Jan. 5, 1954 W. F. HICKSON ET AL 2,665,380

AERIAL ARRANGEMENT

Filed Nov. 9, 1949

3 Sheets-Sheet 1

FIG. 1.

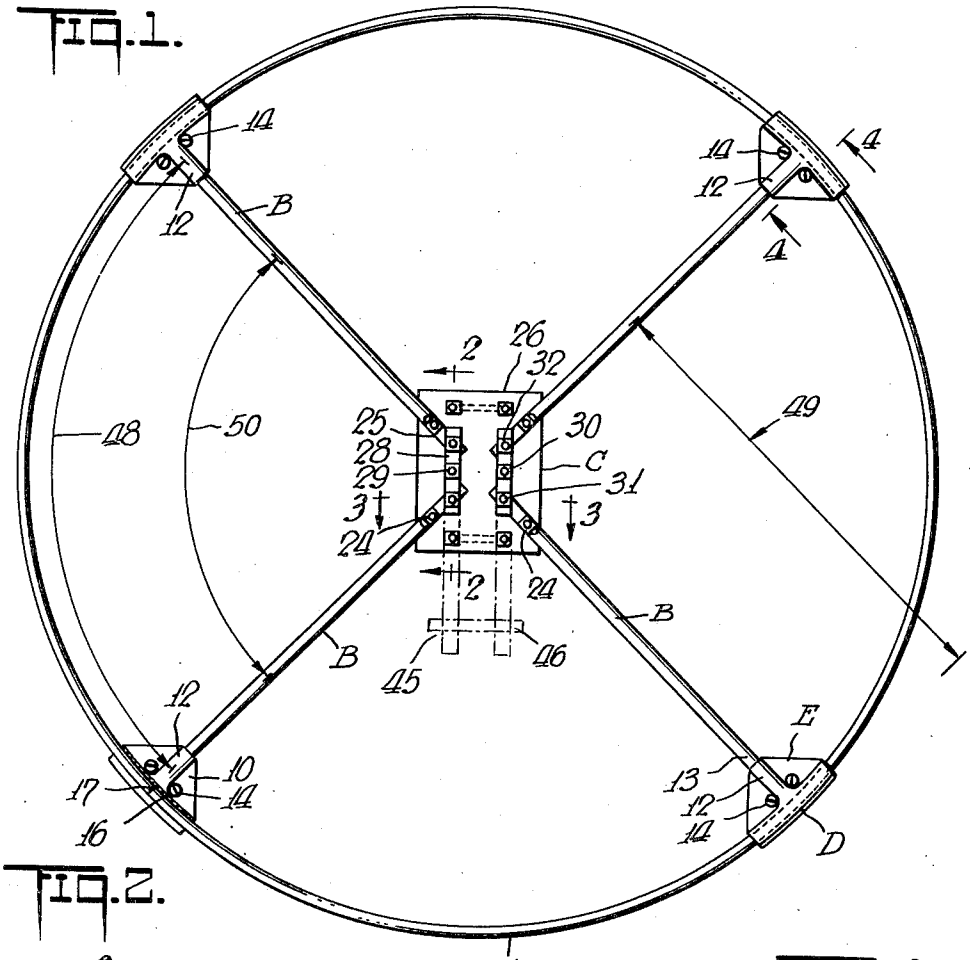


FIG. 2.

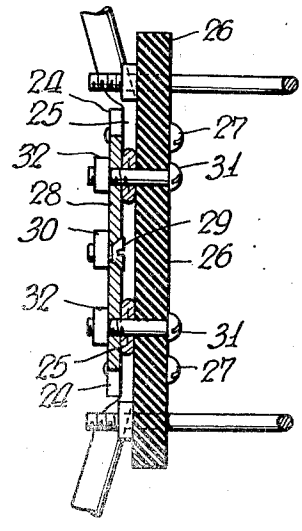


FIG. 3.

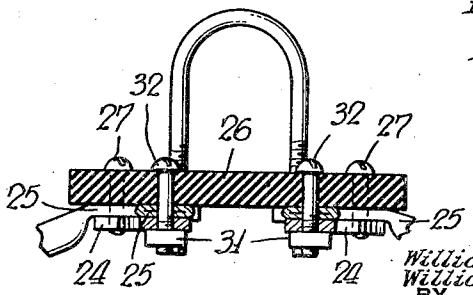
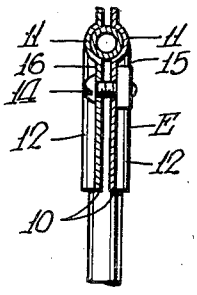


FIG. 4.



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AERIAL ARRANGEMENT

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FIG. 5.

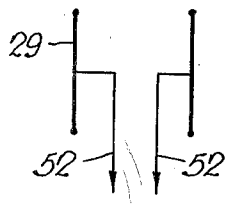


FIG. 6.

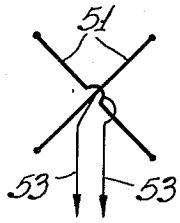


FIG. 7.

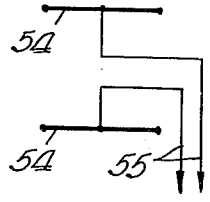


FIG. 8.

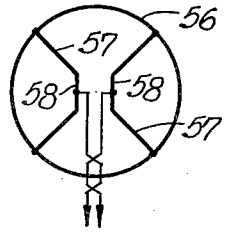


FIG. 9.

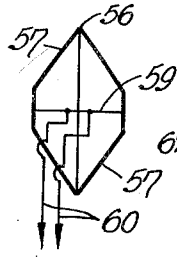


FIG. 10.

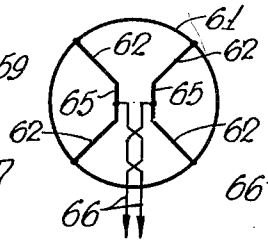


FIG. 11.

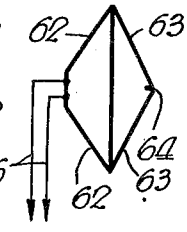


FIG. 12.

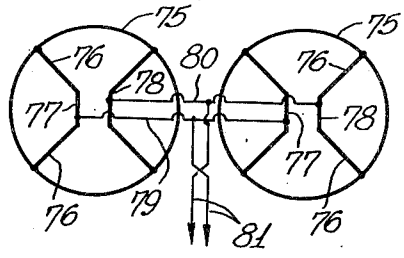


FIG. 13.

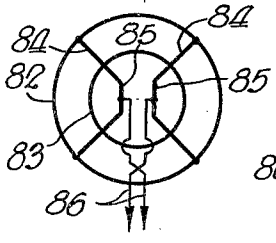


FIG. 14.

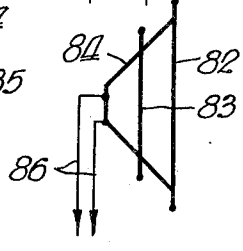


FIG. 15.

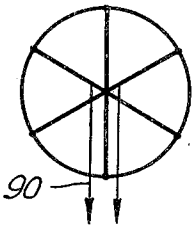


FIG. 16.

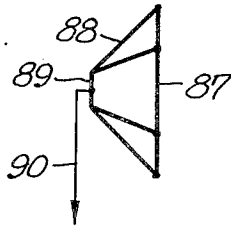


FIG. 17.

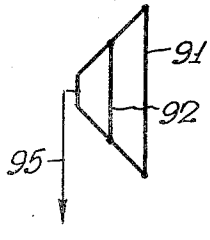


FIG. 18.

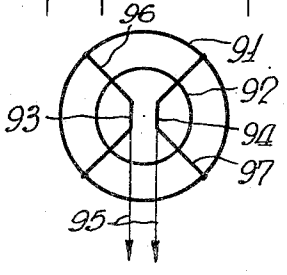


FIG. 19.

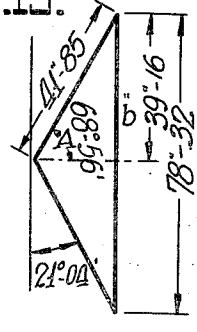
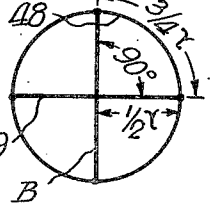


FIG. 20.



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AERIAL ARRANGEMENT

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FIG. 21.

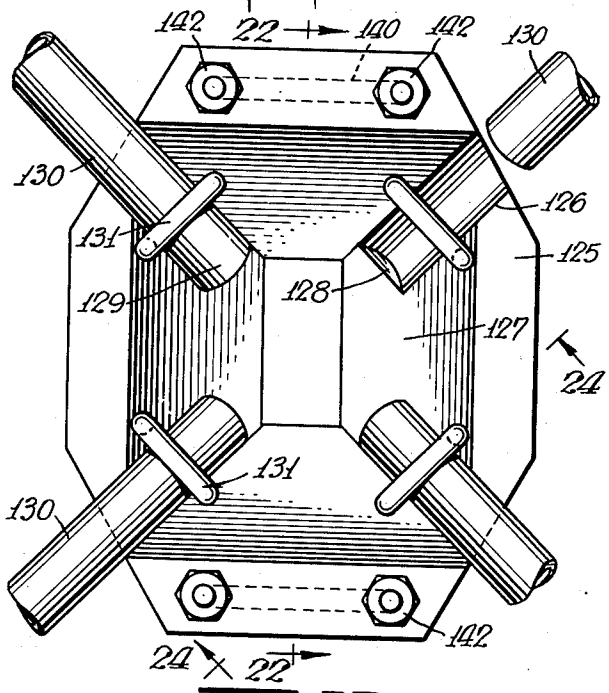


FIG. 22.

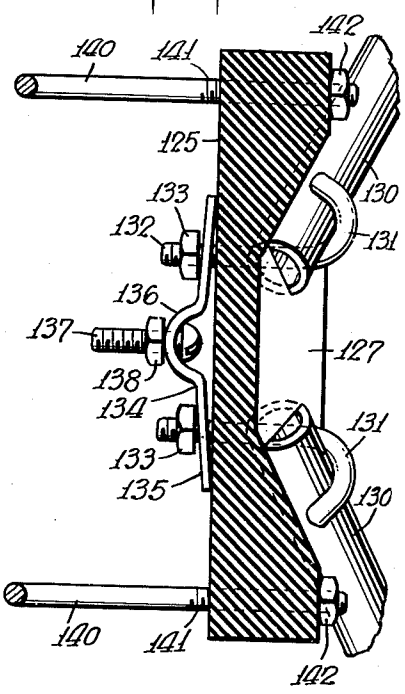


FIG. 23.

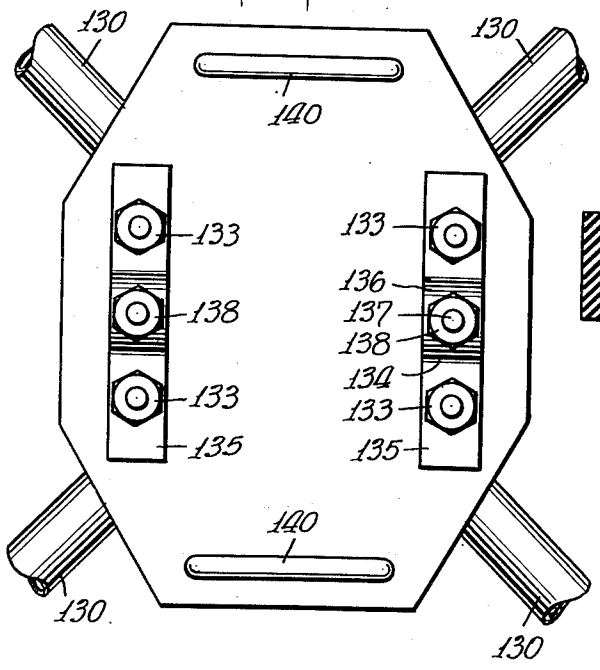
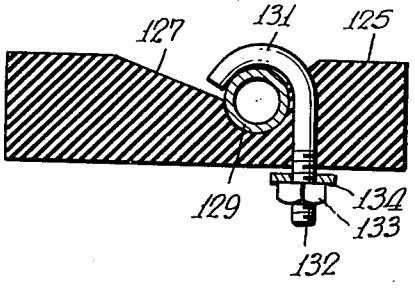


FIG. 24.



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Patented Jan. 5, 1954

2,665,380

UNITED STATES PATENT OFFICE

2,665,380

AERIAL ARRANGEMENT

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Application November 9, 1949, Serial No. 126,413

7 Claims. (Cl. 250—33)

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The present invention relates to an aerial arrangement and it particularly relates to a television aerial.

It is among the objects of the present invention to provide a simple, inexpensive, readily mounted and dismounted, adjustable television aerial which will have high fidelity in bringing in television signals and which may be mounted exteriorly or interiorly on roofs or on windows, as the case may be.

A further object is to provide a novel, improved television aerial which will cover substantially an entire television range without constant adjustment and with assurance that most faithful reproduction will be obtained with maximum reception from various television broadcasting stations, regardless of their distance or angular location within the normal television broadcasting range.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

In accomplishing the above objects, it has been found most satisfactory, according to one embodiment of the present invention, to provide a circular aerial construction desirably formed of light-weight aluminum, brass or magnesium tubing having a plurality of equally spaced, radially extending bars or braces. The arcuate divisions of the circle between the ends of the bars are equivalent to about three-quarters of an average wave length while the radial bars, braces or aerial elements average about one-half a wave length.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described, and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claims appended hereto.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:

Fig. 1 is an elevational view of one form of aerial according to the present invention.

Fig. 2 is a vertical transverse fragmentary sectional view upon the line 2—2 of Fig. 1, upon an enlarged scale as compared to Fig. 1.

Fig. 3 is a transverse vertical sectional view

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upon the line 3—3 of Fig. 1, upon an enlarged scale as compared to Fig. 1.

Fig. 4 is a fragmentary transverse vertical sectional view upon the line 4—4 of Fig. 1, upon an enlarged scale as compared to Fig. 1.

Figs. 5, 6 and 7 are, respectively, diagrammatic plan views showing the manner of connecting or feeding the antenna at the center thereof and also showing the lead-off wires.

Figs. 8 and 9 are, respectively, front elevational and side elevational views of an alternative form of antenna construction in which the radial elements extend inwardly and diverge outwardly on each side of the main circle and in which the transverse connecting members are connected to feeders.

Figs. 10 and 11 are, respectively, front elevational and side elevational views of another alternative antenna form in which the radial members diverge inwardly in both directions from the circular outer member but are provided with feeders on only one side of the antenna.

Fig. 12 is a diagrammatic front elevational view of still another alternative form showing two or more antenna in phase with each other.

Figs. 13 and 14 are, respectively, front and side elevational views showing an alternative form of antenna with several circular elements positioned at several different distances from the center of the antenna.

Figs. 15 and 16 are, respectively, front and side elevational views of an antenna construction with a different arrangement of radial members.

Figs. 17 and 18 are, respectively, side and front elevational views of an alternative form of antenna arrangement with a plurality of circular elements at different radial distances.

Figs. 19 and 20 are, respectively, side and front elevational diagrammatic views, Fig. 19 being on a somewhat larger scale as compared to Fig. 20, showing both linear and angular dimensions.

Figs. 21 to 24 show an alternative central supporting structure which may be utilized in connection with the aerial arrangements of Figs. 1 to 20, in which Fig. 21 is a fragmentary front elevational view of the central arrangement, Fig. 22 is a vertical transverse sectional view upon the line 22 of Fig. 21, Fig. 23 is a rear elevational view, and Fig. 24 is a fragmentary transverse sectional view upon the line 24—24 of Fig. 21.

Referring to Fig. 1, there is a circular element A and a plurality of radial ribs, bars or braces B having a central mount C. The elements A and B may be formed of brass, aluminum or magnesium tubing and they may be connected at the points D by the clips E.

The clips E, as shown in Fig. 4, consist of the plates 10 having the outwardly bridged or channel portions 11 to receive the circular member A and the radial channel portions 12 to receive the ends 13 of the radial elements B. The plates are held together by the screws 14 and the nuts 15, which extend through the contacting corners 16 of the plates 10.

The ends of the circular element A may also be joined within one of said clamping elements E, as for example indicated at the point 17 in Fig. 1.

Interiorly, the flattened ends 25 of the radial elements B are mounted upon a molded plastic or insulating board 26 by the bolts 27 and the nuts 24.

The ends 25 of the radial members B are connected, by the bars 28, by the bolts 31 and the nuts 32 to the insulating plate 26 as well as the flattened ends 25 of the radial members B.

The nuts 30 and the bolts 29 enable connection of wire conductors 52 leading down from the bars 29 to the receiving set (see Fig. 5).

Referring to Fig. 1, the stub bars 45 constitute continuations of the connection straps 28 and they have an adjustable impedance at 46. The stub bars 45 and the adjustable impedance 46 give a matching effect to enable adjustment of the antenna construction of Figs. 1, 2, 3 and 4.

By adjusting the impedance 46, it is possible to match the antenna sets having an impedance of about 300 ohms, but the impedance may readily vary from 72 to 300 ohms.

By the arrangement as shown in Figs. 1 to 4, it is possible to obtain best reception over the entire television band, particularly where the distance of each section of the tube A indicated by the dimension 48 is ¾ of a wave length and the distance of each radius bar, as indicated by the dimension 49 is ½ of a wave length, such wave length being adjusted substantially at the middle of the complete television band.

The normal television band now extends from 54 to 216 megacycles, with each broadcasting station having a band about six megacycles wide.

Although not restricted thereto, the particular antenna as illustrated in Figs. 1 to 5 may be made of aluminum tubing of ⅜ to 1" outside diameter and about 86.06 inches in diameter.

Generally, the radius rods B in respect to each other will form a conical structure having an angle of about 130 to 150 degrees. Although the bars B are at an angle of 90 degrees to each other, as indicated by the angular dimension 50, this angle may be varied from 60 to 120 degrees. If desired three, four, six or eight rods B may be provided at equal angular spacings.

If it is desired to make a smaller antenna, the segment indicated by 48 may be adjusted in size to be equivalent to about ⅝ of a converging wave length, while the length of the radius rods B may be ⅕ of a wave length and this will give a convenient house size.

In the arrangement of Fig. 6, the central bars 51 cross over each other and connect together the diametrically opposite radius bars B instead of adjacent radial bars as in Figs. 1 to 5.

The lead-in wires 53 are attached to each of the bars 51, as are also the lead-in wires 52 in the structure of Figs. 1 to 5.

In the arrangement of Fig. 7, the two top adjacent radius elements B and the two bottom adjacent radius elements B are connected by the horizontal bars 54 having the lead-in wires 55.

In the arrangement of Figs. 8 and 9, the circular, outer, tubular member 56 is of double conical shape to form a wafer, with radius bars 57 extending in both directions from the outer circular bar 56.

The cross bars 58 of Figs. 8 and 9 are provided with separate cross bars 59 which are connected in turn to the lead-in wires or feed-in wires 60.

In the arrangement of Figs. 10 and 11, there is a double, conical construction with a circular outside element 61 and outwardly directed, oblique radius bars 62 and 63. The bars 63 meet at a point 64 at one side of the unit.

At the other side of the unit of Figs. 10 and 11 are the vertical connecting bars 65 which are provided with feeders 66 leading to the set.

In the arrangement of Fig. 12 there is shown two circular members 75 having inwardly directed radial bars 76, the inside ends of which are connected by the vertical tie-in bars 77 and 78. The bars 77 are connected by the member 79 while the bars 78 are connected by the tie members 80 to the feed-in wires 81.

In Fig. 13 there are shown two circular members 82 and 83 having the radial connecting bars 84 and the cross bars 85. The cross bars 85 are connected to the set by the feeder wires 86.

In the arrangement of Figs. 15 and 16, the outer circle 87 has a six radial elements 88 leading to a cross bar 89 and having a downward feed 90.

In the arrangement of Figs. 17 and 18 there are two circular members 91 and 92 having radial elements 96 and 97 connecting bars 93 and 94 with a feed-in wire 95.

Figs. 19 and 20 are a diagrammatic view showing the approximate dimensions in inches of a preferred form of antenna, such as shown in Figs. 1 to 6, based upon the assumption that the antenna has been set for the middle of the band at 135 megacycles. In this arrangement of Fig. 19 the radius rods have an actual length of 41.85" and a projective length of 39.16" while the entire circumference has a length of 246.18".

In Fig. 20 it will be noted that the arcuate sectors 48 have a dimension of ¾ wave length while radial sectors 49 have a dimension of about ½ wave length, with the spacing between the bars B being about 90 degrees.

In the arrangement of Figs. 21 to 24, the molded plastic or resin base 125 is provided with a series of recesses 126 at the bottom of the central depression 127, with stops 128 for the ends 129 of the tubes 130, which may form the radial bars of an antenna.

The hook members 131 hold the ends 129 of the bars 130 in position by means of the threaded ends 132, the nuts 133 and the brace 134.

The brace 134, as best shown in Fig. 22, has the two ends 135 which are pressed down by the nuts 133 and it has a central dome portion 136 receiving a screw or bolt 137 and the nut 138 to make connections to the lead-in wires. The loops 140 have threaded ends 141 which extend through the base 125 and are held in position by the nuts 142. The loops 140 enable mounting of the aerial and do not form a part of the electrical connections.

The television aerial of the present invention covers all television channels, eliminating the need for two separate antenna for the high and low ends of the television band. The antenna gives an extremely high power signal as contrasted to a low noise ratio and it covers a wide angle of reception without requirement of reflectors.

There is perfect match to 72, 150 and 300 ohm

lead-in lines, depending upon the receiver input circuit, and there is extremely high signal strength on all channels, eliminating the necessity for stacked arrays and guide structures. Moreover, there is extremely long distance reception as well as local reception.

The entire device, as shown, is a very lightweight one, for example about 1½ pounds, with very low vibration tendencies and there practically is no wind noise. The few connected parts enable ready assembly and give most satisfactory performance on the television set.

If desired, the various radius rods B of Fig. 1 and 130 of Fig. 21 may be insulated from the outer circle just inside of the clips E and the ends of the circles A may also be insulated from one another at the junctions 17.

By the arrangement shown, the applicant has devised a simple, useful antenna construction having wide use in television receivers or even transmitters, which is of simple construction and which may be widely used.

While there has been herein described a preferred form of the invention, it should be understood that the same may be altered in details and in relative arrangement of parts within the scope of the appended claims.

Having now particularly described and ascertained the nature of the invention, and in what manner the same is to be performed, what is claimed is:

1. A shallow conical aerial arrangement for television and other reception comprising a central insulating base, a plurality of outwardly extending radial conductor elements and an outside circular conductor element connecting the ends of the radial elements, the diameter at the outside of the cone being substantially greater than the height of the cone and said elements being formed of metallic tubing and said circular element being positioned in a vertical plane and the length of the radial elements being substantially one-half of an average wave length.

2. A shallow conical television aerial arrangement comprising a vertical base consisting of a circular conductor element and a plurality of radial conductor elements forming the sides of the cone and an insulating base at the apex thereof, the diameter at the outside of the cone being substantially greater than the height of the cone and said elements being formed of metallic tubing and said circular element being positioned in a vertical plane and the length of the radial elements being substantially one-half of an average wave length.

3. A shallow conical aerial arrangement for television and other reception comprising a central insulating base, a plurality of outwardly extending radial conductor elements and an outside circular conductor element connecting the ends of the radial elements, and conductor bars on said base connecting pairs of said radial elements and having lead-in connections to the television set, the diameter at the outside of the cone being substantially greater than the height of the cone and said elements being formed of metallic tubing and said circular element being positioned in a vertical plane and the length of the radial elements being substantially one-half of an average wave length.

4. A shallow conical television aerial arrangement comprising a vertical base consisting of a circular conductor element and a plurality of radial conductor elements forming the sides of the cone and an insulating base at the apex thereof, and conductor bars on said base connecting pairs of said radial elements and having lead-in connections to the television set, the diameter at the outside of the cone being substantially greater than the height of the cone and said elements being formed of metallic tubing and said circular element being positioned in a vertical plane and the length of the radial elements being substantially one-half of an average wave length.

5. A shallow conical aerial arrangement for television and other reception comprising a central insulating base, a plurality of outwardly extending radial conductor elements and an outside circular conductor element connecting the ends of the radial elements, and electrical connections on said base for the inside ends of said radial elements providing impedance adjustment and lead-ins to the television set, the diameter at the outside of the cone being substantially greater than the height of the cone and said elements being formed of metallic tubing and said circular element being positioned in a vertical plane and the length of the radial elements being substantially one-half of an average wave length.

6. A shallow conical television aerial arrangement comprising a vertical base consisting of a circular conductor element and a plurality of radial conductor elements forming the sides of the cone and an insulating base at the apex thereof, and electrical connections on said base for the inside ends of said radial elements providing impedance adjustment and lead-ins to the television set, the diameter at the outside of the cone being substantially greater than the height of the cone and said elements being formed of metallic tubing and said circular element being positioned in a vertical plane and the length of the radial elements being substantially one-half of an average wave length.

7. A circular shallow dish-shaped television aerial comprising a plurality of outer circular arcuate segments forming the periphery of the dish positioned so that the segments will lie substantially in a vertical plane, said segments being of an electrically conducting material, a central insulating mount positioned to one side of said plane, radial support conductors extending inwardly from the ends of said segments and away from the plane of said segments to the center mount to form the shallow dish shape, and means to clamp the inner ends of said conductors to said mount, said aerial having an additional circular member inside of and concentric to said segments.

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