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2749,544

OMNIDIRECTIONAL ANTENNA

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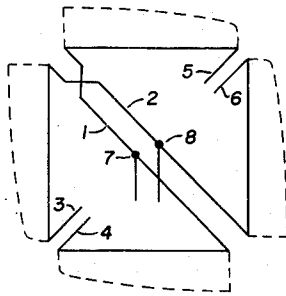


FIG. 1

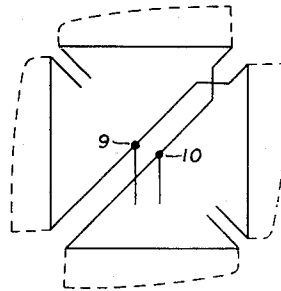


FIG. 2

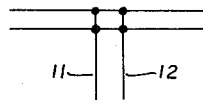


FIG. 3

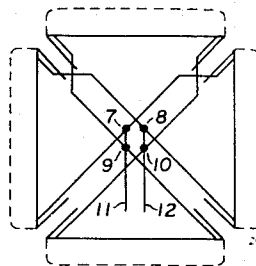


FIG. 4

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OMNIDIRECTIONAL ANTENNA

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2 Claims. (Cl. 343-742)

My invention relates to horizontally polarized omnidirectional antennas and more particularly to omnidirectional antennas of the square loop type.

My invention is particularly applicable to the square loop type of omnidirectional antenna which comprises a pair of Z-shaped elements superimposed in a square configuration, with the corresponding ends of the elements adjacent each other at diagonal corners of the square. The feed point is at the center of each of these elements. The configuration, usually referred to as an Alford antenna, is shown in Fig. 1. The sides of the square are preferably a quarter of a wave length long at the center of the band of frequencies over which the antenna is to be operated. This type of antenna is described, for example, in J. D. Kraus, "Antennas," McGraw-Hill Book Company, New York, 1950, at page 429.

Those who have used this type of antenna at very-high and ultra-high frequencies have found that the current distribution around the loop is not uniformly strong. The current distribution produces a pattern which is generally oval in configuration rather than circular, as is desired in omnidirectional antennas.

It is accordingly an object of my invention to provide a new and improved horizontally-polarized omnidirectional antenna.

It is another object of my invention to provide a horizontally-polarized omnidirectional antenna having a closer approach to circularity at very-high and ultra-high frequencies than the square-loop type of antenna just described.

Further objects and advantages of my invention will become apparent as the following description proceeds and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention, reference may be had to the accompanying drawing in which:

Fig. 1 shows the schematic configuration in plan view of the square-loop type of antenna under discussion;

Fig. 2 shows a second such antenna configuration in plan view;

Fig. 3 is an edge view of an antenna according to my invention; and

Fig. 4 is a plan view of the embodiment of my invention shown in Fig. 3.

The loop antenna shown in Fig. 1 comprises a pair 1 and 2 of Z-shaped elements superimposed in a square configuration. Corresponding ends 3 and 4 of the two elements are placed adjacent each other on one corner of the loop configuration while the other corresponding ends 5 and 6 are placed adjacent each other at the diagonally-opposite corner of the square. Element 1 is fed at its center point 7, while element 2 is fed at its center point 8.

The loop configuration indicated in Fig. 1, while generally thought to have a current distribution substantially

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uniform around the square, in actuality has the current distribution shown by the dashed lines. In accordance with my invention, I provide a pair of loops of the type shown in Fig. 1. I orient the first of these loops as shown in Fig. 1, for example, and the second as shown in Fig. 2. The loop shown in Fig. 2 is substantially identical with that shown in Fig. 1, except that the antenna in Fig. 2 is rotated substantially 90° in the horizontal plane with respect to the first loop. The current distribution of the loop shown in Fig. 2 is substantially the same as that shown in Fig. 1, except, of course, it is rotated by 90° in the horizontal plane because of the orientation of the loop.

In accordance with my invention, the loops oriented as shown in Figs. 1 and 2 are positioned one above the other in the fashion shown in Fig. 3. I prefer that the vertical separation between the two square loops be a negligible fraction of the wave length at which the loops resonate. For example, if the loops resonate at 100 mc./s., a vertical separation on the order of 1/2" is satisfactory.

The loop of Fig. 1 is conventionally fed at points 7 and 8 and that of Fig. 2 at points 9 and 10. Further in accordance with my invention, I parallel points 7 and 9 and likewise points 8 and 10 to provide a parallel feed for the two loops. The paralleled feedpoints are chosen to provide additive currents in the two loops, rather than subtractive. The feed points may be connected, via line 11, 12, to a conventional source of energy or to a receiver as the need may be; such units are not shown, for they form no part of my invention. The individual current distribution patterns of the loops of Fig. 1 and Fig. 2 combine when in the position of Fig. 3 to provide the substantially improved distribution pattern shown by dashed lines in Fig. 4. Thus, the primary object of my invention is shown to have been achieved.

While I have shown and described my invention as applied to a specific embodiment thereof, other modifications will readily occur to those skilled in the art. I do not, therefore, desire my invention to be limited to the specific arrangement shown and described, and I intend in the appended claims to cover all modifications within the spirit and scope of my invention.

What I claim is:

1. In a substantially horizontally polarized omnidirectional antenna, the combination of a pair of square loop antennas of the type comprising a pair of substantially Z-shaped elements superimposed in a square configuration, with the corresponding ends of said elements adjacent each other at diagonal corners of said square configuration and with a center feed point for each said element, one of said square loops being placed directly above the other and oriented substantially at a 90° angle in the horizontal plane with respect to the other of said loops, said loops being fed in parallel at said center feed points of said elements.

2. The combination of claim 1 in which said loops are vertically displaced by a distance which is a negligible fraction of the wave length at which said loops resonate.

References Cited in the file of this patent

UNITED STATES PATENTS

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"Antennas," J. D. Kraus, 1950 ed. published by McGraw-Hill Book Company, Inc., New York, N. Y., pages 27-32 and page 429.