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(12) **United States Patent**  
**Ying**

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(54) **MINIATURE PRINTED SPIRAL ANTENNA FOR MOBILE TERMINALS**

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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 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **09/112,366**

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(51) **Int. Cl.<sup>7</sup>** ..... **H01Q 1/24**

(52) **U.S. Cl.** ..... **345/702; 343/700 MS; 343/850; 343/895**

(58) **Field of Search** ..... **343/700 MS, 702, 343/850, 851, 852, 895**

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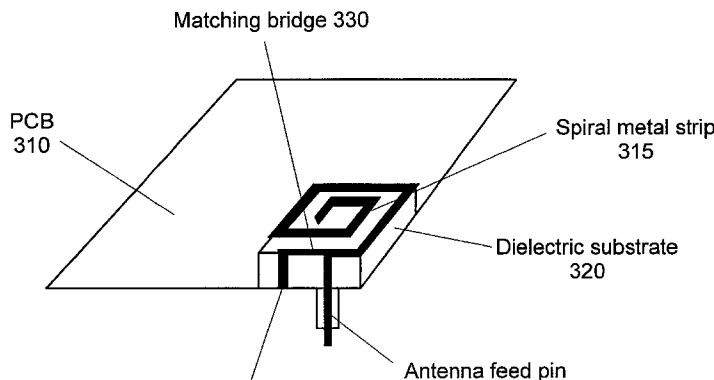
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(57) **ABSTRACT**

The present invention seeks to overcome the above-identified deficiencies in the art by providing a built-in printed spiral antenna which is small enough to satisfy the needs of future compact mobile terminals. According to exemplary embodiments, a built-in antenna is provided which includes a printed spiral metal strip that is connected to the mobile terminal's printed circuit board via a substrate. Matching of the antenna is performed by a matching bridge which is positioned between a feeding pin and a grounded post. By adjusting the length of the matching bridge, the matching of the antenna can be changed. In an alternative embodiment, a loading resistor is attached to the matching bridge in order to enhance the bandwidth of the antenna. The size of the antenna of the present invention can be reduced to 20–30% of the conventional PIFA antenna (i.e., less than 1/10 of the wavelength of the operating frequency). As a result, the antenna can be used in a very compact chassis.

**20 Claims, 7 Drawing Sheets**



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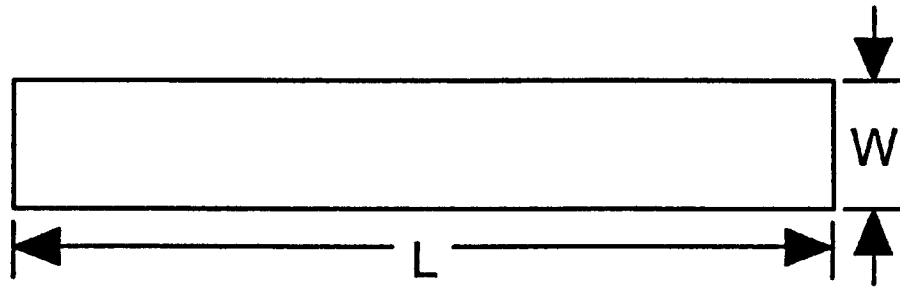


FIG. 1A

PRIOR ART

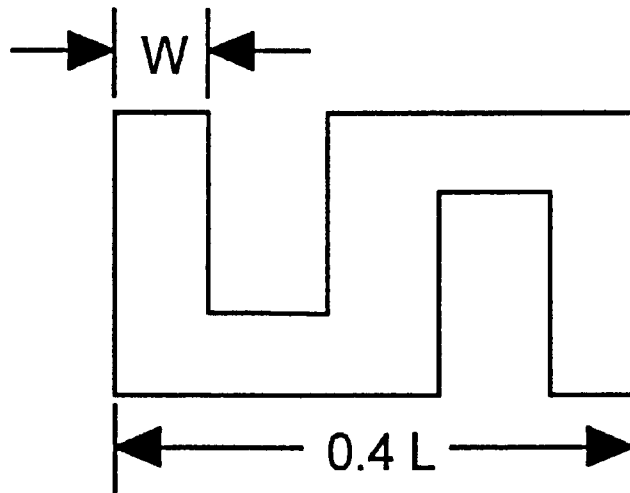


FIG. 1B

PRIOR ART

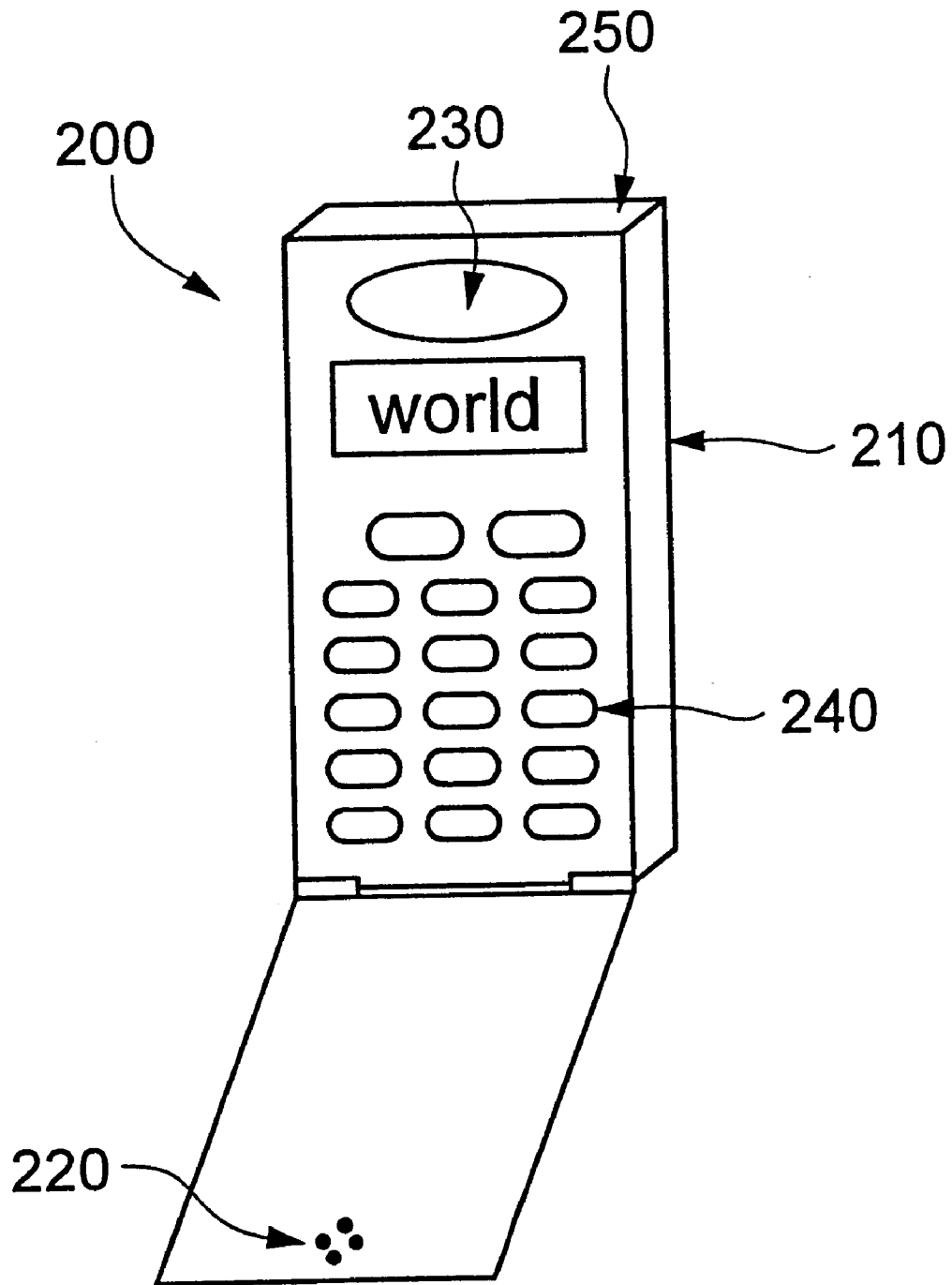
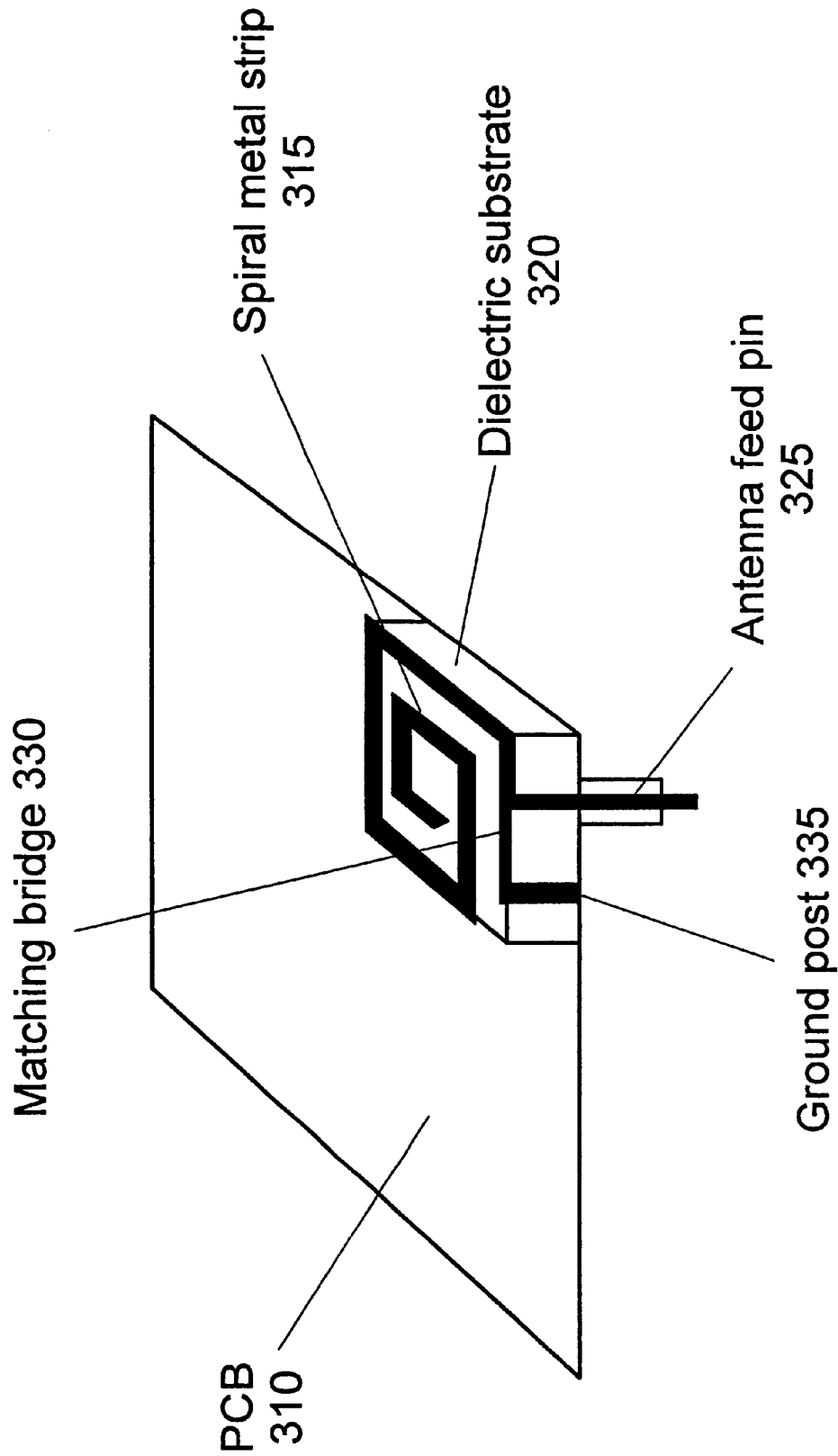


FIG. 2

FIG. 3



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