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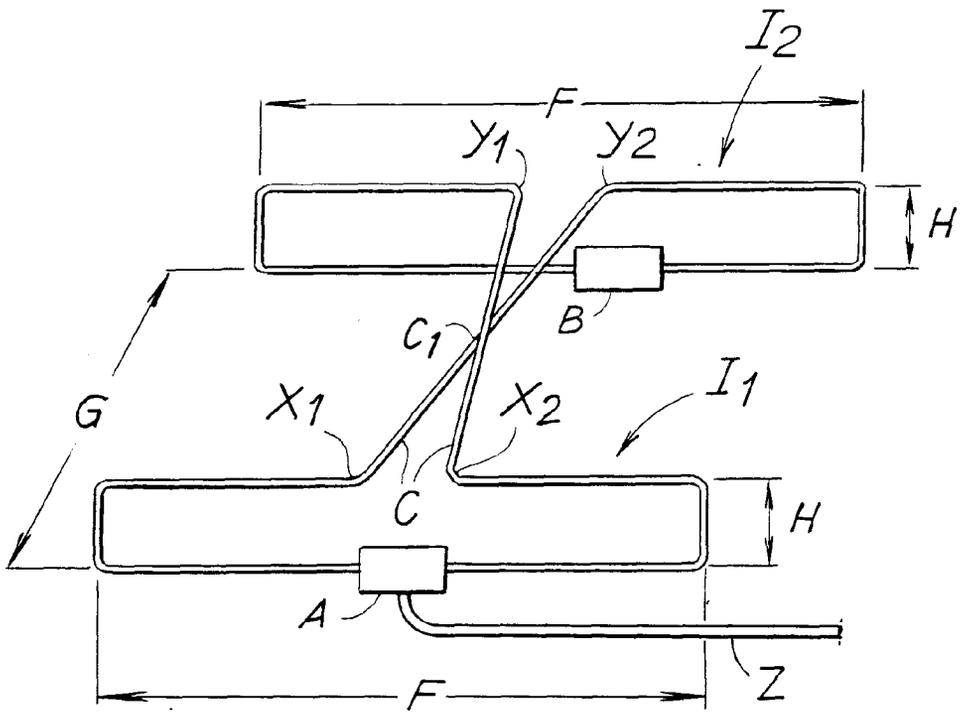
(54) Compact wide band receiving and transmitting antenna

(57) The antenna comprises two folded dipoles (11, 12) connected one to the other by means of a crossed double-wire line (C), one of said dipoles (12) being closed with a non-inductive resistance (B).

Fig.1



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Description

[0001] Known radio antennas, for example for HAM-radio systems, for military or other purposes, allow operation over a rather wide range of frequencies, although their size and cost may be considerable. For example, for a range of frequencies included between 1.5 and 30 MHz, which corresponds to a wavelength range included between 200 and 10 m, the dimensions of known antennas are of the same order of size. For even wider frequency ranges, such as those from 1.5 to 200 MHz, which are normally employed for broadcasting, several antennas are used, with their respective power supply cables and stands for the various optimal location heights, forming a costly and bulky complex, the environmental impact of which is not tolerated by local or general legislation.

[0002] These problems can be limited by employing manual or automatic tuners which are nevertheless very expensive and do not cover the entire range from 1.5 to 200 MHz, present poor directional features and poor gains.

[0003] This invention relates to a small wide-band receiving and transmitting antenna, suitable for continuous tuning coverage of the frequencies from 1.5 to 200 MHz without the assistance of either external antenna tuners to adapt output impedance or servo devices or mechanisms to vary the frequency in the aforesaid band.

[0004] The antenna according to this invention comprises two folded dipoles connected one to the other by means of a double-wire line, preferably a crossed line, one of which dipoles is closed with a non-inductive resistance. Said non-inductive resistance preferably presents a value included between 400 and 1200 Ohm, more particularly a value of approximately 820 Ohm. Said non-inductive resistance is generally dimensioned for a power which is equal to at least 30% of the transmission power of the antenna.

[0005] An impedance transformer for wide-band radio-frequency is arranged between the antenna and the cable connecting it to the power supply and to the device. In a preferred embodiment of the invention, it presents a transformation ratio of between 1:4 and 1:12. Said impedance transformer preferably has a transformation ratio of 1:9, where the power supply cable has an impedance to earth of 50 Ohm. Said impedance transformer can be an autotransformer, a transformer proper or a line-balance converter.

[0006] The antenna according to this invention, for the range of frequencies from 1.5 to 200 MHz, presents dimensions as concerns plan clearance of between 3 and 12 m in length and between 0.5 and 5 m in width and a height of between 2 and 40 cm.

[0007] In a preferred form of embodiment, the antenna comprises a supporting rod which is developed along a long side of each dipole to which said long side is fastened. The rod presents at its ends, and on the same side, respective short appendixes which are parallel to each other along the short sides of the dipole, the short sides of the dipole being fastened to said appendixes and the other long side of the dipole being taut between the free ends of said appendixes.

[0008] The invention will be better understood with reference to the description and enclosed drawing which shows a non-limiting example of the invention. In the drawing:

Fig. 1 illustrates a schematic axonometric view of an antenna circuit according to the invention and
Fig. 2 illustrates an axonometric view of the structure of an antenna having an antenna circuit like that shown in Fig. 1.

[0009] With reference to Fig. 1, the antenna circuit comprises two dipoles of equal dimensions 11, 12, each of which lies on a respective vertical plane and presents a folded development along sides F, H of a rectangle. The upper side of each dipole is cut at the middle line and the ends X1, X2 of a dipole are connected to the corresponding opposite ends Y2, Y1 of the other dipole by means of a crossed double-wire line C. The dipole 11 is connected at the center of the long side to the wire Z connecting to the power supply and to the device (the wire having an impedance to earth of 50 Ohm) by means of an impedance transformer A for wide-band radio-frequency, wound on toroid ferrite with a transformation ratio of 1:9. The other dipole 12 presents the lower side cut at the middle line, the two resulting ends being connected one to the other by means of a pure resistance B, i.e. one without inductance, with a value of 820 Ohm and dimensioned to support an electrical power equal to at least 30% of the maximum power which is received or transmitted by the antenna.

[0010] Preferably, the dipoles are made of copper and are applied to a structure comprising two respective rods 1, 3 made of fiberglass and supported in the center by a metal crossmember 5 applied to a supporting pole 7. The rods 1, 3 present short appendixes 9, 11; 13, 15 on their respective ends along which appendixes the short sides of the respective dipoles 11, 12 extend. The crossmember 5 acts as a support for the transformer A, for the terminal part of the power supply cable Z and for an insulator C1 suited for preventing reciprocal contact for the two between branches of the crossed double-wire line C.

[0011] With reference to Fig. 1, the dimensions of the antenna according to the invention are included in the following range of values:

$3m<F<12m$; $2cm<H<40cm$; $0.5m<G<5m$.

[0012] The antenna described above is suitable for receiving and transmitting in a continuous band of frequencies from 1.5 to 200 MHz without the need for tuners to adapt the output impedance or servo mechanisms to vary the frequency. With respect to known antennas, the antenna is very compact and lightweight, can be di-

rected and presents a 90% gain in said range of frequencies compared to a dipole with a dimension of a half wavelength and a stationary wave ratio of between 1.1: 1 and 2.0:1.

[0013] It is understood that the drawing illustrates only an example, provided as a practical demonstration of the invention only, and that the forms and arrangements of said invention can be varied without thereby departing from the scope of the concept underlying said invention. The presence of reference numbers in the appended claims has the purpose of facilitating reading of the claims with reference to the description and do not limit the scope of protection represented by the claims.

Claims

1. A receiving and transmitting antenna for a wide band of radio-frequencies, characterized in that it comprises two folded dipoles (11, 12) connected one to the other by means of a double-wire line (C), one of said dipoles (12) being closed with a non-inductive resistance (B).

2. An antenna according to claim 1, characterized in that said double-wire line (C) connecting the dipoles is crossed.

3. An antenna according to claim 1 or 2, characterized in that said non-inductive resistance (B) presents a value included between 400 and 1200 Ohm.

4. An antenna according to claim 3, characterized in that said non-inductive resistance (B) has a value of approximately 820 Ohm.

5. An antenna according to at least one of claims 1 to 3, characterized in that said non-inductive resistance (B) is dimensioned for a power which is equal to at least 30% of the transmission power of the antenna.

6. An antenna according to any one of the previous claims, characterized in that an impedance transformer (A) for wide-band radio-frequency with a transformation ratio of between 1:4 and 1:12 is arranged between the antenna and the cable (Z) connecting it to the device.

7. An antenna according to claim 6, characterized in that said impedance transformer (A) has a transformation ratio of 1:9 where said cable has an impedance of 50 Ohm.

8. An antenna according to claim 6 or 7, characterized in that said impedance transformer (A) is an autotransformer.

9. An antenna according to claim 6 or 7, characterized in that said impedance transformer (A) is a line-balance converter.

10. An antenna according to any one of the previous claims, characterized in that it presents the following dimensions, with reference to Fig. 1: F is between 3 and 12 m, H is between 2 and 40 cm, G is between 0.5 and 5 m.

11. An antenna according to any one of the previous claims, characterized in that it comprises two supporting rods (1, 3) each of which is developed along a long side of a respective dipole (11, 12), said long side of the dipole being fastened to it, the rod (1, 3) presenting at its ends, and on the same side, respective short appendixes (9, 11; 13, 15) which are parallel to each other, along the short sides of the dipole, the short sides of the dipole being fastened to said appendixes and the other long side of the dipole being taut between the free ends of said appendixes.

Fig.1

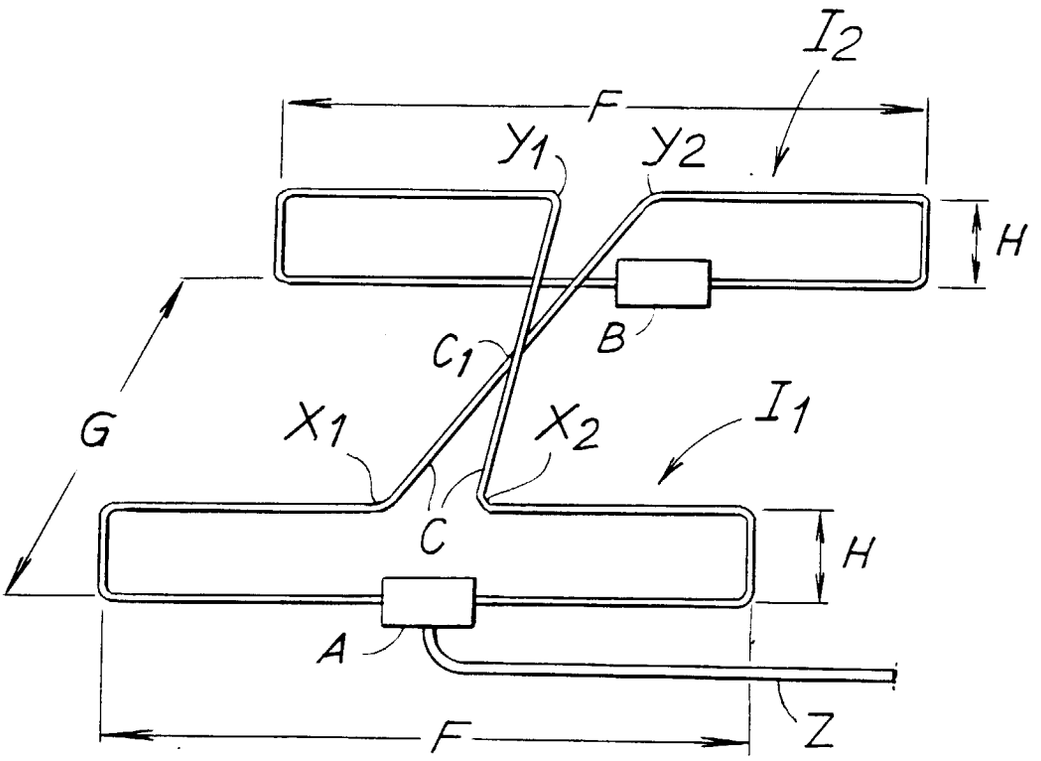

Fig. 2