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A. TROOST ET AL
FERRO-MAGNETIC CORE ANTENNA

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Fig. 1

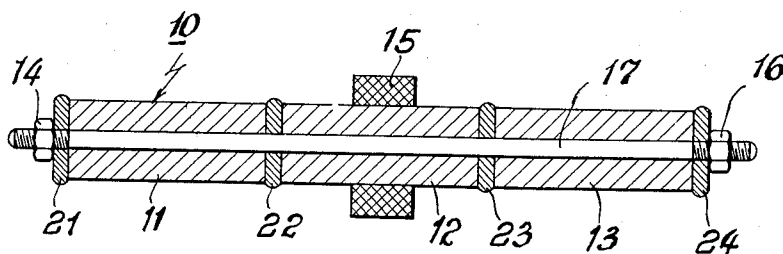
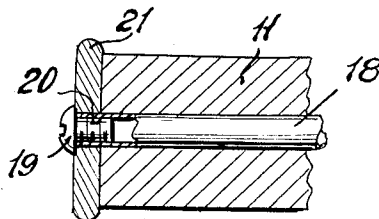


Fig. 2



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FERRO-MAGNETIC CORE ANTENNA

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1 Claim. (Cl. 343—787)

The present invention relates to an antenna having a core of ferro-magnetic material and, more particularly, to a rod-shaped ferrite-antenna comprising several individual ferro-magnetic members arranged adjacent one another and being mechanically joined.

It has been known to make a core for an antenna by assembling several individual members, i.e., ferro-magnetic rods, which are mechanically joined. The reason for the division of the antenna core into several discrete members is that it is very difficult to manufacture a long ferro-magnetic rod which is uniform in density over the entire length. It is also difficult to obtain uniform mechanical properties and strength over the entire length of a long rod. Due to the division of the antenna core into several members, these difficulties in the manufacture of such antenna rods are overcome. Furthermore, simpler molding equipment can be used in making these rods, whereby the manufacture of the cores becomes less expensive.

Such long ferro-magnetic cores, comprising shorter rod members, are readily subjected to mechanical stresses. This is particularly true, if the antennas are attached to vehicles, wherein the antenna cores may break under the mechanical stresses. Another kind of strong mechanical stress occurs if the rods of ferro-magnetic material are mounted at their centers to supports, about which the antennas can be rotated at high speed. Even if the core should not break due to motion, adjacent members of the sectional cores will wear, due to frictional rubbing against each other.

It is an object of the present invention to provide an improved rod antenna, overcoming these disadvantages of the known antennas.

It is another object of the invention to provide a novel antenna having a ferro-magnetic core, particularly, a ferrite core, said antenna core comprising a plurality of individual members.

It is another object of the invention to provide a ferro-magnetic antenna core having a certain degree of elasticity so as to avoid breaking when the antenna is subjected to mechanical stresses.

It is a further object of the invention to provide a ferro-magnetic antenna core comprising several individual rod members connected to one another, which are not subjected to frictional wear at their adjacent ends.

It is a still further object of the invention to provide a resilient insert between the individual ferro-magnetic rod members.

It is an additional object of the invention to provide as such inserts resilient disks between each pair of adjacent ferro-magnetic members.

A core thus assembled does not have the disadvantages of the cores of the prior art antennas. The resistance against mechanical stresses is thus greatly increased. Contrary to all expectation of magnetic field interruption, due to the insertion of the resilient disks between each pair of adjacent members, it has been found by tests that these resilient disks scarcely affect the magnetic flux with-

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in the core. Thus, the superior electric properties of a ferro-magnetic antenna are unexpectedly retained, despite the insertion of the resilient material according to the invention.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

In the drawings:

Figure 1 is a longitudinal section through an antenna according to the invention;

Figure 2 is a longitudinal section through an end portion of a modified antenna according to the invention.

In the embodiment of Figure 1, an antenna 10 comprises three individual ferro-magnetic rod members 11, 12, 13. Resilient disks 22 and 23, preferably of rubber or plastic, are inserted between the ends of the rod members 11, 12 and 12, 13, respectively. The rod members 11, 12 and 13 and the disks 22 and 23 are provided with central bores, through which a common mandrel, such as a brass stud 17, is passed, aligning these members and disks and retaining them as a unit. Resilient disks 21 and 24 also having central bores are provided adjacent the outer ends of the rod members 11 and 13 on the brass stud 17. The entire assembly is held together by nuts 14 and 16, screwed on the threaded ends of the stud 17, and seating on the outer faces of the end disks 21 and 24, so as to press them against the respective ends of the rod members 11 and 13, whereby the compressional forces at respective ends of the rod members 11, 12 and 13 are resiliently cushioned by the insert or spacer disks 22 and 23. A coil 15 is mounted on the center of the rod member 12.

It has been found that the provision of the central bores through the ferrite rod members 11, 12 and 13 and the filling of these bores by the metal stud 17 passing therethrough does not appreciably impair the electrical properties of the antenna, but that it results in a superior antenna construction.

In addition, ferro-magnetic material is saved, due to the provision of the bores. As the antenna according to the invention is used for high frequencies, the center thereof will be almost free of electro-magnetic fields, i.e., such fields are displaced towards the outer peripheries of the ferro-magnetic members.

In the embodiment of Figure 2, a slightly modified manner of assembling of the core components is illustrated. In this modification, the mandrel comprises a tube 18. The outer ends of this tube 18 are internally threaded at 20 to receive mounting screws 19 retaining the ends of the antenna core and fulfilling the function of the nuts 14 and 15 in Figure 1. With such screws 19 at both ends, the entire structural length of the antenna is scarcely increased beyond the total of the individual antenna components. In other words, the mandrel tube 18 does not protrude from the end disks 21 and 24.

The antenna, as shown in Figures 1 and 2 of the drawing, may be used as a unit in a larger antenna assembly, for example, a cross-loop or a square. For the cross-loop antenna, two antennas as shown in the drawing may be simply superimposed. For a square, four of such antennas will be interconnected to form the four sides of a square.

In place of a single coil 15 on the antenna, as shown in Figure 1, a plurality of coils may be provided on the antenna rod 10 and may be uniformly distributed along

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its length, whereby each of the rod members 11, 12, 13 may support one or several of such coils.

We claim:

An elongated rod-type antenna having a ferro-magnetic core, said antenna comprising, in combination: a series of ferro-magnetic tubular cores having axially aligned bores; a plurality of thin resilient spacer rings interposed between and covering substantially the entire surface of the end faces of adjacent cores; and clamping means extending through said central bores of said cores and through the centers of said spacer rings for clamping together said series of cores and the interposed spacer rings to form a single rod-type antenna, whereby said antenna possesses an inherent elasticity afforded by the

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resiliency of said spacer rings between adjacent cores, thereby avoiding breakage of the antenna when the same is subjected to mechanical stresses.

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