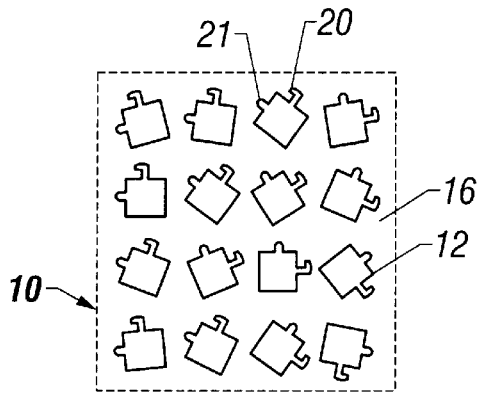


FIG. 1B

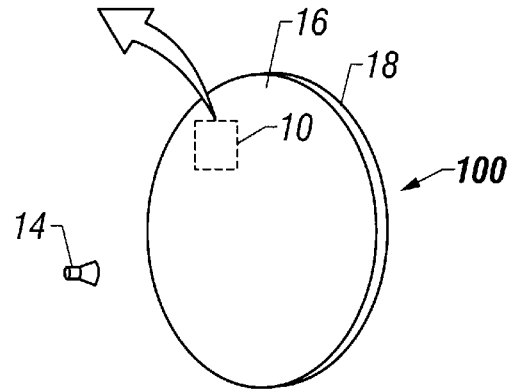


FIG. 1A

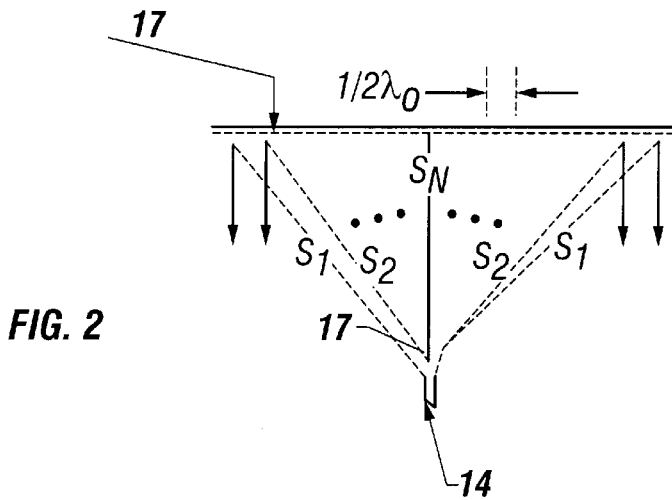


FIG. 2

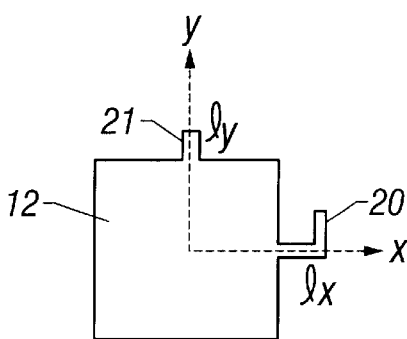


FIG. 3A

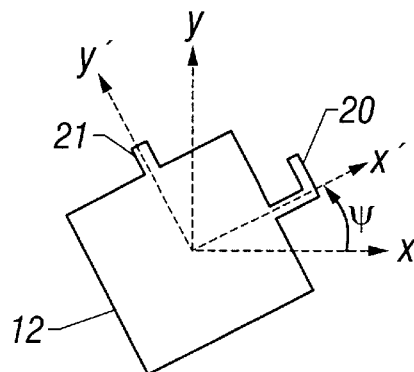


FIG. 3B

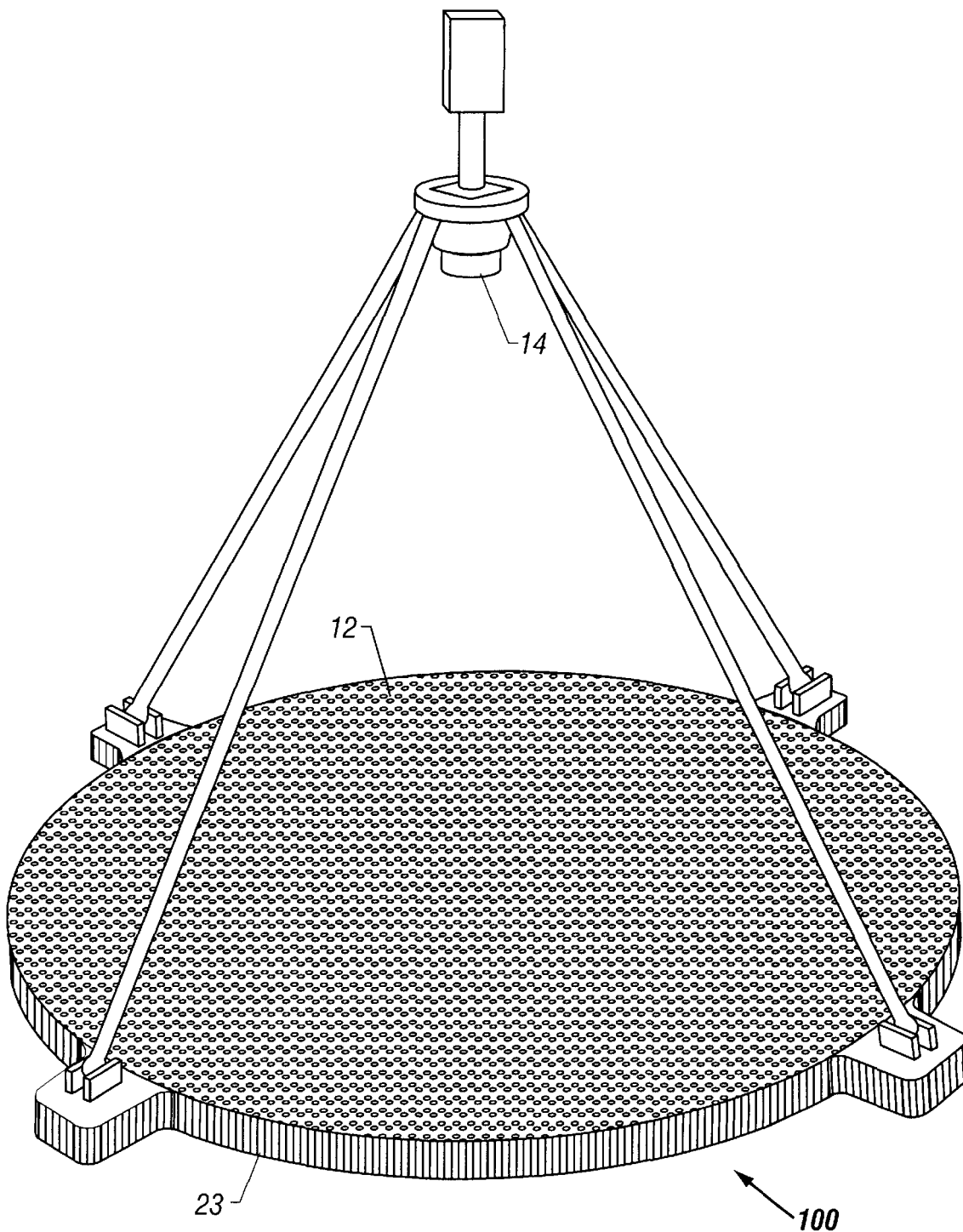


FIG. 4A

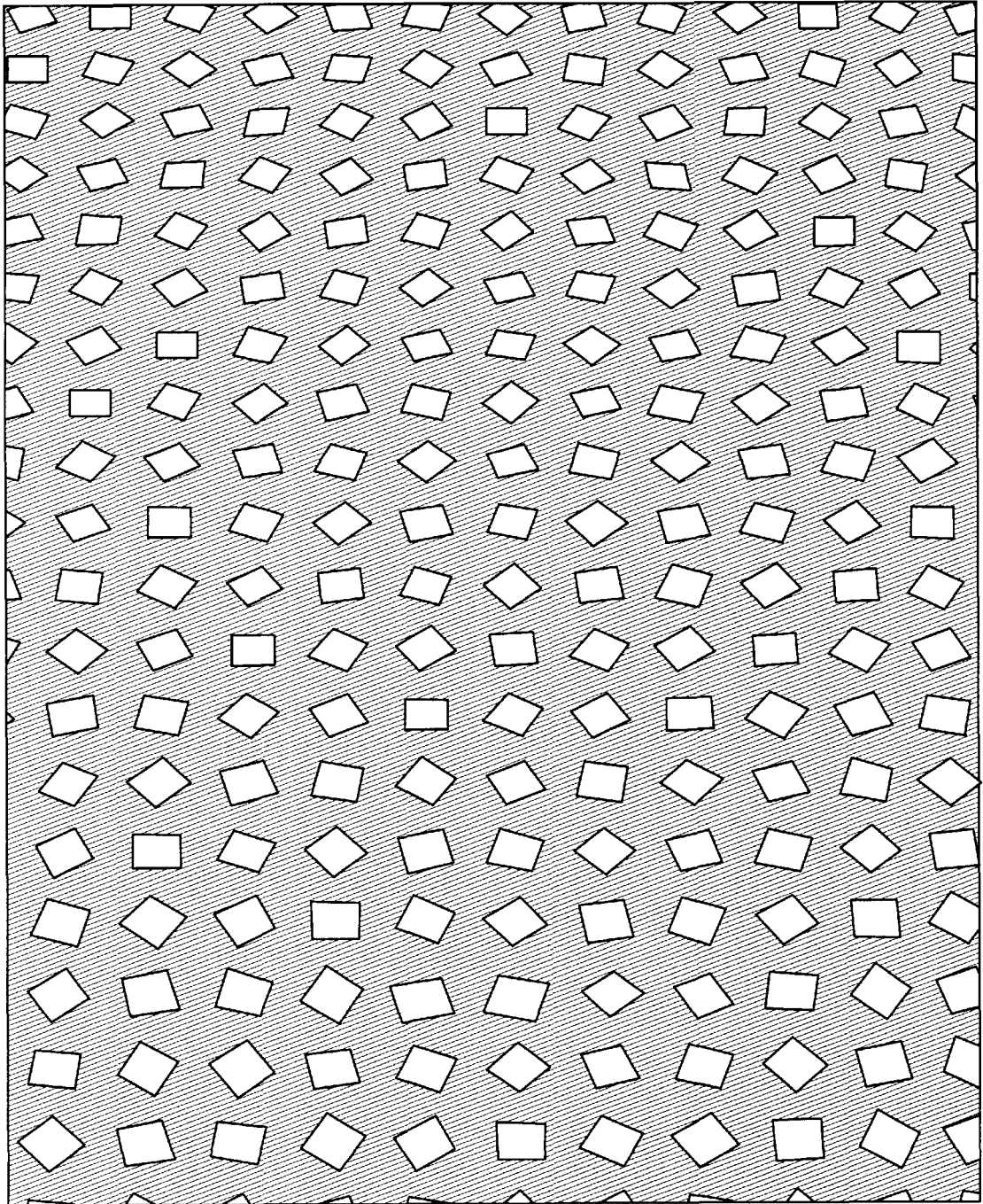
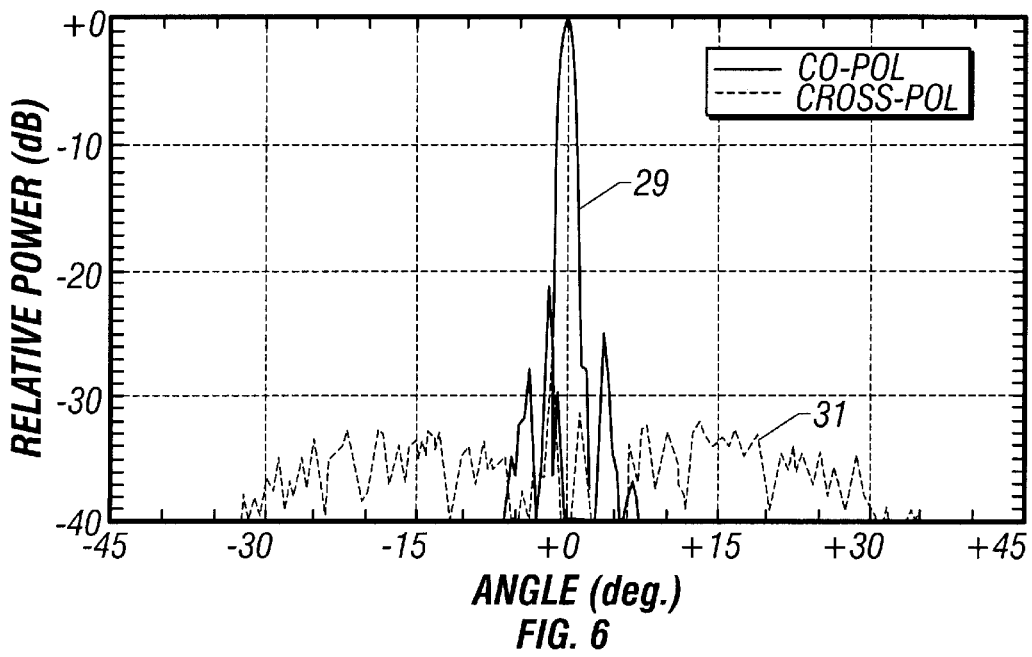
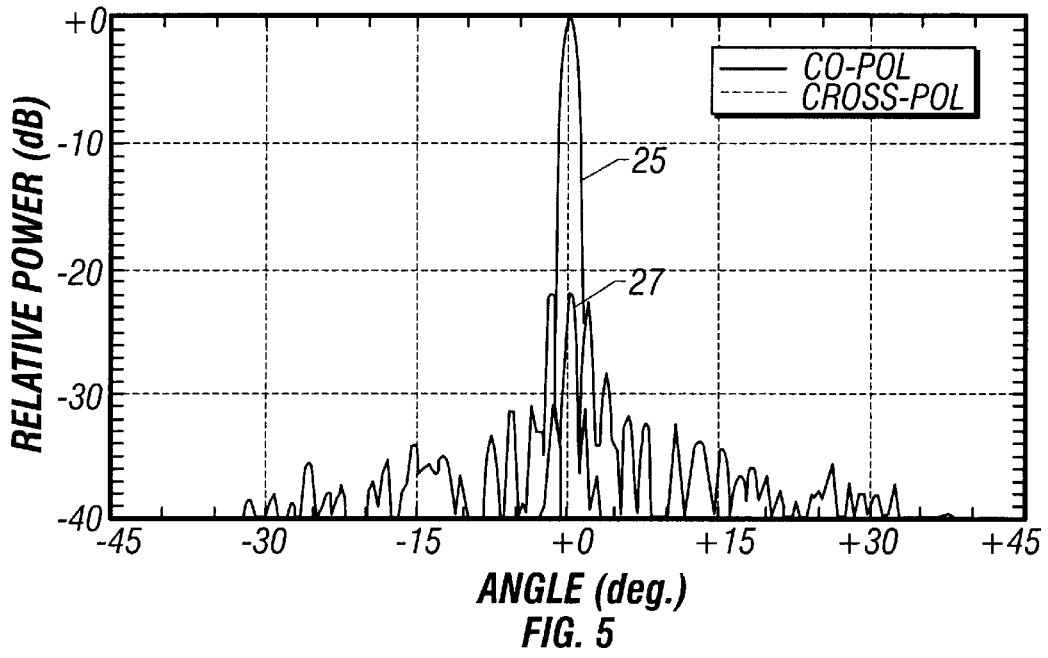


FIG. 4B



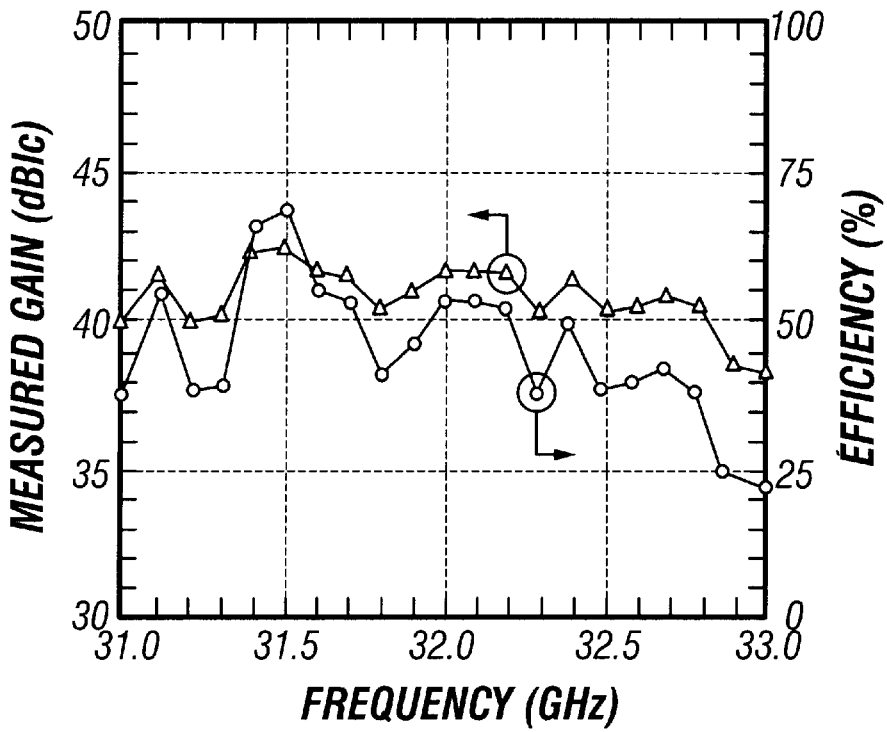


FIG. 7

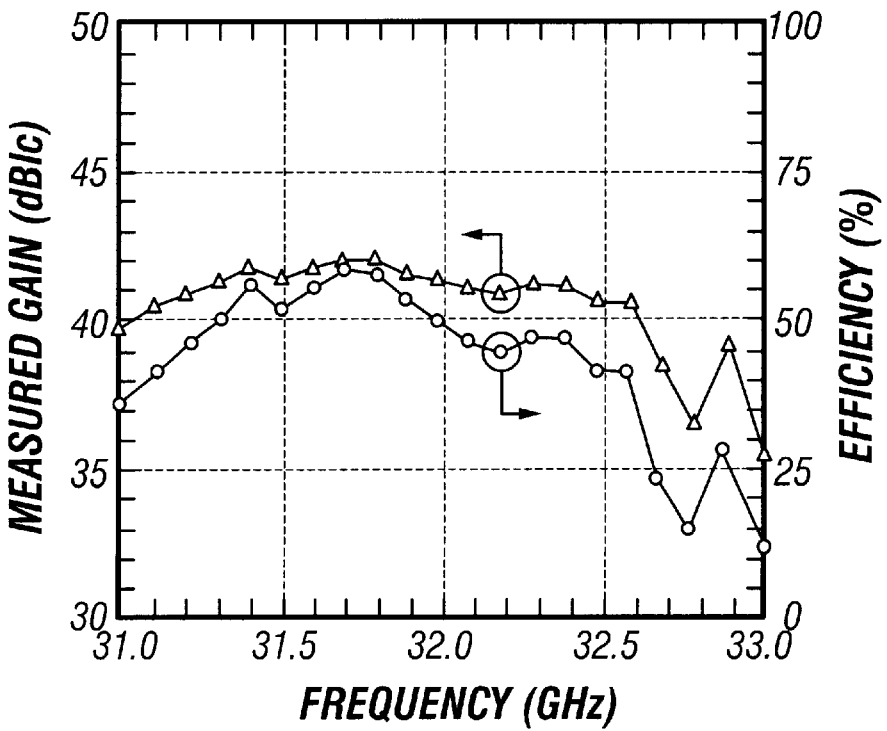


FIG. 8