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(54) A microloop antenna

(57) A microloop antenna (100) includes a pair of symmetrical open loop radiators (10) placed in a symmetrical position each having an opening oppositely facing each other and a pair of parallel ends (12) extending toward a middle portion thereof and a pair of symmetrical feedlines (30) symmetrically connected between the open loop radiators.

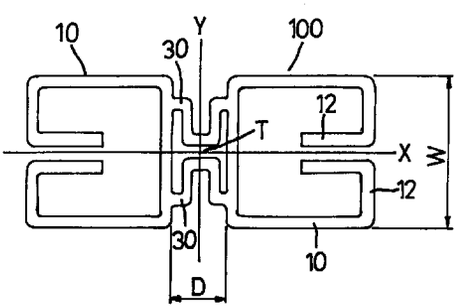

FIG. 1

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Description

The present invention relates to an antenna for a wireless communication system, and particularly to a microloop antenna for improving indoor radio communications.

In recent years, wireless communication apparatuses such as cellular phones and Citizen's Band transceiver are commonly utilized to provide a convenient communication. However, as radio signals are often blocked by walls of buildings, indoor communication quality is always poor if there is no repeater installed in the buildings.

An objective of the present invention is to provide a microloop antenna which is light in weight and capable of providing a high communication quality.

Another objective of the present invention is to provided a microloop antenna which is integrally formed with the communication apparatus.

According to the present invention, a microloop antenna includes a pair of symmetrical open loop radiators placed in a symmetrical position each having an opening oppositely facing each other and a pair of parallel ends extending toward a middle portion thereof and a pair of symmetrical feedlines symmetrically connected between the open loop radiators.

Other objects, advantages, and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

Fig. 1 is a plan view of the microloop antenna of the present invention;

Fig. 2 is a cross sectional view of the microloop antenna in cooperation with a release sheet;

Fig. 3 is a cross sectional view of another microloop antenna in cooperation with a release sheet; and

Fig. 4A-4D are plan views of radiators of other microloop antenna of the present invention.

Fig. 1 shows a plan view of one exemplary embodiment of a microloop antenna 100 according to this invention. The microloop antenna 100 includes two U-shaped loop radiators 10 and two feedlines 30 connected between the loop radiators 10. The U-shaped loop radiators 10 and the feedlines 30 are symmetrically positioned with respect to each of two mutually perpendicular axes X, Y intersecting at a middle point T of the microloop antenna 100. Each of the U-shaped loop radiators 10 has an angled end 12 extending in a parallel relation toward the vertical axis Y (as shown) as to define a tuning capacitor. Preferably, a width W of the radiator 10 is about 1/8μ to 1/10μ and a distance D between two radiators 10 is at least 1/15μ, μ is the wavelength at an anticipated operating frequency, such as when the operating frequency is 1.5 gigahertz, the width W will be 2.5 centimeters while the operating frequency is 1.9 gigahertz, the width will be 2.0 centimeters.

As shown, the feedlines 30 are in a square-step configuration, those skilled in the art will appreciate that the dimension of the feedlines 30 should be appropriately designed to match the impedance of the radiators.

The feedlines 30 and the radiators 10 having the above-described configuration can be formed from a unitary sheet of conductive material such as gold, silver, copper, or aluminum or by forming said conductive material film on a plastic sheet using thin film forming methods such as deposition, plating, and sputtering and by patterning the film using photolithography or the like. Alternatively, the feedlines 30 and the radiators 10 may be formed by screen-printing a conductive material to provide the configuration as shown in Fig. 1.

Referring to Fig. 2, the bottom side of the microloop antenna 100 is coated with an adhesive layer 40 then the coated microloop antenna 100 is placed over a release sheet 50 for a user to easily adhere the antenna onto a back of a mobile phone (not shown) by peeling away the release sheet.

Additionally, if the antenna 100 is deposited on a film 60 as previously mentioned, an adhesive layer 40 is coated on the bottom side of the film 60 then placed over a release sheet 50 as shown in Fig. 3 for a user to adhere the antenna 100 onto a back of the mobile phone by peeling away the release sheet 50. Alternatively, the antenna 100 may directly plated on a back cover of a mobile phone if desired.

Figs. 4A-4D show four individual configurations of the radiators according to the present invention, wherein ends of each loop radiator 10 extend in parallel toward a central portion of the loop and define a tuning capacitor as previously mentioned. Alternatively, a sheet capacitor (not shown) may be used to replace the tuning capacitor defined in the radiator.

Although the invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the invention as hereinafter claimed.

Claims

1. A microloop antenna (100) characterised in that:

   a pair of symmetrical open loop radiators (10) placed in a symmetrical position each having an opening oppositely facing away each other and a pair of parallel ends (12) extending toward a middle portion thereof; and
   a pair of symmetrical feedlines (30) symmetrically connected between the open loop radiators (10).

2. A microloop antenna (100) according to claim 1 wherein said symmetrical open loop radiator (10) defines a substantially square shaped area.

3. A microloop antenna (100) according to claim 1

wherein said symmetrical open loop radiator (10) defines a substantially circular shaped area.

4. A microloop antenna (100) according to claim 1 wherein said symmetrical open loop radiator (10) defines a substantially rectangular shaped area.

5. A microloop antenna (100) according to claim 1 wherein said symmetrical open loop radiator (10) defines a substantially octagonal shaped area.

6. A microloop antenna (100) according to claim 1 wherein said symmetrical open loop radiator (10) defines a substantially triangular shaped area.

7. A microloop antenna (100) according to claim 1 wherein said symmetrical open loop radiator (10) defines a substantially hexagonal shaped area.

8. A microloop antenna (100) according to claim 2 wherein said square shaped area has a width of from one eighth to one tenth of wavelength of an operating frequency.

9. A microloop antenna (100) according to claim 4 wherein said rectangular shaped area has an edge symmetrical to the feedlines in length of from one eighth to one tenth of wavelength of an operating frequency.

10. A microloop antenna (100) according to claim 1 wherein said symmetrically placed radiators have a distance of at least one fifteenth of wavelength of an operating frequency.

11. A microloop antenna (100) according to claim 1, wherein said loop radiators (10) and feedlines (30) are formed from a unitary sheet of conductive material.

12. A microloop antenna (100) according to claim 1, wherein said loop radiators (10) and feedlines (30) are formed on a plastic sheet by using thin film deposition of a conductive material.

13. A microloop antenna (100) according to claim 1, wherein said feedline (30) is a square step configuration.

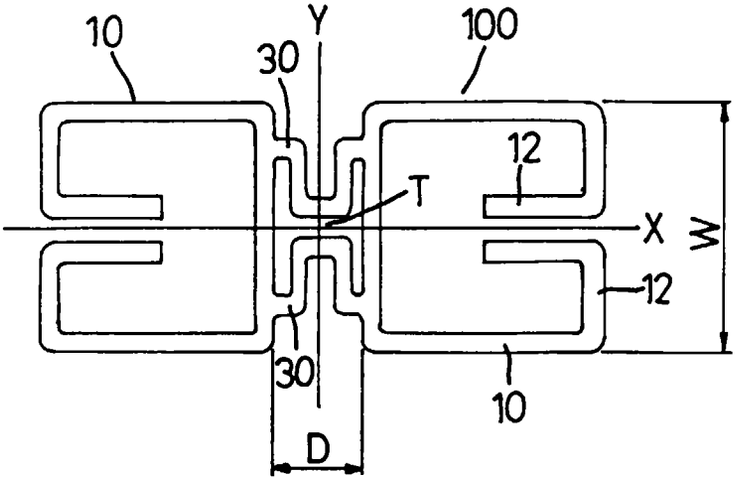

FIG. 1

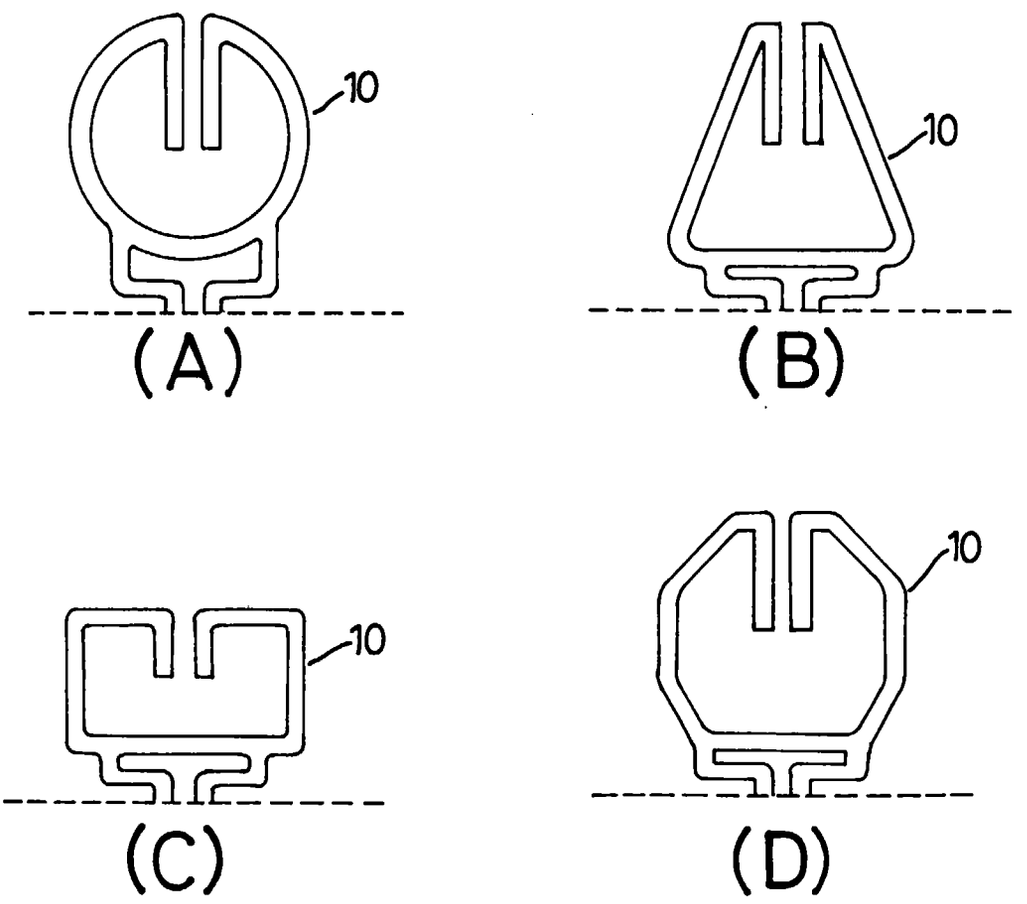

FIG. 4

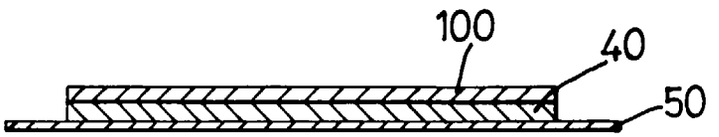

FIG. 2

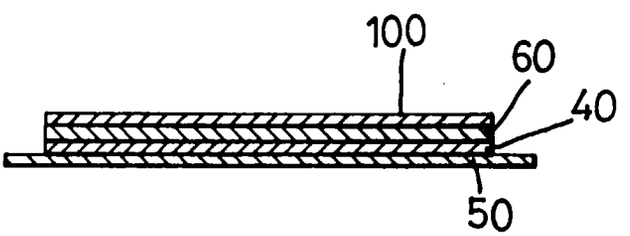

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 96 10 1153

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	GB-A-2 246 023 (NIPPON SHEET GLASS) * page 4, last paragraph - page 6, line 4; figure 1 *	1	H01Q7/00 H01Q1/38
Y	US-A-4 547 776 (BOLT,JR. ET AL.) * column 1, line 22 - column 2, line 60; figures 1-5 *	1	
A	IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, vol. 33, no. 4, April 1985, NEW YORK US, pages 375-382, XP002007128 FENN : "Arrays of Horizontally Polarized Loop-Fed Slotted Cylinder Antennas" * page 375 - page 376; figure 2 *	1,6	
A	EP-A-0 060 628 (TOKYO SHIBAURA) * abstract; figures 6A-10 *	1	
A	US-A-5 451 965 (MATSUMOTO) * column 4, line 13 - column 7, line 19; figures 1A-C,5A-6B *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H01Q
A	ELECTRONICS AND COMMUNICATIONS IN JAPAN, PART I: COMMUNICATIONS, vol. 74, no. 2, February 1991, NEW YORK US, pages 108-115, XP000241430 KUMON ET AL.: "An Analysis of the Crossed Twin Delta Loop Antennas with Circular Polarization" * the whole document *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	1 July 1996	Angrabeit, F

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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