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[54] **HIGH FREQUENCY ANTENNA**

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[51] **Int. Cl.** **H01q 9/28**

[58] **Field of Search** 343/795, 873, 906

[56] **References Cited**

UNITED STATES PATENTS

2,673,931	3/1954	Stevens	343/873
3,501,767	3/1970	Velez	343/795

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[57] **ABSTRACT**

A sheet composed of two superimposed laminae of electrically non-conductive synthetic plastic foil material has a pair of triangular antenna elements of metallic foil sandwiched between them. The apices of the metallic foil elements are adjacent but spaced from one another and their bases are remote from and at least substantially parallel to each other. Antenna conductors are connected with the antenna elements in the region of the apices thereof and have free ends for connection to a user device.

3 Claims, 4 Drawing Figures

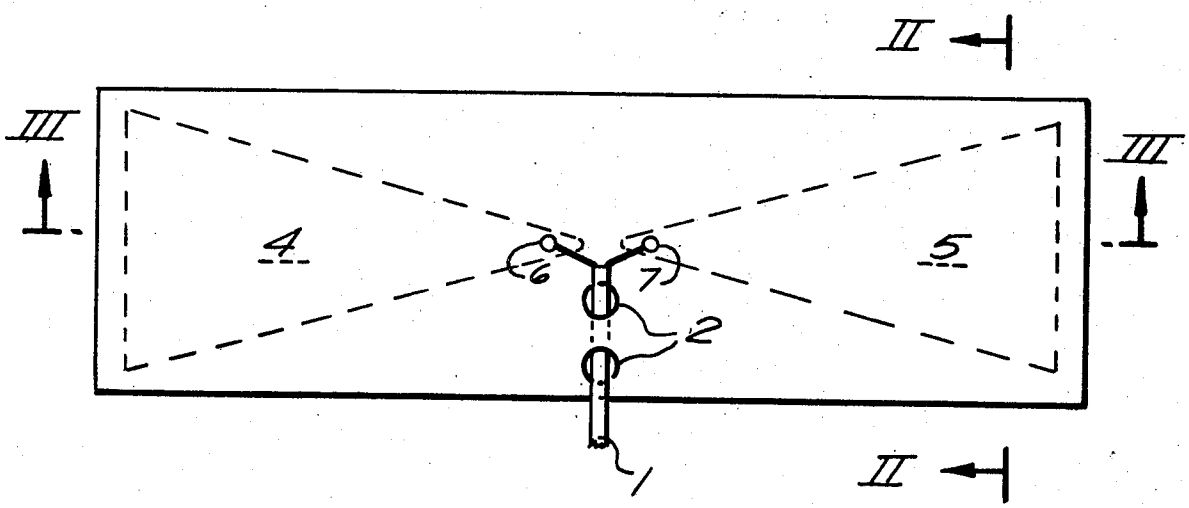
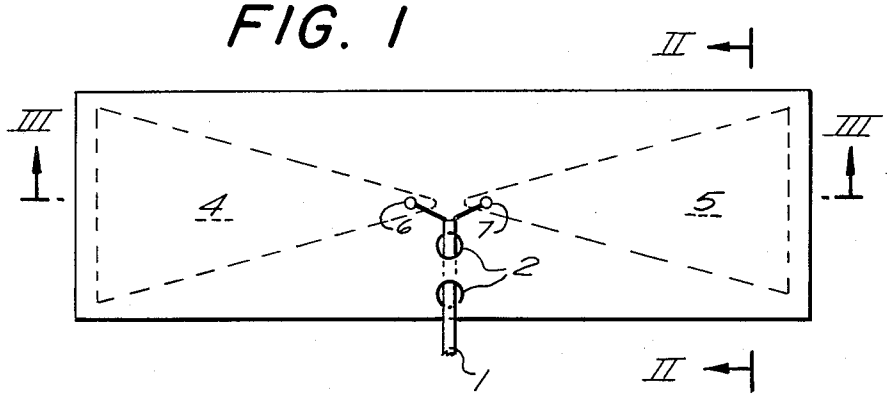


FIG. 1



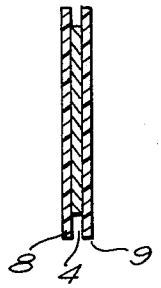


FIG. 2

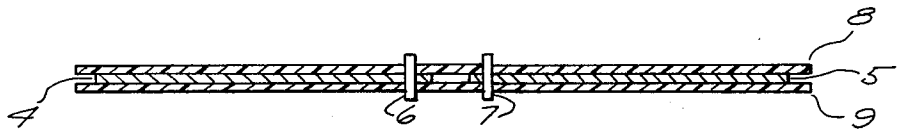
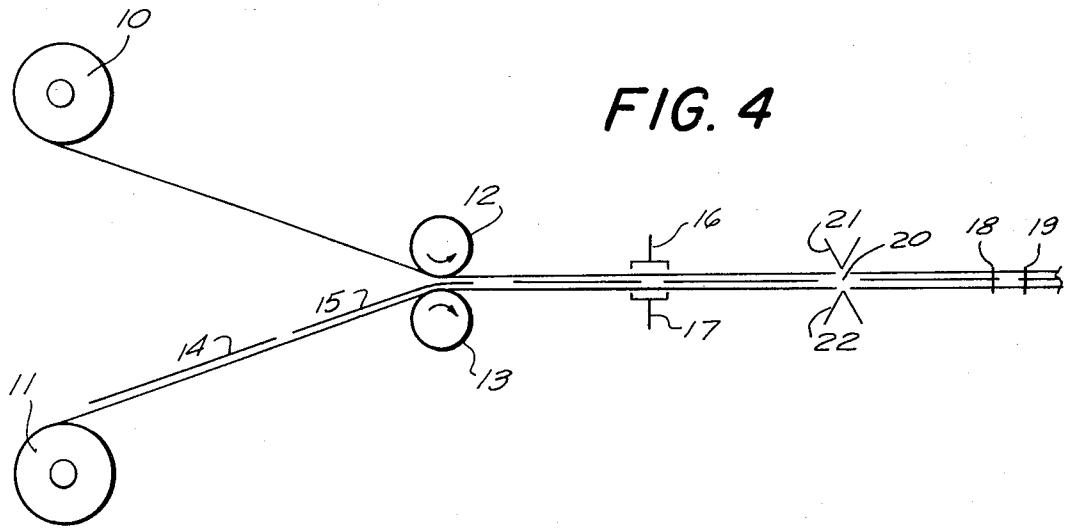


FIG. 3

FIG. 4



HIGH FREQUENCY ANTENNA

BACKGROUND OF THE INVENTION

The present invention relates generally to a high frequency antenna, and more particularly to an antenna which is especially useful for the reception of such high frequencies as are used in television broadcasting and in frequency modulated broadcasting.

Antennas of the type in question are, of course, well known by now, with the popularity of television and FM broadcasting being well established. Most of the antennas used for this purpose at this time are composed of a series of rods mounted more or less horizontally and essentially forming a dipole antenna with or without additional parasitic elements.

The difficulty with these known antennas is that they are relatively complicated to assemble and install, requiring technical knowledge for this purpose and necessitating the use of tools.

Another problem is that they are, of course, very noticable and cannot be concealed at all. This, however, is frequently considered an undesirable drawback, especially in situations where it is not possible to mount an antenna on the roof of a building, as for instance a private house, and where, therefore, the possibility of being able to conceal the antenna is most important.

SUMMARY OF THE INVENTION

It is, accordingly, an object of the present invention to provide an improved high frequency antenna which overcomes the aforementioned disadvantages.

More particularly, it is an object of the invention to provide an improved high frequency antenna which is light in weight and small, and which can be readily concealed from view so as not to interfere with or detract from the decor of the location in which it is installed.

Another object of the invention is to provide such an antenna which requires no separate space for its installation.

Still a further object of the invention is to provide such an antenna which is simple and economical to produce, and which can be readily installed by anyone without the use of tools and with only the merest modicum of technical knowledge.

In keeping with these objects and others which will become apparent hereafter, one feature of the invention resides in a high frequency antenna which, briefly stated, comprises a sheet composed of two superimposed laminae of electrically non-conductive synthetic plastic foil material, a pair of triangular antenna elements of metallic foil sandwiched between these laminae and having respective apices adjacent but spaced from one another and respective spaces remote from and at least substantially parallel to each other. Antenna conductors are provided and are connected with the respective antenna elements in the region of the apices thereof; these antenna conductors have free ends for connection to a user device.

It is important that the antenna elements be in fact "sandwiched" between the laminae of which the sheet of synthetic plastic foil material is composed. In other words, there will be bonding over the entire interface of the laminae with one another, and also over the interface of the antenna elements with the laminae. If the laminae were to be constructed as an envelope, being

connected only in the region of their margins, this would leave the antenna elements free to perform at least some shifting movement within the thus obtained cover and that is undesirable because it might interfere with the efficiency of operation of the novel antenna. Therefore, the laminae of foil material and the antenna elements from a single structural unit, not an envelope in which the antenna elements are accommodated.

The synthetic plastic foil material may be polyester film or it may be another suitable synthetic plastic material. The metal foil of the antenna elements may also be of various different materials, but aluminum foil has been found to be quite advantageous.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a top plan view of antenna according to the present invention;

FIG. 2 is a section taken on line II—II of FIG. 1;

FIG. 3 is a section taken on line III—III of FIG. 1; and

FIG. 4 is a diagrammatic side elevational view illustrating an arrangement for making the novel antenna.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing firstly the embodiment of the antenna as illustrated in FIGS. 1–3, it will be seen that the antenna utilizes a sheet composed of two superimposed and bonded-together laminae of electrically non-conductive synthetic plastic foil material, identified with reference numerals **8** and **9**, respectively. Such foil material may be Polyester, to name an example, and the thickness of each layer may be on the order of 0.0005 inch although this is of course only exemplary. It is also possible to use Polyester for one of the laminae and polyethylene for the other, or to use polyethylene for both.

Sandwiched between and also bonded to the laminae **8** and **9** is a pair of triangular antenna elements **4, 5** of metallic foil material, for instance aluminum foil having a thickness of 0.00035 inch although this again is only exemplary. The apices of the antenna elements **4, 5** face one another but are not in contact with each other, as clearly seen in FIGS. **1** and **3**. The bases of these triangular elements **4** and **5** are spaced from one another and extend in at least substantial parallelism with each other.

A pair of piercing terminals **6** and **7** is provided. These piercing terminals are of such type that they can be made to pierce the laminae **8, 9** and the material of the antenna elements **4** and **5**, that is they extend from one side of the sheet composed of the laminae **8** and **9** through the material of the antenna elements **4** and **5** to the other side of the sheet. They pierce the material of the antenna elements **4** and **5** in the region of the apices thereof, thus establishing an electro-connection. Terminals of an antenna conductor **1** may be already connected with these piercing terminals or they may be

subsequently connected to them to establish an electrical connection. To provide stress relief in the event a pull is exerted upon conductor 1, the sheet composed of the laminae 8 and 9 is provided in the region where the antenna elements 4, 5 are not located, with apertures 2 of which any desired number can be provided and which may have any desired configuration. The point is that the conductor 1 is passed through these apertures 2 so that they will alternately extend at one side and at the other side of the sheet. This provides for a certain amount of stress relief which may be further enhanced by bonding the conductor 1 to the sheet or otherwise securing it further to it, so as to avoid the possibility that if a pull is exerted on the conductor 1 the connection thereof with the piercing terminals 6, 7 might be severed.

The antenna according to the present invention may be installed in various ways in none of which it will interfere with the decor of the location where it is employed, in all of which it can be invisible and in none of which it will take up separate space. For instance, the antenna may be placed under a carpet, it may be placed behind an article of furniture, it may be placed in the attic where it could be placed on the floor or hung on the wall, or it may even be installed within a wall, that is for instance between the two sides of a dry wall construction. It has been observed that although the antenna operates satisfactorily if it is positioned in a horizontal position, for instance under a rug or a carpet, it will operate better if it is in an upright position. Even in such a position the antenna can be readily concealed, for instance by hanging it on the wall behind a picture.

FIG. 4 shows a simple installation which permits the manufacture of the novel antenna in an economical manner, and in a continuous operation. Two rolls of synthetic plastic material for the laminae 8 and 9 are identified with reference numerals 10 and 11, and the material is continuously withdrawn from these rolls 10 and 11 and fed between laminating rollers 12 and 13. The metallic foil antenna elements, here designated by reference numerals 14 and 15, are applied between the plastic laminae in suitable manner which is well known. They are applied before the foil material passes between the laminating rollers 12, 13 and are thus sandwiched between and bonded to the plastic foil, for instance by heating of one or both of the rollers 12, 13 which then bond the foils in surface-to-surface contact to the elements 14, 15.

Downstream of the laminating rollers 12 and 13 is provided a terminal inserting machine 16, 17 which inserts the terminals, here designated with reference numerals 18 and 19 but corresponding to the piercing terminals 6 and 7. Reference numeral 20, downstream of the terminal inserting machine 16, 17, designates a cutter having cutter blades 21, 22 which sever the continuous sheet into appropriate lengths, that is which sever the sheet in such a manner that an antenna will be obtained having the two antenna elements 14 and 15 (corresponding to the elements 4 and 5 of FIG. 1) sandwiched between and bonded to the synthetic plastic foil material, with the terminals 18 and 19 being inserted. The finished antenna is designated with reference numeral 23.

It is clear that the antenna according to the present invention is simple to produce, can be readily installed without tools and any kind of expertise, can be concealed from view and requires no space. Thus, all of the objects of the present invention are achieved.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a high frequency antenna, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meansing and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. A high frequency antenna, comprising a sheet composed of two superimposed laminae of electrically non-conductive synthetic plastic foil material; a pair of triangular antenna elements of metallic foil sandwiched between said laminae and having respective apices adjacent but spaced from one another and respective bases remote from and at least substantially parallel to each other; signal conductors connected with the respective antenna elements in the region of the apices thereof, and having free ends for connection to a user device; and connecting terminals connecting said conductors with said antenna elements and each having a portion piercing the respective laminae so as to make electrical contact with the respective antenna element from the exterior of said sheet, said laminae being provided outside the outline of said elements with a plurality of holes; and wherein said conductors extend through said holes alternately at one side and at the opposite side of said sheet.

2. An antenna as defined in claim 1, wherein said metallic foil is aluminum foil.

3. An antenna as defined in claim 1, wherein said synthetic plastic material is polyester.

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