Jan. 10, 1950 R. A. MORRIS ET AL 2,494,255

LOOP ANTENNA

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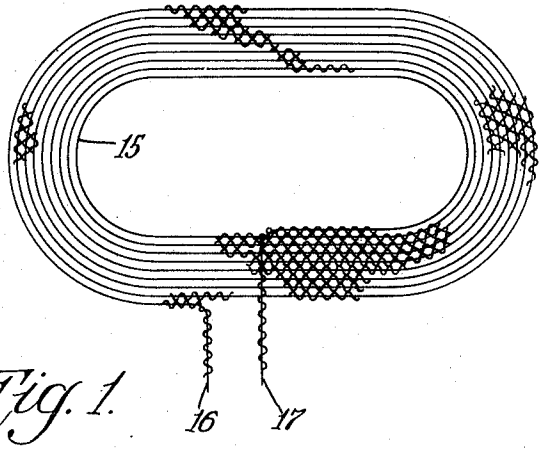


Fig. 1.

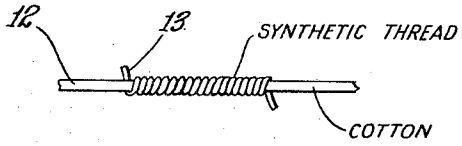


Fig. 2.

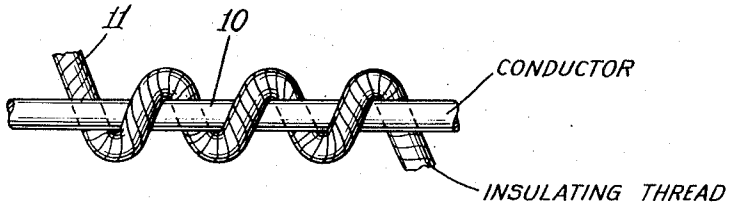


Fig. 3.

Inventors:
Raymond A. Morris
Frank A. Iverson
By Robert L Kahn
Atty.

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LOOP ANTENNA

Raymond A. Morris and Frank A. Iverson, Chicago, Ill., assignors to Edwin I. Guthman & Co., Inc., Chicago, Ill., a corporation of Illinois

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4 Claims. (Cl. 250—33.67)

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This invention relates to a loop antenna and wire for making a loop antenna or the like. Loop antennas for small radio receivers have been formed by winding wire to provide a flat pancake structure. In order for a loop antenna to operate properly, it must have certain physical dimensions and preferably have a certain capacitance and low loss characteristics. The necessity for having low distributed capacitance in a loop antenna makes it necessary to provide adequate spacing between wire turns. It is desirable that such spacing between wire turns have a minimum solid insulating material to reduce the dielectric losses.

In accordance with this invention, a loop antenna is provided having a simple construction in which most of the insulating medium between adjacent wire turns consists of air. At the same time, however, the construction is relatively rigid, easy to manufacture, and thoroughly practical.

The wire of which the loop antenna is formed is provided with an insulating material having such a shape and dimension as to provide maximum spacing between adjacent wire turns with minimum insulating material. It is clear, therefore, that wire embodying this invention may be used for other purposes than loop antennas. Thus, in certain types of radio frequency transformers and chokes, it is necessary to reduce dielectric losses and distributed capacitance. A wire embodying the present invention may be used in the manufacture of such coils.

In its more general form, the invention provides for the use of bare copper or other wire upon which is wound a coarse spiral of insulating material. This insulating material may be a coarse filamentary thread of suitable material having a sufficiently large diameter to define a substantial region around the wire. The insulating material may be partly or completely of synthetic material such as cellulose acetate, nylon, rayon or other textile material. The presence in part at least of a synthetic textile material is preferred for the reason that cheap solvents therefor are readily available. Thus, two adjacent lengths of wire insulated as indicated may be cemented together by the use of a textile material solvent. However, conventional material, such as cotton or silk, may also be used. Instead of a solvent for the insulating material, such materials as glue or cement may also be used.

For a fuller description of the invention, reference will now be made to the drawings wherein

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Figure 1 is a top plan view of a loop antenna embodying the present invention.

Figure 2 is a detail of the insulating thread.

Figure 3 is a detail of a length of wire insulated in accordance with the present invention.

Referring specifically to the drawings, in Figure 3, wire 10 is shown as wound with a filamentary insulating thread 11. Wire 10 is shown as a solid wire. However, stranded wire may be used if desired. While wire 10 may be conventionally insulated, it is preferred to use bare wire.

Filamentary thread 11 may have any desired diameter, preferably of the order of that of wire 10, and the winding pitch may be as great or as small as may be found convenient. Filamentary thread 11 may be attached to wire 10 by the use of any suitable material such as rubber cement, a solution of cellulose acetate, or the like. By treating the insulated wire in this fashion, a strong bond between thread 11 and wire 10 may be obtained.

Thread 11, as previously stated, may be of any suitable textile material. Thus, it may be entirely of cotton or entirely of some synthetic textile material as cellulose acetate or any of the other materials previously mentioned or a combination of these.

Inasmuch as synthetic fibers are generally more expensive than cotton, thread 11 may be formed of two threads 12 and 13 twisted around to form a single composite thread. Thread 12 may be of cotton, while thread 13 may be of cellulose acetate. As shown, thread 13 is wound around thread 12. The pitch may be as coarse as desired.

The advantage of using a composite thread, as shown in Figure 2, is that the acetate thread may be affected by solvents as acetone, for example, readily available on the market. While solvents are available for cotton, as a rule they are expensive and undesirable to use. Thus, the synthetic thread is distributed around in the composite thread so that bonding of the entire composite thread may be easily effected. It is obvious that other types of composite thread may be used. Thus, the two threads may be simply twisted or a simple cotton thread may have its outer surface chemically treated or may have a cellulose acetate coating precipitated over it.

A loop antena made of the wire shown in Figure 3 is shown in Figure 1. This consists of a plurality of turns 15 of wire to form a flat annular coil. Leads 16 and 17 are provided for connection to a radio receiver. As clearly indicated in Figure 1, the relatively coarse insulating

thread 11 imparts a desirable space factor to adjacent wire turns. The loop antenna itself may be formed in any desired fashion and, after formation, may be dipped into any suitable cement or solvent. Instead of dipping into the solvent or cement, the loop may be sprayed. In any event, it is preferred to use as little cement or solvent as possible. By using a solvent with a low surface tension, and most textile solvents are of that character, the spaces between the wire will remain substantially free of solid material.

What is claimed is:

1. A loop antenna comprising a plurality of turns of wire, said wire consisting of a conductor having insulating material wound around the wire to form a helix with the pitch of said helix being coarse enough to expose most of the wire surface to the atmosphere, adjacent wire turns being maintained in predetermined spaced relation by cement on said insulating material with the spacing between wire being controlled substantially solely by the thickness of the insulating material.

2. The antenna of claim 1 wherein said insulating material is a textile thread.

3. The loop antenna of claim 1 wherein said insulating material is a thread consisting of cotton and a synthetic textile thread and wherein the insulating material is cemented together by a solvent therefor to render the entire structure rigid.

4. The structure of claim 1 wherein said insulating material consists of a cotton thread with a fine synthetic thread coiled around said cotton thread.

RAYMOND A. MORRIS.
FRANK A. IVERSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,553,315	Gould	Sept. 15, 1925
1,601,817	Forster	Oct. 5, 1926
2,018,477	Wentz	Oct. 22, 1935
2,030,160	Titcomb	Feb. 11, 1936
2,197,616	Lehne et al.	Apr. 16, 1940

FOREIGN PATENTS

Number	Country	Date
529,892	Germany	July 18, 1931