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CENTER-FED WHIP ANTENNA

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment of any royalty thereon.

The present invention relates generally to improvements in antennas and the like and more particularly to a new and improved center-fed whip antenna wherein the antenna will continue to radiate energy after the upper section has been severed from the lower section.

The center-fed, vehicular, whip antenna generally acknowledged as superior in performance to the conventional base-fed, vehicular, whip antenna. Also, the center-fed whip antenna is more versatile than the base-fed antenna since the characteristics of the former are independent of the type or place of mounting. For example, the center-fed antenna need not be returned when moved from one mount to another.

However, one criticism of prior center-fed, vehicular whip antennas is that if the antenna were broken below the so-called "feed-point" and the upper section severed from the lower section, no radiation whatsoever would emit from the antenna.

The base-fed antenna will continue to radiate under these same conditions; however, the efficiency will be reduced, of course, but sufficient energy will still be radiated to handle emergency communications.

This feature of conventional radiation after the antenna has been broken is particularly important in military equipment. For example, it is not uncommon for a tank to have its antenna broken in battle by enemy gunfire, which results in effectively removing that particular tank from combat operation.

It is therefore an object of this invention to provide a center-fed whip antenna which will continue to radiate energy even after the antenna has been broken below the feed-point.

Other objects and features will become apparent from the following detailed description taken in connection with the accompanying drawings which form a part of this specification, and in which:

FIG. 1 is an elevation view of the antenna of the present invention;

FIG. 2 is a view similar to FIG. 1 but with a portion of the antenna severed; and

FIG. 3 is a sectional view of the antenna of FIG. 1 in the area of 3-3.

Referring to FIG. 1, there is shown an antenna 10 having an upper section 11, a lower section 12, and a base portion 13. The upper section 11 is removably connected to the lower section 12 at section 14. Base portion 13 comprises a flange 15 for mounting the antenna 10, and a threaded coaxial connector 16 for connecting to a coaxial line leading from the radio set (not shown).

As seen in FIG. 3, the lower section 12 comprises a coaxial cable 17 which is held by and makes an electrical connection with a plurality of springs 25. These springs 25 may be fastened in the recess 24 by soldering or any other well known method.

The outer conductor 20 of the coaxial cable will function as the lower radiator of the whip antenna 10 with the effective feed-point located at 22. Of course, this coaxial cable also functions as a transmission line for feeding energy to the upper section 11.

Upper section 11 comprises a tubular conductor 26 having a threaded end portion 27 removably connected to a threaded socket 28 in connector 23. This conductor 26 will function as the upper radiator of the dipole with the outer surface of conductor 20 acting as the lower radiator. As stated before, the inner surface of conductor 20 and the inner conductor 21 function as an R-F transmission line which feeds this dipole at 22.

The upper conductor 26 has a filling 30 of lightweight material, while the entire antenna 10 is covered with a relatively rigid insulating material 31 such as fiberglass. This material 31 is put on in two sections so that the upper section 11 may be removed from the lower section 12 at section 14. To prevent the connector 23 from moving relative to the insulating material 31, projections 32 are provided which protrude into material 31.

To provide for broadening of the antenna, the upper conductor 26 and the lower conductor 20 should be made as wide as possible. Also, to provide for easier matching and greater efficiency, the inner conductor 21 should be made as thin as possible. Of course, the thicker the antenna, the better the chances are of its being severed by some projectile. However, since the inner conductor 21 is relatively thin, and since it is protected to some degree by the outer conductor 22 and the material 31, its chances of being severed by the projectile are small.

In the prior art devices, this inner conductor 21 would normally be torn by the severed portion of the antenna and the break would occur at an uncontrolled place. All that would usually be left standing would be a portion or all of the outer conductor 20 which, by itself, could not radiate any energy.

In the present antenna, shown in FIG. 3, the inner conductor 21 is connected to the conductor 26 by the connector 23 which, because of springs 25, has only a fractional hold on the inner conductor 21. If the antenna should be severed somewhere below the feed point, connector 23 will merely slip away from the inner conductor 21, thereby leaving a portion of this inner conductor 21 exposed to function as the upper radiator of the dipole, as shown in FIG. 2. Although the efficiency of the antenna is now reduced, it will still be capable of radiating some energy.

Of course, if the antenna is broken above the feed point 22, there will be no problem since the remaining portion of the upper conductor 26 will still function as the upper arm of the antenna.

If the antenna is broken near the base, thereby removing substantially all of the outer conductor 20, the center conductor 21 will still radiate energy using the base 13 or the flange 15 as a counterpoise.

The center conductor 21 should be made of a length such that, if the antenna should be severed at the feed point 22, there will be a sufficient exposure of the inner conductor 21 to be capable of some radiation. The specific length will depend on the range desired and the dimensions of the antenna.

Since after the antenna is broken, the inner conductor 21 will be free to move against the outer conductor 20, an insulating cover should be applied to inner conductor 21. Also, the inner conductor 21 should also have some resiliency so as to snap up to a substantially vertical position after the upper portion is severed. The inner conductor could easily and inexpensively be fabricated of steel core covered with a copper layer followed by an insulating shell. The insulation, of course, should be omitted in the region where the springs 25 contact the
inner conductor. It can therefore be seen that regardless of the point at which the present antenna may be broken, assuming, of course, that the highly flexible and thin inner conductor 21 is not destroyed, radiation will still be feasible.

It should be understood that the foregoing disclosure relates to only a preferred embodiment of the invention and that numerous modifications or alterations may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. A center-fed whip antenna comprising: a lower conductor having a tubular outer conductor and a flexible inner conductor mounted coaxially therewith and spaced radially therefrom, coaxial connector means connected to the lower end of said lower conductor for connecting a utilization device from the lower end of said inner conductor to the lower end of said outer conductor; an upper conductor; and dielectric means mounting said upper conductor axially with said lower conductor and spaced from said outer conductor, said inner conductor at the upper end thereof extending axially a substantial distance beyond the upper end of said outer conductor and terminating in an electrical connection which is mechanically weaker under tension than the tensile strength of said inner conductor and said coaxial connector means, whereby when said outer conductor is broken off the inner conductor will remain in place and extend beyond the break to serve as a substitute antenna.

2. The antenna according to claim 1 and wherein said electrical connection comprises a friction means for providing a relatively weak mechanical connection and a relatively good electrical connection between said inner conductor and said upper conductor.

3. A center-fed whip antenna comprising upper and lower conductors; said lower conductor having a tubular outer conductor and a flexible inner conductor mounted coaxially therewith and spaced radially therefrom, coaxial connector means connected to the lower end of said lower conductor for connecting a utilization device from the lower end of said inner conductor to the lower end of said outer conductor; the upper end of said inner conductor extending axially a substantial distance beyond the upper end of said outer conductor; a metallic connector; said upper end of said inner conductor terminating in a friction connection with said metallic connector; and means on said metallic connector for mounting said upper conductor in axial relationship with said lower conductor and spaced from said outer conductor, whereby when a portion of said outer conductor is broken off the inner conductor will remain in place and extend beyond the break to serve as a substitute antenna.

4. The antenna according to claim 3 wherein said friction connection comprises at least one spring finger mounted on said metallic connector contacting the upper end of said inner conductor.

5. The antenna according to claim 3 and wherein a resilient dielectric cover extends from said outer conductor to said metallic connector for maintaining said metallic connector spaced from said outer conductor.

6. The antenna according to claim 3 and wherein said inner conductor comprises a thin, resilient rod covered by an insulating material throughout except for the upper end thereof.

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