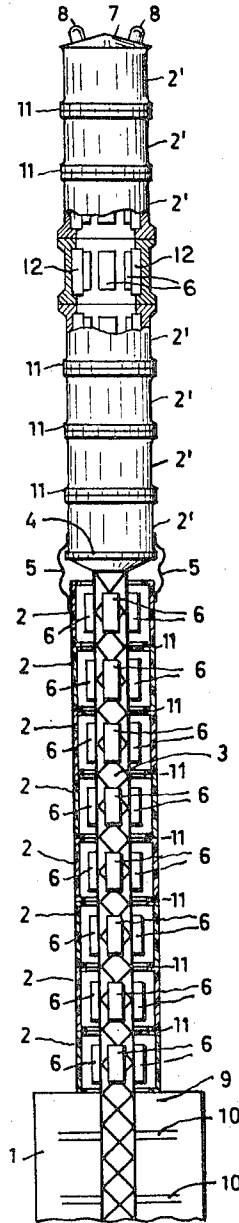


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DOUBLE MAST ANTENNA HAVING THE UPPER MAST SUPPORTED BY A CARRIER MAST WHICH EXTENDS THE LENGTH OF THE LOWER MAST
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DOUBLE MAST ANTENNA HAVING THE UPPER MAST SUPPORTED BY A CARRIER MAST WHICH EXTENDS THE LENGTH OF THE LOWER MAST

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The invention disclosed herein is concerned with an antenna mast of great height, made of tubular sections of insulating material, for antennas operating in the ultra short wave range or decimeter wave range.

The construction of a transmitter antenna with an array of directional antennas, for example, omnidirectional antennas operating in the ultra short wave range or in the decimeter wave range, is limited by the mechanical stability of the supporting elements of the array. This becomes particularly apparent when it is attempted to arrange upon a mast, tower or other carrier, in superposed relationship, a plurality of antennas for operation in the same or in different frequency ranges.

The invention relates to an antenna mast comprising tubular envelopes made of insulating material, assembled to form the facing or the mounting means for a plurality of antennas operating in the ultra short wave range or in the decimeter wave range, especially for television antennas, omnidirectional antennas and the like.

The principal object of the invention is to provide antenna masts of this kind, which are of great structural height and have sufficient mechanical stability, employing tubular sections made of insulating material.

In a known arrangement which attempts to solve the problems involved, the antenna elements are fastened to a carrier mast, and the whole structure is surrounded by a protective electrically permeable tubular envelope which is likewise mechanically directly fastened to the carrier mast. The disadvantage resides in the great weight which such an arrangement assumes when constructed so as to withstand the wind pressures that may be expected to act thereon. Moreover, entering into and climbing within the protective envelope are made practically impossible.

Another solution for the pertinent problems involved in connection with a sender antenna comprising dipoles, is described in the German auslegeschrift 1,078,643. The arrangement provides a tubular mast made of insulating material, serving as a carrier for the dipoles which are fastened to the inside wall thereof, and surround them as a protection against atmospheric influences. The dipoles are constructed as rigid units mounted with the aid of struts in a polygon arrangement on the inner wall of the self-supporting tubular envelope forming the mast, so that the tubular envelope, which is made of insulating material, serves as the sole carrier for the entire antenna arrangement. Accordingly, the protective tubular envelope forms the carrier element. The structural height is limited by the maximum permissible wall thickness of the elements forming the tubular envelope.

It has also been proposed to reinforce the known self-supporting tubular mast, made of insulating material, with the aid of auxiliary steel carriers within the respective dipole groups or by stiffening inserts disposed in the wall of the tubular envelope. Difficulties arise in connection with such structures due to the fact that the corresponding systems cannot be easily comprehended sta-

According to the invention, the above indicated drawbacks are overcome by arranging in superposed coaxial relation two separate self-supporting tubular mast portions or envelopes comprising tubular sections made of insulating material, and supporting the upper mast envelope upon a carrier mast which extends freely upwardly from the foundation of the lower mast portion, inside of the latter, without any direct mechanical connection with the tubular insulating sections of the lower mast envelope.

The structure according to the invention results in definite static conditions since the protective envelope or tubular structure of the lower antenna portion assumes the entire wind pressure acting thereon. The carrier mast for supporting the upper antenna envelope is thus completely free of wind pressure. The tubular antenna mast comprising tubular sections made of insulating material, can in this manner be constructed with considerably greater height, without entailing difficulties.

Details of the invention will appear from the appended claims and from the description of an embodiment which is rendered below with reference to the accompanying drawing.

The drawing shows an embodiment of an antenna mast made of tubular insulating material, comprising an upper envelope which is indicated in elevation and a lower envelope which is represented in sectional view.

Referring now to the drawing, numeral 1 indicates a foundation which is disposed, for example, on top of a tower or upon an antenna mast of greater diameter. Upon this foundation is built a self-supporting lower mast envelope comprising, for example, eight tubular sections 2 made of insulating material. A carrier mast 3 which is by suitable and known means held on the foundation 1 extends freely upwardly therefrom, through the interior of the tubular lower envelope made of insulating material, and carries an upper envelope made of insulating material constructed similarly of tubular insulating material sections 2'. The carrier mast 3 for supporting the upper mast envelope is constructed as a polygonal, for example, as a four-sided metal grid mast with considerably smaller cross-section than the tubular insulating sections of the corresponding envelope. There are no direct mechanical connections between the inner carrier mast 3 and the tubular insulating material sections 2 of the lower envelope of the mast.

At the upper end of the carrier mast 3 is provided a plate- or disk-like support 4 with a diameter corresponding approximately to that of the tubular insulating material sections, upon which is supported the tubular upper envelope of the mast. Numeral 5 indicates a flexible weather-resistant facing.

The antennas 6 in the lower mast envelope, which are, for example, constructed as dipoles, may be fastened, as shown, on the carrier mast 3, or may be fastened in known manner, by means of struts, on the inner walls of the respective tubular sections 2 of insulating material, as illustrated in German auslegeschrift 1,078,643. The antennas 6 in the upper mast envelope, which does not contain an interior carrier mast, are suitably held by struts 12 on the inner walls of the respective tubular envelope sections 2'. Numeral 7 indicates a top cover and numerals 8 indicate lamps for illuminating it.

The lowermost tubular section 2 of the lower mast envelope is held upon a suitable support 9 of the foundation 1. Numerals 10 indicate means for holding the carrier mast 3.

The tubular sections 2 and 2' are made, for example, of synthetic glass fiber material or of fiber glass material. Reinforcing rings or flanges 11 are provided at the

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ends of the tubular sections for the assembly thereof with adjacent sections.

There is in this manner provided an antenna structure comprising two separate tubular self-supporting insulating material mast envelopes which can move or sway independently responsive to wind pressure acting thereon. Antennas for identical or for different ranges, for example, television bands, can be provided in the respective lower and upper mast envelopes. The respective mast envelopes may be provided with separate antennas or may contain interconnected parts forming a common array.

Changes may be made within the scope and spirit of the appended claims which define what is believed to be new and desired to have protected by Letters Patent.

I claim:

1. An antenna mast for a plurality of antennas operating in the ultra short wave range or in the decimeter wave range, especially for television antennas, omnidirectional antennas and the like, comprising two separate individually self-supporting tubular envelopes arranged in superposed relationship, each envelope comprising a plurality of tubular sections made of insulating material, means forming a foundation on which the lower antenna envelope is supported, and a carrier mast supported by said foundation and extending freely upwardly therefrom within said lower envelope, on which the upper antenna envelope is supported.

2. An antenna mast according to claim 1, wherein said carrier mast is constructed as a polygonal metal grid mast with a cross-section smaller than that of the tubular envelope sections.

3. An antenna mast according to claim 2, comprising a plate-like member carried by said carrier mast at the upper end thereof for supporting said upper antenna envelope.

4. An antenna mast according to claim 3, comprising flexible means connecting the lower end of the upper tubular antenna envelope with the upper end of the lower tubular envelope.

5. An antenna mast according to claim 3, comprising flexible weather-resistant means enclosing the space between the lower end of the upper tubular antenna envelope and the upper end of the lower tubular antenna envelope.

6. An antenna mast comprising means forming a foundation, a carrier mast constructed as a polygonal

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metal grid mast secured to and upwardly extending from said foundation, a first tubular envelope likewise secured to and extending upwardly from said foundation, said first envelope comprising a plurality of superposed tubular sections made of insulating material surrounding said carrier mast radially spaced therefrom without any direct mechanical connection therewith, a plate-like support carried by said carrier mast at the top thereof, a second tubular envelope supported by and extending upwardly from said plate-like support, said second envelope likewise comprising a plurality of superposed tubular sections made of insulating material, antennas enclosed by said first and second tubular envelopes, and a flexible weather-resistant facing enclosing the space between the lower end of said second tubular envelope and the upper end of the first tubular envelope.

7. An antenna mast comprising two superposed coaxially vertically extending tubular envelopes, each envelope enclosing antennas, each envelope comprising a plurality of superposed tubular sections made of insulating material, means forming a foundation for directly supporting the lower one of said tubular envelopes, and supporting means for independently supporting on said foundation the upper one of said envelopes, said supporting means comprising a carrier mast made in the form of a polygonal metal grid mast fastened to said foundation and extending vertically freely upwardly therefrom interiorly of said lower tubular envelope without any direct mechanical connection therewith, and a plate-like support carried by said carrier mast at the upper end thereof for supporting said tubular upper envelope.

References Cited by the Examiner

UNITED STATES PATENTS

2,441,086	5/1948	Stinson	343—827	X
2,532,551	12/1950	Jarvis	343—872	X
2,760,191	8/1956	Blackmer et al.	343—872	X
2,771,606	11/1956	Kandoian	343—890	
3,153,239	10/1964	Adams	343—872	X

FOREIGN PATENTS

1,078,643	3/1960	Germany.
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