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ANTENNA DIRECTOR

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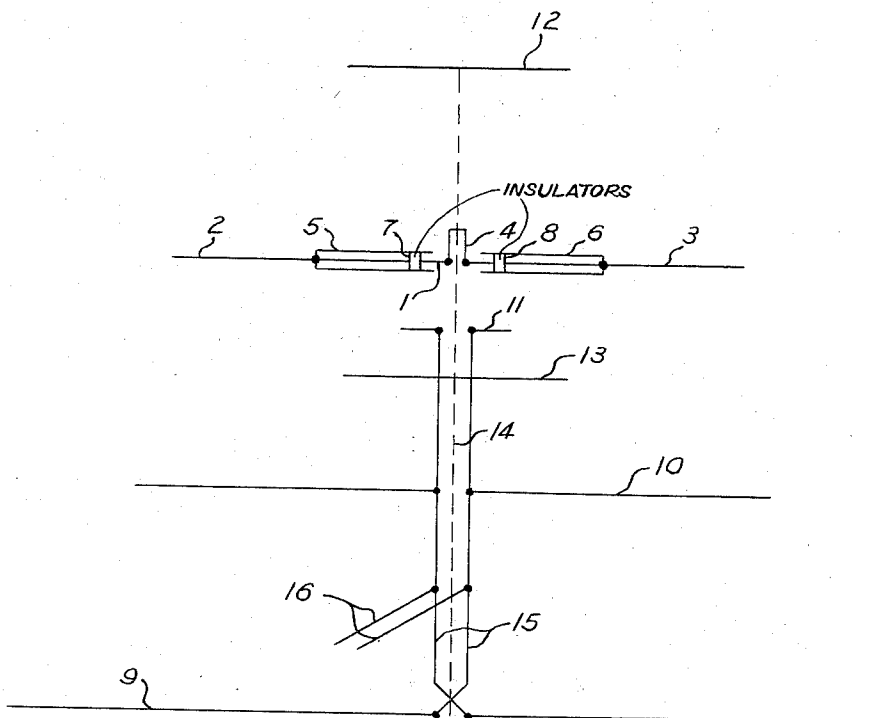


FIG. 2

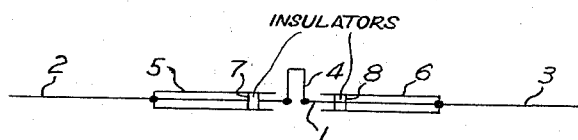


FIG. 1

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This invention relates to antennas and more particularly to a director used in an antenna system which will function effectively over a wide range of frequencies.

The television antenna art has developed a Yagi type antenna system which is designed to receive signals that vary over several bands of frequencies. These bands are in the very high frequency range, the low band which range from 54 to 88 megacycles and the high band which ranges from 174 to 216 megacycles, and in the ultra high frequency range a band from 470 to 890 megacycles. The Yagi type antenna system produces a gain by placing several parasitic elements in alignment with the driven element. The parasitic elements that are so placed between the driven element and the source of the signal are called directors and the others are called reflectors. The electrical properties of known directors are such that they will give a gain for one of the bands, but very little or no gain for the other bands.

It is therefore an object of this invention to provide a director used in an antenna system that will give a substantial gain for both the low band and the high band of frequencies in the very high frequency range and the ultra high frequency band used in television broadcasting.

Another object of this invention is to provide a director used in an antenna system that will give a substantial gain over a wide range of frequencies.

Another object of this invention is to provide a director used in an antenna system that will function effectively over a wide range of frequencies and is simple and inexpensive to construct.

Further objects and advantages of this invention will become more readily apparent from the following drawings, descriptions and claims.

In the drawings Fig. 1 is a view of the director and Fig. 2 is a view of an antenna system using the director.

The director 1 is composed of two sections 2 and 3 which are connected at their ends by a quarter wave length stub 4 for near the ultra high frequency range. A quarter wave length stub 5 for near the high end of the high band in the very high frequency range is connected near the middle of section 2. Another quarter wave length stub 6 for near the high end of the high band in the very high frequency range is connected near the middle of section 3. The quarter wave length stubs 4, 5 and 6 may be positioned on the sections 2 and 3 so as to be substantially in a single plane. The open ends of the quarter wave length stubs 5 and 6 are held in position near the quarter wave length stub 4 by the insulators 7 and 8 which are fastened to the sections 2 and 3.

One type of antenna system in which the director 1 may be used is shown in Fig. 2. The antenna system is composed of a low band half wave length dipole driven element 9, a high band full wave length dipole driven element 10, an ultra high frequency band half wave length dipole driven element 11, two high band directors 12 and 13 and the director 1. The dipole driven elements 9, 10 and 11 and the directors 1, 12 and 13 are held in position in a single plane by a supporting rod 14.

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The dipole driven elements 9, 10 and 11 are connected by conductors 15. A transmission line 16 is connected to the conductors 15.

The electrical properties of the director 1 are such that it will give good gain to the antenna system in the low band, the high band and the ultra high frequency band. The electrical properties of the quarter wave length stubs 5 and 6 are such as to make the sections 2 and 3 of the director 1 effectively disconnected half wave length high band directors for the high end of the high band. The quarter wave length stubs 5 and 6 have little or no effect at the low end of the high band. Therefore the quarter wave length stub 4 is inserted between the sections 2 and 3 of the director 1 to improve the phasing of the sections 2 and 3 of the director 1 at the low end of the high band. The quarter wave length stub 4 also has the effect of making the two sections 2 and 3 of the director 1 appear to be a single half wave length director for the low band. The quarter wave length stub 4 and the quarter wave length stubs 5 and 6 have the effect of making the sections 2 and 3 effectively disconnected half wave length directors for the ultra high frequency band. By making the quarter wave length stub 4 for near the ultra high frequency band, the over all length of the director 1 is increased over that possible if the quarter wave length stub 4 would be for the very high frequency bands.

The director 1 may be used in many antenna systems having different types of driven elements and having other directors and reflectors. It can be readily seen that the director may be used with driven elements of the folded dipole type of other types. No reflectors are shown but they may be added to the antenna system without impairing the effectiveness of the director 1. The plane of the positioning of the ultra high frequency stub and the very high frequency stubs is not critical. The director 1 may be also used as a driven element as well as a director.

I claim:

1. An antenna system comprising an ultra high frequency band driven element, a very high frequency high band driven element, a very high frequency low band driven element and a parasitic element so arranged as to be a director and comprising two half wave length high band sections connected together at one end of each section by an ultra high frequency quarter wave length stub, a very high frequency quarter wave length stub connected at its closed end to one of the two sections and another very high frequency quarter wave length stub connected at its closed end to the other of the two sections.

2. An antenna system comprising an ultra high frequency band driven element, a very high frequency high band driven element, a very high frequency low band driven element and a parasitic element so arranged as to be a director and comprising two half wave length high band sections connected together at one end of each section by an ultra high frequency quarter wave length stub, a very high frequency quarter wave length stub connected at its closed end to one of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub, another very high frequency quarter wave length stub connected at its closed end to the other of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub.

3. An antenna system comprising an ultra high frequency band driven element, a very high frequency high band driven element, a very high frequency low band driven element and a parasitic element so arranged as to

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be a director and comprising two half wave length high band sections connected together at one end of each section by an ultra high frequency quarter wave length stub, a very high frequency quarter wave length stub connected at its closed end to near the middle of one of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub, another very high frequency quarter wave length stub connected at its closed end to near the middle of the other of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub.

4. An antenna system comprising an ultra high frequency band driven element, a very high frequency high band driven element, a very high frequency low band driven element and a parasitic element so arranged as to be a director and comprising two half wave length high band sections connected together at one end of each section by an ultra high frequency quarter wave length stub, a quarter wave length stub for the high end of the high band in the very high frequency range connected at its closed end to near the middle of one of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub, another quarter wave length stub for the high end of the high band in the very high frequency range connected at its closed end to near the middle of the other of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub.

5. An antenna system comprising a very high frequency high band driven element, a very high frequency low band driven element and a parasitic element so arranged as to be a director and comprising two half wave length high band sections connected together at one end of each section by an ultra high frequency quarter wave length stub, a very high frequency quarter wave length stub connected at its closed end to one of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub, another very high frequency quarter wave length stub connected at its closed end to the other of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub.

6. An antenna system comprising a very high frequency high band driven element, a very high frequency low band driven element and a parasitic element so arranged as to be a director and comprising two half wave length high band sections connected together at one end of each section by an ultra high frequency quarter wave length stub, a very high frequency quarter wave length stub connected at its closed end to near the middle of one of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub, another very high frequency quarter wave length stub connected at its closed end to near the middle of the other of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub.

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ter wave length stub, a very high frequency quarter wave length stub connected at its closed end to near the middle of one of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub, another very high frequency quarter wave length stub connected at its closed end to near the middle of the other of the two half wavelength high band sections and having its open end positioned near the ultra high frequency quarter wave length stub.

7. An antenna system comprising a very high frequency high band driven element, a very high frequency low band driven element and a parasitic element so arranged as to be a director and comprising two half wave length high band sections connected together at one end of each section by an ultra high frequency quarter wave length stub, a quarter wave length stub for the high end of the high band in the very high frequency range connected at its closed end to near the middle of one of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub, another quarter wave length stub for the high end of the high band in the very high frequency range connected at its closed end to near the middle of the other of the two half wave length high band sections and having its open end positioned near the ultra high frequency quarter wave length stub.

8. An antenna system comprising a very high frequency high band driven element, a very high frequency low band driven element and a parasitic element so arranged as to be a director and comprising two half wave length high band sections connected together at one end of each section by an ultra high frequency quarter wave length stub, a very high frequency quarter wave length stub connected at its closed end to one of the two sections and another very high frequency quarter wave length stub connected at its closed end to the other of the two sections.

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