

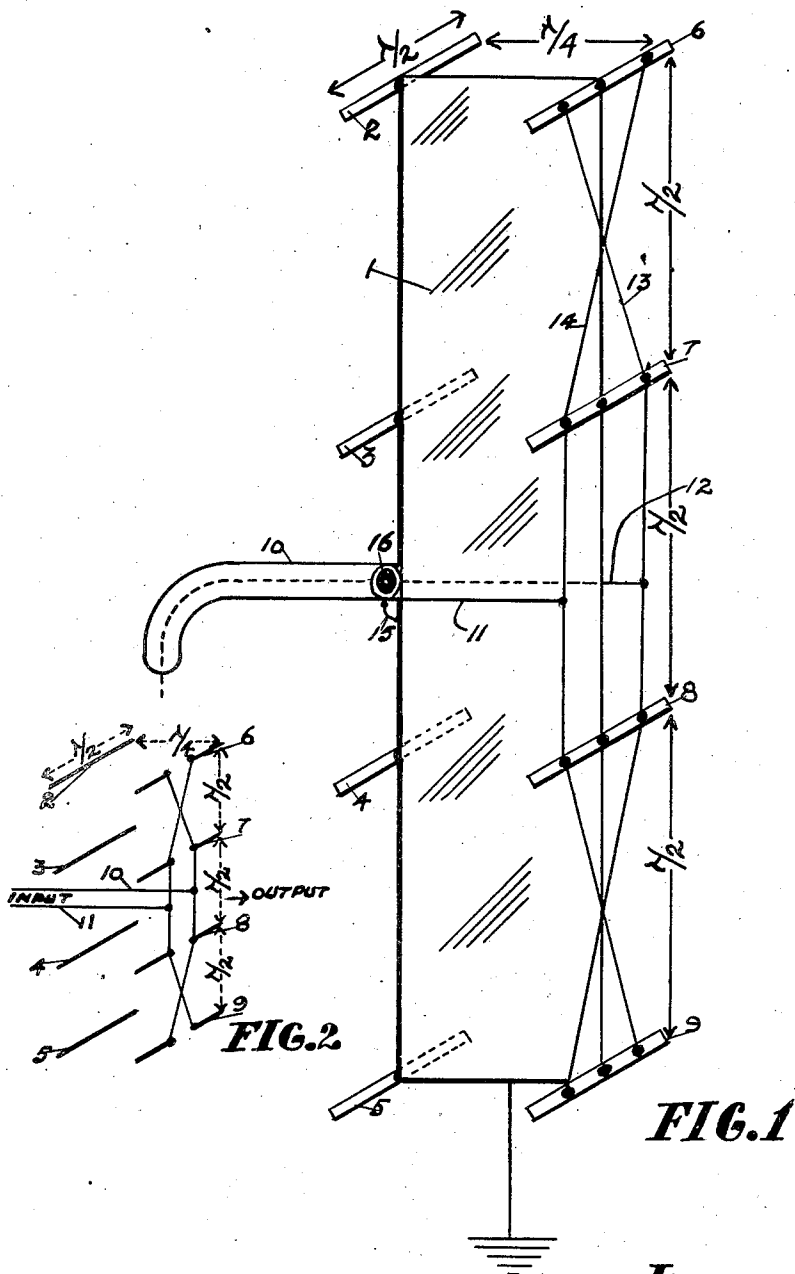
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ANTENNA SYSTEM

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ANTENNA SYSTEM

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This invention pertains to radio antenna systems and in particular to a novel method of constructing radio antennae which are to be erected at a point or points where such structures are exposed to the severity of the weather. This novel radio antenna system is specifically adapted to radio antenna systems which are known as short wave directional antennae.

This novel method of radio antenna construction combines well known and established radio and electrical characteristics in a form of construction which renders the structure rugged and rigid and gives it the required strength to withstand violent gusts of wind and substantially eliminates the detuning effects of the accumulation of ice and snow on the structure.

A rigid metal plate or metal mesh in a rigid metal frame, of such dimensions that its vertical length is in excess of its width, is maintained at ground potential. To one edge of this vertical frame there is secured a series of metallic radiating arms, parallel to one another and arranged in such a manner in their attachment to the grounded vertical frame that they are co-planar in a plane substantially perpendicular to the plane surface of the vertical frame.

To the opposite edge of the vertical frame a similar number of metallic reflecting arms are secured in such a manner that they are each co-planar in a horizontal plane to their associated radiating arms.

The radiators are shunt fed from a feeder line consisting of the usual coaxial cable terminated by the correct impedance at the transmitter as usual. At the point where the coaxial feeder cable enters the antenna, arrangements are provided for a high degree of insulation and protection from ice formation.

The above noted desirable features are realized by means of the novel structure shown, by way of example, in the drawings which accompany and form part of this specification and in which like reference numerals designate corresponding parts thereon.

In the drawings:

Fig. 1 is a perspective view of the complete antenna structure.

Fig. 2 is a diagrammatic representation of the functional and equivalent electrical characteristics of the structure shown in Fig. 1.

Referring now particularly to Fig. 1 which illustrates, by way of example, the novel structure as applied to a high frequency or short wave di-pole directional antenna adapted to horizontally polarize the radiated wave, the grounded

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plate or member 1 which may be a solid metal plate as shown having a length in excess of its width and a thickness sufficient to be self-supporting or it may be a rigid frame supporting a metal mesh surface, is provided with a plurality of radiating arms as 6, 7, 8 and 9. These are made of metal and are secured to one edge of the plate 1 as shown in a rigid manner as by bolting or, preferably, welding. They are separated one-half wavelength from each other and are parallel to each other and are co-planar in a plane substantially perpendicular to the plane surface of the plate 1. A series of reflector arms 2, 3, 4 and 5 are secured in a rigid manner, as by welding, to the other edge of the plate 1 and each of these arms is co-planar in a horizontal plane with its respective radiating arms as 6, 7, 8 and 9. These reflector arms are separated from their associated radiating arms one-quarter wavelength. They are maintained co-planar in a plane substantially perpendicular to the plane surface of the plate 1. The radiating arms as 6, 7, 8 and 9 are interconnected by means of conductors 13 and 14 as shown. These conductors are used for phasing the radiator wave and may be therefore termed phasing conductors. These conductors 13 and 14 are each electrically united with the radiating arms and no insulators are used in connecting these conductors to the antenna structure. A high frequency coaxial line or transmission line 10 which is terminated at the transmitter in the usual correct impedance is united with the plate 1 through an insulator 16 which closes the extremity of the transmission line. One of the conductors of the transmission line 10 is connected to the plate 1 by conductor 15 and through conductor 11 with the phasing conductor 14 while the other conductor of the high frequency line is connected by conductor 12 to the remaining phasing conductor 13.

Although these phasing conductors are connected directly to the metal arms as 6, 7, 8 and 9, thus eliminating the plurality of usual insulators and hence substantially eliminating the detuning effects of the accumulation of ice and snow on the structure, they are not short-circuited because the high frequency impedance of each of the radiating arms between the points of connection of the phasing conductors is so high that the functional and equivalent electrical characteristics of the antenna structure are the same as that indicated diagrammatically in Fig. 2—that is, the extremity of each of the radiating arms as 6, 7, 8 and 9 function electrically as

though they were insulated from the remaining portion of the arm.

It will be noted from the above that this antenna structure is rugged, simple and possesses the qualities to withstand accumulated ice and snow and also high wind pressure. It will be further noted that through the elimination of a multitude of insulators the detuning effects of the accumulated ice and snow are substantially eliminated.

While there has thus been disclosed only one embodiment of this novel structure, by way of example, it is to be thoroughly understood that numerous changes may be made therein and that it may be adapted to various types of antenna arrays without departing from the spirit or narrowing the scope of the invention as set forth in the claims as follows.

I claim:

1. An antenna system comprising, a metallic member of greater length than width, means for maintaining said member at ground potential, metallic radiating arms rigidly attached to one edge of said member parallel to each other and co-planar in a plane substantially perpendicular to the plane of the surface of said member, a metallic reflector arm for each of said radiating arms rigidly attached to the opposite edge of said member, each of said reflector arms being co-planar in a horizontal plane with its associated radiating arm and all of said reflector arms being co-planar in a plane substantially perpendicular to the plane surface of said member, phasing conductors connected with said radiating arms, a high frequency conductor connected to said member and to one of said phasing conductors, and a high frequency conductor connected to the other phasing conductor.

2. An antenna system comprising, a metallic plate of greater length than width and self-supporting, means for maintaining said plate at ground potential, a plurality of radiating arms rigidly attached to one edge of said plate parallel to each other and co-planar in a plane substantially perpendicular to the plane of the surface of said plate, a reflector arm for each of said radiating arms rigidly attached to the opposite edge of said plate, each of said reflector arms being co-planar in a horizontal plane with its associated radiating arm and all of said reflector arms being co-planar in a plane substantially perpendicular to the plane surface of said plate, phasing conductors connected with said radiating arms, a high frequency conductor connected to said plate and to one of said phasing conductors, and a high frequency conductor connected to the other phasing conductor.

3. An antenna system comprising, a metallic plate of greater length than width and self-supporting, means for maintaining said plate at

ground potential, a plurality of radiating arms rigidly attached to one edge of said plate spaced one-half wave-length apart and arranged parallel to each other and co-planar in a plane substantially perpendicular to the plane of the surface of said plate, a reflector arm for each of said radiating arms rigidly attached to the opposite edge of said plate, each of said reflector arms being co-planar in a horizontal plane with its associated radiating arm and being spaced one-quarter wavelength from said radiating arms, and all of said reflector arms being co-planar in a plane substantially perpendicular to the plane surface of said plate, phasing conductors connected with said radiating arms, a high frequency conductor connected to said plate and to one of said phasing conductors, and a high frequency conductor connected to the other phasing conductor.

4. An antenna comprising a metal plate of greater length than width vertically arranged and electrically grounded, a plurality of metallic radiating arms parallelly spaced apart and arranged in a common plane perpendicular to the plane of said plate and each attached to one longitudinal edge of said plate midway of their length, reflector means secured to the opposite longitudinal edge of said plate, phasing conductors connected with said radiating arms, a high frequency conductor connected to said plate and to one of said phasing conductors, and a high frequency conductor connected to the other phasing conductor.

5. An antenna comprising a metal member of greater length than width vertically arranged and electrically grounded, a plurality of metallic radiating arms arranged in a common plane perpendicular to the plane of said plate and attached to one longitudinal edge of said plate midway of their length and parallelly spaced apart one half wave length, reflector arms secured perpendicular to the opposite longitudinal edge of said plate and each in a plane coinciding with the horizontal plane of a corresponding radiating arm, phasing conductors connected with said radiating arm, a high frequency conductor connected to said metal member and to one of said phasing conductors, and a high frequency conductor connected directly to the other phasing conductor.

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