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DOPLET ANTENNA ARRAY WITH ALTERNATE ARMS MOUNTED
IN RESPECTIVE PLANES, PARALLEL
TO COMMON REFLECTOR

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2 Sheets-Sheet 1

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The present invention relates to antennas and more particularly to antennas of the type used with television receivers.

One of the principal objects of the present invention is to provide a television antenna in which the "Q" is substantially lower and the resonance characteristics broader than in conventional antenna of similar types.

A further object of the invention is to provide an antenna of the aforesaid type in which the driven elements and the reflector can be adjusted relative to one another at the place of installation to any one of several television channels.

Still another object of the invention is to provide a television receiver antenna of a simplified and sturdy construction composed of a number of duplicate, interchangeable subassemblies.

Another object of the invention is to provide a television antenna which can readily be fabricated, packaged, shipped and thereafter installed with a minimum amount of time and effort and without employing any special tools or skills.

Additional objects and advantages will become apparent from the following description and accompanying drawings, wherein:

Figure 1 is a front elevational view of a television antenna embodying my invention;

Figure 2 is a side elevational view of the antenna shown in Figure 1;

Figure 3 is a bottom view of the antenna shown in Figure 1;

Figure 4 is an enlarged fragmentary cross sectional view of a portion of my antenna taken on line 4—4 of Figure 1; and

Figure 5 is an enlarged fragmentary cross sectional view of another portion of the antenna taken on line 5—5 of Figure 1.

Referring more specifically to the drawings, Figures 1 through 3 show an assembled television receiver antenna in position ready for mounting on a mast, consisting of front assembly or driven element 10, rear or reflector assembly 12 and connecting supports 14 and 16 for holding said assemblies in a predetermined spaced relation. The antenna shown is adapted for all U. H. F. channel reception but can be adjusted to obtain optimum reception of any selected channel.

The front assembly consists of subassemblies 18 and 20 mounted on insulating members 22 and 24. These subassemblies are identical in construction and interchangeable and consist of a tube or bar 26 having four equally spaced bands, groups of dipole or whisker elements 28, 29, 30 and 31, the groups 28 and 31 mounted on the ends of tubes 26 extending outwardly from each other and the groups 29 and 30 mounted in the intermediate portion of the tubes extending inwardly toward each other. Whisker groups 29 and 30 of one tube overlap the corresponding groups of the other tube, but the groups of one tube are on a different plane than those of the other tube, as shown clearly in Figures 4 and 5.

In this arrangement the driven elements of a single subassembly are on the same vertical plane and the planes of one subassembly is parallel with the plane of the other subassembly and with the reflector. This novel construction in phasing, i.e., using a transposed arrangement for driven elements 29 and 30 made possible by the slight off-set in the planes of the subassemblies, in lieu of the conventional cross-over or transposition of the phasing bars, lowers the "Q" of the antenna and consequently broadens its resonance characteristics. Further, the present construction combines in the subassemblies both good electrical and mechanical strength. Although the two center bars or groups 29 and 30 overlap each other at their electrical centers, voltage or current phasing is in no way adversely affected.

The whisker groups are shown consisting of two elements in V-shaped arrangement; however, a single dipole may be used instead if desired. Those shown are inserted in closely spaced holes located at equal distances along tube 26. In assembling the whisker elements in the holes, the element is first formed into a U shape, the curvature of which has a slightly smaller diameter than the distance between said holes. The ends of the elements are then slipped through the holes until the tube is seated firmly against the curved portion of the U section. While the element is held firmly in the holes the two prongs of the element are bent away from one another to the position shown in Figure 1, thereby locking the element securely in place in the holes and forming a good electrical contact between the whisker elements and tube 26. This construction in addition to its ease of fabrication is particularly sturdy and is unaffected by the corrosion normally taking place during extended use of the antenna and also has the further advantage of having only metals of similar composition in contact with one another, thus reducing to a minimum electrolytic corrosion between the two parts and thereby increasing the effective life of the antenna. Since the diameter of the curved portion is slightly less than the distance between the paired holes, a good electrical contact is always maintained between the element and tube. Both tube 26 and the whisker elements are preferably constructed of aluminum although other metals may be used if desired.

The whisker element and tube assembly just described is disclosed and claimed in my copending application Serial Number 593,247 filed June 22, 1956.

Members 22 and 24 are preferably constructed of Bakelite, hard rubber, stiff plastic or other material of good insulating quality at U. H. F. frequencies, and are provided with transverse grooves 49 and 52 on opposite sides near the ends thereof for receiving tubes 26 of the subassembly. Tubes 26 are held rigidly in their respective grooves by bolts 44 extending through said bars and members 22 and 24 at the bottom of the grooves therein. When the nut on the bolt is tightened the bars are pulled firmly against the sides of the grooves which align the two bars with one another.

The rear assembly 12 is substantially the same as that shown in my previously mentioned copending application and will not be described in detail herein. This assembly generally consists of an open and coarse mesh screen 59 of welded or soldered wire construction spaced on vertical support 52 held rigidly in place by two pairs of cross members 54 and 56 connected to the upper and lower ends of support 52, respectively, by bolts or rivets 58 and 60. As seen in Figures 1, 2 and 3 vertical support 52 is placed on one side of the reflector screen and cross members 54 and 56 are placed on the other side to give the reflector greater rigidity and to hold the reflector and support 52 firmly together.

The front and rear assemblies are held in a predetermined spaced relation by supports 14 and 16, the former...
consisting of a bracket secured to the back side of member 22 by a bolt 61 and having one leg secured to the rear assembly by bolt 58 and another leg 64 having a hole and a bolt 66 on the end thereof for extending through a longitudinal slot 68 in vertical support 52. This manner of connecting the front and rear assemblies permits adjustment to an infinite number of positions in the range of adjustment and is disclosed and claimed in my copending application along with another modification. The servicemen can adjust the distance between the two assemblies to obtain the best performance by merely selecting the correct position for bolt 66 in slot 68.

To collapse the antenna with this type of adjustment means, bolt 66 is merely loosened and leg 64 permitted to slide downwardly in slot 68. In order to facilitate bending of the two legs for making the adjustment and for collapsing the front assembly onto the rear assembly for packaging and shipping, transverse slots 70 are provided at the point where the bending is to occur. Support 16 is secured at one end to the center of member 24 by a bolt 72 and at the other end to vertical member 52 by a bolt 74. This support is also provided with transverse slots 70 to facilitate bending at the points where it joins onto support 52 and member 24. Since support 16 must also bend when an adjustment is spaced between the front and rear assemblies is being made and when the antenna is being collapsed for packaging and thereafter when it is being extended for installing.

My antenna is mounted on the mast by placing vertical support 52, which is U-shaped in cross section with the open side to the rear, against the mast with the edges of the support in contact with the mast. The strap of a conventional stand-off fixture is then inserted through slots in the side of support 52, wrapped around the mast, and clamped against the mast by the screw of the fixture. Two fixtures, one at the top and the other at the bottom of support 52, are normally used although a greater number can be employed if desired. The lead wires are connected to the center of tubes 26 by any suitable means, such as those disclosed in my copending application.

After the antenna has been assembled and is ready to be shipped it is collapsed or folded by loosening bolt 66 and then pushing the front assembly toward the rear assembly. When the antenna is in its folded position, it can be shipped in a relatively thin carton consuming only about one third of the space which would required if it could not be folded. When an installation is to be made the front assembly is pulled away from the rear assembly by the desired distance and bolt 66 tightened to hold leg 64 at the proper position. The present antenna can be assembled, installed and serviced much more readily than present conventional antennas adapted for the same type of television reception and can be stacked to obtain the desired gain and receiving characteristics.

A few modifications in my antenna construction have been suggested herein. Other modifications and changes can be made without departing from the scope of the present invention.

I claim:

1. An antenna for a television receiver, comprising a screen-like reflector, two spaced insulating members having two opposed surfaces parallel to said reflector and being arranged one above the other in front of said screen, a means for adjustable connecting said members to said screen in spaced relation thereto, vertical grooves on opposed surfaces of said members, a bar secured in corresponding grooves of said members, a V-shaped element at each end of said bar extending outwardly parallel to said reflector in the direction of the nearest vertical edge thereof, two V-shaped elements positioned on said bar intermediate of said end elements and extending parallel to said reflector in the direction of the farthest vertical edge of said reflector, said elements being in the other corresponding grooves of said members, a V-shaped element at each end of said last mentioned bar extending outwardly parallel to said reflector in the direction of the nearest vertical edge thereof, and two V-shaped elements positioned on said bar intermediate of said end elements of said last mentioned bar and extending parallel to said reflector in the direction of the farthest vertical edge of said reflector.

2. An antenna for a television receiver, comprising two parallel vertically arranged bars, a V-shaped element at each end of said bars extending outwardly in the direction opposite from the other bar, two V-shaped elements positioned on said bars intermediate of said first mentioned elements and extending in the direction generally toward the other bar, a reflector member spaced from said bars, and a means for adjustable connecting said bars to said reflector member, all the elements on each bar being on a common plane and parallel to said reflector member the plane of the elements on one bar being offset from the plane of the elements of the other bar.

3. An antenna for a television receiver, a plurality of parallel bars, elements at each end of said bars extending outwardly in the direction opposite from the other bar, elements positioned on said bars intermediate of said first mentioned elements and extending in the direction generally toward the other bar, a reflector member spaced from said bars, and a means for connecting said bars to said reflector member, all the elements on each bar being on a common plane and parallel to said reflector member and the plane of the elements on one bar being offset from the plane of the elements of the other bar.

4. An antenna for a television receiver, comprising a screen-like reflector, two spaced insulating members having two opposed surfaces parallel to said reflector, a means for connecting said members to said screen in spaced relation thereto, a vertical groove on each opposed surface, a bar secured in corresponding grooves of said members, an element at each end of said bar extending outwardly parallel to said reflector in the direction of the nearest vertical edge thereof, elements positioned on said bar intermediate of said first mentioned elements and extending parallel to said reflector in the direction of the farthest vertical edge of said reflector, a second bar secured in the other corresponding grooves of said members, an element at each end of said last mentioned bar extending outwardly parallel to said reflector in the direction of the nearest vertical edge thereof, and elements positioned on said bar intermediate of said end elements of said last mentioned bar and extending parallel to said reflector in the direction of the farthest vertical edge of said reflector.

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