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PARASITIC ANTENNA ASSEMBLAGE

Original Filed March 30, 1956

2 Sheets-Sheet 1

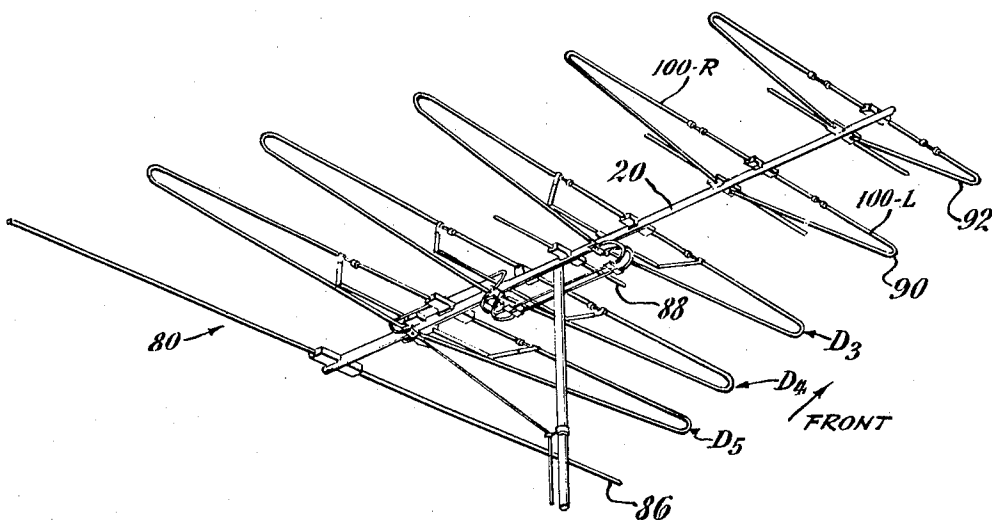


Fig. 1.

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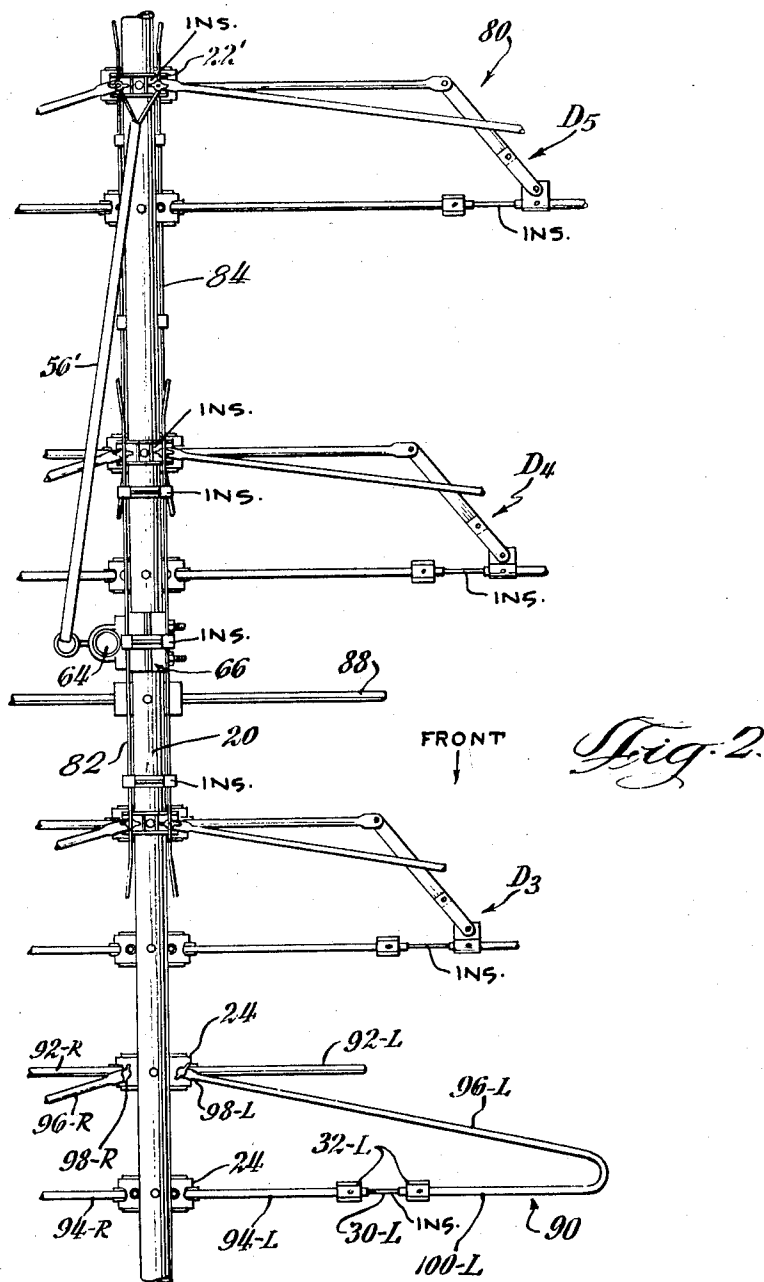
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PARASITIC ANTENNA ASSEMBLAGE

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Continuation of application Serial No. 616,710, October 18, 1956, now abandoned, which is a division of application Serial No. 575,153, March 30, 1956. This application November 6, 1957, Serial No. 695,480

11 Claims. (Cl. 343—815)

This invention relates generally to high frequency antennas, and more particularly is concerned with the construction of an antenna whose specific, although not exclusive, purpose is the reception of television signals over the presently known television spectrum in the so-called low and high channels, as opposed to the ultra-high frequency channels. The presently utilized channels of television signal transmission are in two bands designated "low" consisting of channels 2 to 6 inclusive and "high" consisting of channels 7 to 13 inclusive. The range of frequencies for the low band are 54 to 88 megacycles per second and for the high band are 174 to 216 megacycles per second.

This application is a continuation of my application Serial No. 616,710, now abandoned. The latter application comprises a divisional application of an application entitled "Composite Dipole Multi-Channel Television Antenna" Serial No. 575,153 filed March 30, 1956, by John F. Guernsey and Arthur E. Vail, now Patent No. 2,772,413. The applicant herein is one of the inventors of said patent application, the invention herein being limited to the construction of certain of the parasitic elements of the antenna shown and described and claimed in said co-pending application.

Reference may be had to the co-pending application for the objects intended to be achieved by the antenna there described, and to which the parasitic structures of this invention contributed, and it will be seen that the objects in general are the same herein. Specifically, the parasitic structure of the invention herein is intended for use, although not limited thereto, with a multi-channel antenna, for efficient reception over the television channels of today's broad spectrum.

A further object of the invention is the provision of an antenna which includes, a novel arrangement of parasitic elements, increasing the gain, and the rejection of back-received signals.

An important object of the invention lies in the provision of novel structure of the parasitic elements to enable them readily to be folded for transportation and storage.

Many other objects of the invention will become apparent as a description thereof proceeds, in connection with which preferred embodiments have been illustrated in drawings accompanying this specification, in order to make known the manner of construction and use of the invention.

In connection with the description, the nature of the theory of operation of the antenna of the invention will be alluded to, but this is only by way of a desire to assist in the understanding thereof and not by way of limitation. Whether the theory of operation is correct is immaterial, it being of prime importance that the structure described, illustrated and claimed performs the functions desired with outstanding and greatly improved results.

In the drawings, in which the same characters are used throughout the several figures to designate the same or similar parts:

Fig. 1 is a bottom perspective view of an antenna ar-

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ray for use on the television channels constructed in accordance with the invention claimed in said co-pending application, and having parasitic assemblages constructed in accordance with the invention claimed herein.

Fig. 2 is an enlarged bottom plan view of a portion of the antenna of Fig. 1 showing the details of one of the parasitic assemblages used on the front end of the antenna.

Reference will be made hereinafter to composite dipoles and such elements are the driven portions of the antenna array, the exact construction of which are set forth in considerable detail in said co-pending application. The parasitic assemblages or elements as they may be termed will give satisfactory results with arrays formed of such composite dipoles, but will also operate with other types of antennas, and hence it should be appreciated that the illustration of the particular driven elements is merely by way of example.

Referring now to the drawings, the antenna 80 is mounted on a metal boom 20 and supported on a vertical mast 64 by a clamp 66 of any suitable design. The driven elements of the antenna are three in number, and are designated D₃, D₄ and D₅ commencing with the foremost element. All are substantially identical in construction with the composite dipole described and claimed in said co-pending application and the dimensions thereof are chosen to cover the entire spectrum of the high and low bands of the television spectrum in three ranges. The frequencies for which the composite dipoles D₃, D₄ and D₅ are cut decrease from front to rear of the antenna and phasing harnesses 82 and 84 are provided for connecting the three driven elements in proper phase.

The elements of the antenna include, in addition to the driven ones, an integral rear reflector 86, which serves the low band; an intermediate high band element 88; and two composite parasitic elements 90 and 92. These latter two elements serve as directors on high and low bands. The foremost of these, namely 92, is the smaller. Otherwise, they are the same in construction.

Considering element 90 in Fig. 2, metallic brackets 24 are mounted on the boom 20, spaced apart a suitable distance, and properly arranged relative to the dipoles D₃, D₄ and D₅. A rear high band parasitic element 92 is mounted on the rear bracket and a front high band element 94 is mounted on the front bracket 24. The outer ends of the front high band element 94 are connected with diagonal elements 96 (designated 96-R and 96-L in association with the respective element halves 92-R—94-R and 92-L—94-L). The connection is achieved through insulating members 30-R and 30-L and clamps 32-R and 32-L.

There is a metallic connection between the elements 92, 94 and 96 and the boom, since all are parasitics. The ends of 96-R and 96-L may be secured to the rear bracket 24 by thumb nuts, for example, as at 98-R and 98-L, to aid in folding the composite assemblage 90.

On high frequencies, it is believed, the outboard portion 100-R and 100-L are of a phase cancelling the effect of the aligned outer portions of the slanted elements 96-R and 96-L thus providing in effect a high band parasitic element in addition to elements 92 and 94. On low frequencies, it is believed, the elements 92, 94 and the parts 100-R and 100-L have no effect upon the action of the slanted portions alone combining to form a V'd forward parasitic element.

The intermediate element 88 acts either as a reflector for high band elements in the composite dipole D₃ or as a director for high band elements in composite dipoles D₄ and D₅ depending upon the frequency at which the antenna 80 is being operated.

To aid in folding, the inner ends of the elements 94-R and 94-L are pivoted to the bracket 24 to which they are attached.

The antenna 80 is connected to the receiver by the transmission line 56' which has its terminals engaged with appropriate binding posts of the bracket 22' which supports the dipole D₅ on the boom 20.

In order to provide sufficient information to enable one skilled in the art to construct the antenna of the invention, reference may be had to the said co-pending application for the details and dimensions of a practical embodiment. For such embodiment, the details of the parasitic assemblages 90 and 92 as set forth hereinafter.

Parasitic 90

	Inches
Length of 94 end to end-----	24.5
Length of 92 end to end-----	24.5
Length of 100-L (or 100-R)-----	10.5
Length of 96-L (or 96-R)-----	25
Length of 30-L (or 30-R)-----	1

Parasitic 92

This element may either be the same size as element 92 or proportionally smaller, as for example, to resonate at slightly higher frequencies.

The dimensions between D₃ and 90, and between 90 and 92 are both approximately 13 inches.

The parasitic assemblages are disposed in a horizontal plane and hence present very little resistance to the wind and produce little moment upon the mast 64. Considerable variation in the dimensions given is feasible and this is well within the purview of the invention, since it will be obvious that the artisan will adapt the invention to the particular type of antenna array used with suitable changes.

What it is desired to secure by Letters Patent of the United States is:

1. A parasitic assemblage for an antenna comprising a symmetrical triangular wing configuration, the base of the triangle having a first center radiating element and outer collinear radiating elements each of substantially half the length of the said first center element, integral reverse-bent slanted extensions of said outer element meeting at the center to form the apex of said triangular wing configuration and being spaced from said base, and a second center radiating element at said apex having a length substantially that of the said first center radiating element and being substantially parallel therewith.

2. In an antenna array mounted on a conducting horizontal boom arranged in the direction of maximum directivity of the said antenna, a parasitic assemblage cooperating with said array and comprising a symmetrical triangular wing formation having substantially greater length measured from tip to tip transverse of the boom than its dimension along the boom, there being a base portion normal to the boom and two slanted sides meeting the base portion at the outer ends thereof and joined with said boom, the base portion being formed of a central radiating element conductively connected with the boom and resonant at a given frequency, an outboard element mechanically mounted collinear with each end of the central element but insulated therefrom and having a length of the order of half of the central radiating element, and the slanted sides each comprising a radiating element connected to the respective outer ends of the outboard elements and to the boom to form the apex of the said triangular wing formation.

3. A structure as claimed in claim 2 in which the length of each of the said slanted sides is approximately the length of the central radiating element.

4. A structure as claimed in claim 2 in which there is an additional radiating element centered on the boom at the said apex and having a length substantially that of the said first mentioned central radiating element.

5. The combination with a multi-channel antenna array having a plurality of driven elements arranged along a conducting boom transversely thereof, and the boom be-

ing disposed horizontally with its axis aligned with the direction from which the optimum signal is to be received, of a parasitic assemblage cooperating with the said array and comprising a triangular wing configuration having a greater dimension transverse of the boom than along the boom, the wing configuration being substantially in the same plane as the driven elements with the apex of the triangular wing configuration pointing rearward of the antenna, there being a base portion formed of a center dipole element and outer half-dipole elements insulated therefrom but all collinear, slanted extensions connected with the ends of the half-dipole elements and meeting to form the sides of the configuration and the apex thereof, and a second dipole element at the apex substantially parallel with the first dipole element and of the same electrical length.

6. A structure as claimed in claim 5 in which there are a plurality of said parasitic assemblages, but of dimensions decreasing toward the forward end of the boom.

7. In an antenna for high frequency, a metallic boom, a composite parasitic assemblage comprising a pair of parallel dipole elements resonant at a given frequency mounted at their centers spaced from one another for augmenting parasitic action along the axis of the boom, an outboard extension on each end of one dipole element insulated therefrom and substantially shorter than said one dipole element, and a conductor connected from each end of the outboard extensions to the boom at substantially the point where the second dipole element is mounted and thereby forming with the first dipole element and its outboard extensions a shallow isosceles triangle bisected by the boom, and with the second dipole element at its apex.

8. A parasitic assemblage for an antenna array mounted on a horizontal boom and comprising a symmetrical triangular wing configuration, the base having a center dipole element and outer collinear half-dipole elements, integral reverse bent slanted extensions of said half-dipole elements meeting at the apex of said configuration a distance spaced along said boom from said base, and a second dipole element at said apex parallel with the first said dipole element.

9. In combination with an antenna array having a plurality of elements arranged generally in a horizontal plane, and mounted along the length of a boom transversely thereof, a parasitic assemblage including radiating elements of isosceles triangular structure, the base of the structure being arranged normal to the boom and being substantially longer than the equal sides, the said sides meeting at the boom, one support bracket mounting the base and a second support bracket mounting the sides at their meeting, the base being formed of halves pivotal on the said one support bracket, and the sides being detachable from the second support bracket to enable the triangular structure to be folded generally along the length of the boom.

10. A parasitic assemblage for an antenna comprising a symmetrical triangular wing configuration, the base of the triangle having a first center radiating element and outer collinear radiating elements each of substantially half the length of the said first center element, and integral reverse-bent slanted extensions of said outer element meeting at the center to form the apex of said triangular wing configuration and being spaced from said base.

11. A parasitic assemblage for an antenna array mounted on a horizontal boom and comprising a symmetrical triangular wing configuration, the base having a center dipole element and outer collinear half-dipole elements and integral reverse bent slanted extensions of said half-dipole elements meeting at the apex of said configuration a distance spaced along said boom from said base.