United States Patent

Self

[15] **3,683,393**

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[54] **HELICAL DIPOLE ANTENNA**

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[52] **U.S. Cl.**.....**343/806,** 343/895

[51] **Int. Cl.**.....**H01q 1/36**

[58] **Field of Search**.....343/895, 908, 806

[56] **References Cited**

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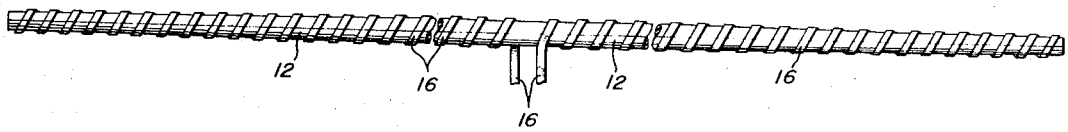
[57] **ABSTRACT**

An antenna for communication equipment, in which a conductor in the form of a ribbon or strip is helically wound upon a tube or rod which is made of plastic material or the like.

1 Claim, 2 Drawing Figures



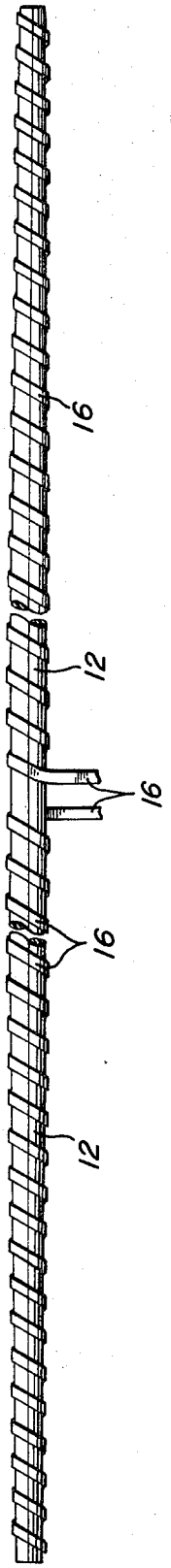


FIG-1

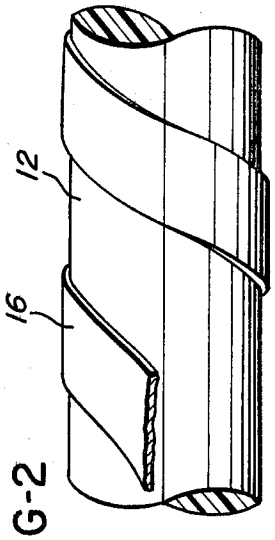


FIG-2

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HELICAL DIPOLE ANTENNA

BACKGROUND OF THE INVENTION

A desirable feature in an antenna is that of having minimum physical dimensions in consideration of its frequency response capabilities.

Another desirable feature in an antenna is that of low weight.

Thus, an object of this invention is to provide an antenna element which has a shorter physical length than its effective electrical or resonant length.

Another object of this invention is to provide an antenna element which has less weight and length than a conventional antenna which is used for the same frequency or range of frequencies.

Another object of this invention is to provide an antenna element which can be constructed at relatively low costs and which is long-lived.

Other objects and advantages reside in the construction of the invention, combinations thereof, the method of manufacture, and the mode of operation, as will become more apparent from the following description.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an elevational view, with parts broken away, of an antenna element of this invention.

FIG. 2 is an enlarged fragmentary elevational view, with parts shown in section, of a portion of an antenna element of this invention.

DETAILED DESCRIPTION OF THE INVENTION

An antenna element of this invention, preferably, comprises a tubular member **12**, which has its largest dimension or diameter at the central portion thereof. The tubular member **12** has a gradually reduced diameter from the central portion thereof to each end thereof. The tubular member **12** is, preferably, made of any suitable electrically non-conductive material. Plastics materials such as fibrous glass have been found to be very satisfactory.

A tape or ribbon or strip **16** of conductive material is helically wound upon the tubular member **12**. The conductive strip **16** is in two portions, each portion extending from the central portion of the tubular member to an end thereof. Preferably the conductive strip **16** has a very small thickness dimension in consideration of its width dimension, as illustrated in FIG. **2**.

The conductive strip **16** may be of copper or any other suitable electrically conductive material. The conductive strip **16** has several advantages over a conductor of circular cross section, among which are:

a. The strip **16**, being flat, readily conforms to the shape of the tubular member **12** and can be tightly wound upon the tubular member **12** and the spacing between convolutions can be accurately maintained, without the possibility of roll action of the conductor, either during the winding operation or after the winding operation. On the other hand, a round conductor as it is wound upon a rod or tubular member, tends to roll. Thus, accurate spacing between convolutions during the winding operation is difficult. Furthermore, round wire may tend to move after it is wound and may require a coating of adhesive material or the like to maintain the proper spacing of the round wire between adjacent convolutions thereof.

b. The flat tape or strip permits a maximum of current carrying capacity in a helically wound conductor in consideration of the weight thereof.

It has been found that an antenna element of this invention as illustrated in the figures, has a greater effective electrical length for a given physical length than does an antenna element which comprises a continuous substantially straight length of electrical conductive material, such as an electrically conductive tube or rod. An antenna of this invention, which includes a coil of electrically conductive strip material upon a non-conductive support member, may be 25 to 30 percent shorter in physical length than a conventional antenna element, such as a rod or tube, which is of conductive material throughout its entire length.

It has also been found that an antenna of this invention has relatively low inductive and capacitive reactance.

An antenna element of this invention has a relatively broad resonance characteristic.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claim.

The invention having thus been described the following is claimed:

1. An antenna element for receiving and transmitting radio frequency energy, comprising:

an elongate tubular electrically non-conductive support member of fibrous glass material, the support member having a maximum cross-sectional dimension at the central portion thereof and having smaller cross-sectional dimension from the central portion thereof to each end thereof, an elongate strip of ribbon-like electrically conductive material helically arranged upon the outer surface of the support member, the strip of ribbon-like electrically conductive material having spaced-apart convolutions extending along the support member, the strip of conductive material having a width dimension which is large compared to its thickness dimension, the strip of electrically conductive material being in two parts, each part extending from the central portion of the support member to one of the ends thereof.

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