DUAL LOOP ANTENNA

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The invention relates to a antenna, more particularly a TV antenna, of small dimensions and large band width and includes a continuous conductor placed in two rectangular loops, and metal powder tubes which are positioned around three of the long sides of the loops to reduce the Q-value of the antenna, and a plastic covering enclosing the conductor and the metal powder tubes.

The present invention relates to an antenna including a continuous conductor placed in two substantially rectangular loops.

To obtain the best possible results in transmitting or receiving electromagnetic waves the antennas employed must have a certain dimension adapted to the wave length in question, and this dimension as a rule is not shorter than half the wave length at horizontal antennas or a quarter of the wave length at vertical antennas. At very short wave lengths there are usually employed antennas having auxiliary elements in the form of directors and reflectors. Prior-art antennas thus generally have considerable dimensions, which is disadvantageous in many respects. Further, such antennas are rather selective, and their efficiency therefore considerably decreases when one goes beyond the wave length for which the antenna is adapted, which particularly applies to antennas having auxiliary elements. For the reception of e.g., TV programs there is therefore required in principle a single antenna for each channel, which in places where two, three or more programs can be received results in a large and heavy antenna structure and, if this structure is placed on a roof it will expose the fastening devices and the roof-truss to heavy stresses. Such antenna arrangements besides are very unsightly, particularly in densely populated areas.

The invention has for its object to eliminate these disadvantages and to provide a very small, lightweight and broadband antenna. This is realized in that the long sides of the rectangular loops are parallel with each other and coplanar and three of said loops are enclosed in metal powder tubes.

These and further features of the invention will become apparent from the following description in which reference is made to the accompanying drawing illustrating a preferred form of the invention. In the drawing:

FIG. 1 is a diagrammatical view of the antenna according to the invention;

FIGS. 2 and 3 are views of different ways of feeding the antenna.

In the drawing, 10 designates a continuous conductor which is placed in two substantially rectangular loops consisting of parts 13, 14, 15, 16 and 17, 18, 19, 20, respectively, which are coplanar and of which parts 13 and 17 extend in parallel with and are closely spaced relative to one another. The parts 13 and 20 of the conductor are connected via terminals 12 and 11 to the braid and the inner conductor, respectively, of a coaxial cable 21. Around the parts 15, 17 and 19 are braids 22, 23, and 24, respectively, in the form of tubes made of metal powder which are insulated from the conductor and from each other. The conductor 10 and the tubes 22, 23, 24 thereon are enclosed in a sheath 25 of plastic material consisting of a central tube in which parts 13 and 17 are enclosed, two tubular portions projecting at right angles from the upper end of the tube in opposite directions and containing parts 14 and 18, respectively, two tubular portions extending from the ends of the first-mentioned tubular portions at right angles thereto and in parallel with the central tube and connected together part 15 and braid 22 and respectively part 19 and braid 24, and finally two tubular portions extending from the ends of the last-mentioned tubular portions at right angles thereto and to the central tube and connected to said central tube, part 16 and part 20, respectively, of the conductor being enclosed in said said tubular portions. All conductor parts and braids may be conveniently secured and, as the case may be, centered in the various tubular portions of the sheath.

The feed line used preferably is a coaxial cable having an impedance of 700; however, also a band cable having an impedance of 3000 may be employed. The coaxial cable may be connected as shown in FIG. 1, in which case, however, the standing wave ratio will be rather high, for which reason the connection should preferably be effected as shown in FIGS. 2 and 3. With the connection utilized in FIG. 2, one end of the conductor 12 is free while a resistor R is connected to the other end. The inner conductor of the coaxial cable is connected to the terminal B and the braid of the coaxial cable to the terminal A. With the manner of feeding according to FIG. 3, the two ends of the conductor 12 are connected together and to the terminal B to which there is also connected a resistor R which on the opposite side is connected to the terminal A. The coaxial cable is connected with its inner conductor to B and the braid is connected to A. In tests carried out with the embodiment according to FIGS. 2 and 3 using a 700 coaxial cable and a resistance value $R=1000\Omega$ the standing wave ratio at frequencies between 50 MHz and 200 MHz never exceeded 1:2.

An antenna according to the invention particularly dimensioned for television reception and 25 x 25 cm. in size, which was connected to a coaxial cable having an impedance of 700 and which was fixedly arranged, gave a perfect reception on channels 4 and 10 and an acceptable reception on channels 2, 6, 7 and 9. In the latter case when the transmitting stations were located at considerable distances the antenna, however, had to be rotated to a certain position in relation to the transmitting station to obtain the highest possible reception quality. By reason of its high sensitivity the antenna can therefore be used for the reception of signals coming from all directions, provided that their strength is not too low, while at low signal strengths the antenna like the prior-art antennas has to be set in a certain position in relation to each transmitting station.

The invention thus provides an antenna which can be utilized with good efficiency for a considerable range of frequencies. Furthermore, the antenna is simple, can be mounted indoors or outdoors with simple and cheap means and finally can be manufactured to a price considerably lower than that of conventional antennas.

The invention is not limited to the forms described above and shown in the drawing but can be varied in many ways within the scope of the appended claims.

What I claim and desire to secure by Letters Patent are:

1. A large bandwidth antenna including a continuous conductor extending in two rectangular loops with the long sides thereof coplanar and coplanar with each
other, a first terminal, the conductor extending from said first terminal merging into one short side of the first rectangular loop and after completion of said loop merging into one short side of the second loop, and completing said second loop, a second terminal on said conductor at the end of said second loop, tubes of metal powder around all the long sides of said loops except the one adjacent the second terminal, and a plastic covering enclosing said loops and said tubes, the terminals being accessible through said covering for the connection of a feed line thereto.

2. A large bandwidth antenna including a continuous conductor extending in two rectangular loops with the long sides thereof parallel and coplanar with each other, the conductor extending into one short side of the first rectangular loop and after completion of said loop merging into one short side of the second loop and completing said second loop, tubes of metal powder around all the long sides of said loops except the second side adjacent the end of the second loop, a first terminal connected to the end of said second loop, a resistor having one end connected between said first terminal and the end of said second loop, a second terminal at the other end of said resistor, the end of said conductor starting said first loop being left unconnected, and a plastic covering enclosing said loops and said tubes, the terminals being accessible through said covering for the connection of a feed line to said terminals.

3. A large bandwidth antenna including a continuous conductor extending in two rectangular loops with the long sides thereof parallel and coplanar with each other, the conductor extending into one short side of the first rectangular loop and after completion of said loop merging into one short side of the second loop and completing said second loop, tubes of metal powder around all the long sides of said loops except the second side adjacent the end of the second loop, a first terminal connected to the end of said second loop, a resistor having one end connected between said first terminal and the end of said second loop, a second terminal at the other end of said resistor, the end of said conductor starting said first loop being left unconnected, and a plastic covering enclosing said loops and said tubes, the terminals being accessible through said covering for the connection of a feed line to said terminals.

References Cited

UNITED STATES PATENTS
1,296,177 3/1919 Franklin 343—867
1,731,992 10/1929 Van Bronk 343—855 X
2,521,550 9/1950 Smith 343—742
2,537,191 1/1951 Moore 343—742

FOREIGN PATENTS

OTHER REFERENCES

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