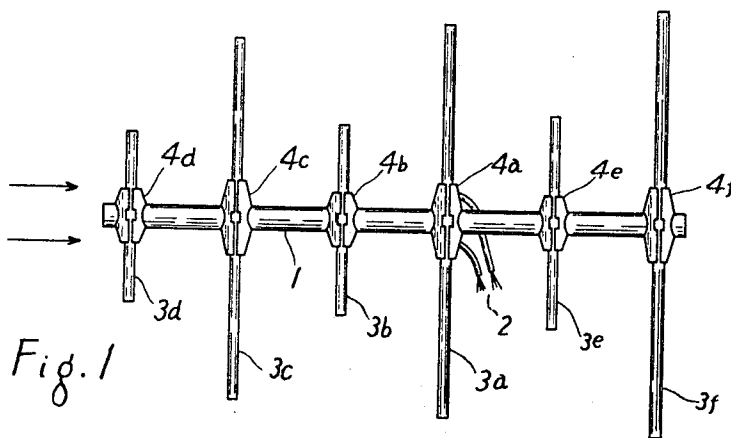
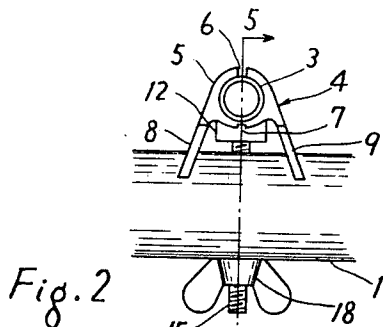
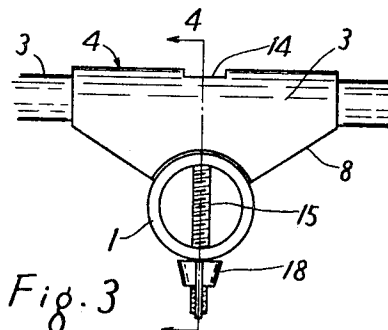
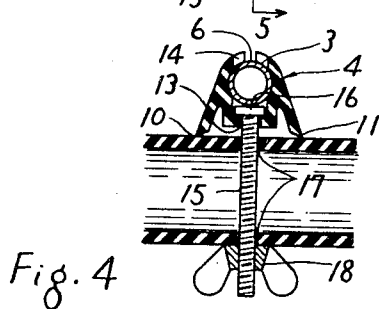
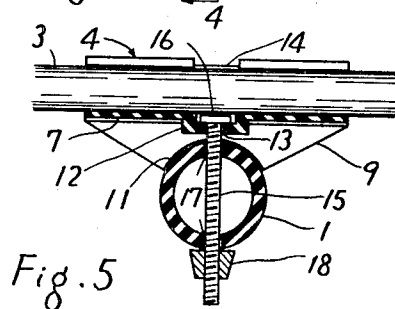
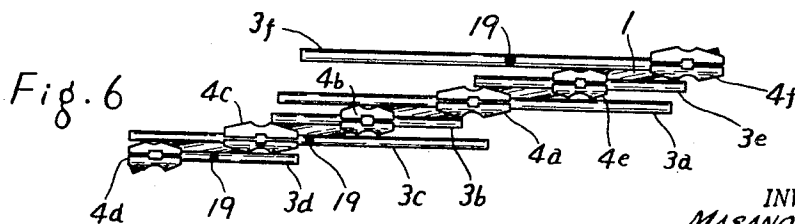


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MASANOBU TSUGE
MULTI-ELEMENT HIGH FREQUENCY ANTENNA AND ELEMENT
MOUNTING MEANS THEREFOR
Filed June 14, 1966

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3,408,655
**MULTI-ELEMENT HIGH FREQUENCY ANTENNA
AND ELEMENT MOUNTING MEANS THEREFOR**
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This invention relates to high frequency antennas and, more specifically, to a novel and improved multi-element antenna and element mounting means for supporting the elements in predetermined positions one relative to the others.

High frequency antennas such as television antennas and the like generally comprise a plurality of different elements arranged one relative to the others in order to attain a desired sensitivity, directivity and frequency characteristic. In most cases the individual elements are linear conductors mounted transversely of a common supporting member disposed in a horizontal plane. This support member is in turn secured to a suitable vertically disposed mast in order to hold the antenna in the desired operating position. The attachment of the individual elements to the horizontal supporting member has presented problems and this invention contemplates the provision of a novel and improved element mounting means which is characterized by its simplicity, ease of attachment to the supporting arm in order to hold the element in a predetermined position relative to the arm, relatively low cost and ease of manufacture.

Another object of the invention resides in the provision of a novel and improved antenna element supporting means which may be secured to the element supporting arm by a single screw or other attaching means and firmly hold an antenna element in a precise position on the supporting arm.

Still another object of the invention resides in the provision of a novel and improved antenna element mounting means.

A still further object of the invention resides in a novel and improved high frequency antenna that may be readily folded into a compact unit for shipment and easily erected for use in the reception of high frequency signals.

The above and other objects of the invention will become more apparent from the following description and accompanying drawings forming part of this application.

In the drawings:

FIGURE 1 is a plan view of an antenna in accordance with the invention.

FIGURE 2 is a fragmentary side elevational view of the antenna shown in FIG. 1.

FIGURE 3 is a fragmentary end view of the antenna shown in FIG. 1 taken in the direction of the arrows 3—3 thereof.

FIGURE 4 is a cross-sectional view of FIG. 3 taken along the line 4—4 thereof.

FIGURE 5 is a cross-sectional view of FIG. 2 taken along the line 5—5 thereof.

FIGURE 6 is a plan view of the antenna of FIG. 1 in the folded position for shipment and storage.

The novel and improved antenna in accordance with the invention may embody any desired number of elements, certain of which may be directors and others reflectors for the principal receiving element. Each of the elements is secured to a horizontal supporting rod by a novel and improved attachment means which automatically positions the elements in a predetermined manner with reference to the supporting rod. The element mounting means in the instant embodiment of the invention is a unitary structure adapted to receive an antenna element and is provided with single mounting means which

automatically causes the mounting means to grip the element being supported and to fix it firmly to the horizontal supporting arm.

More specifically, and with reference to the drawings, FIG. 1 is a plan view of one embodiment of an antenna in accordance with the invention. In this figure the horizontal supporting arm is denoted by the numeral 1 and may be formed of any suitable material such as hard polyvinyl chloride tubing, aluminum and the like. The arm 1 supports a plurality of antenna elements 3a through 3f. In the instant embodiment the element 3a constitutes the principal receiving element, while the elements 3b through 3d are directing elements, while the elements 3e and 3f are reflecting elements. The principal receiving element 3a is in the form of a dipole having leads 2 connected to each of the dipoles in a manner to be described.

Each of the elements 3a through 3f is secured to the arm 1 by novel and improved element mounting or clamping means 4a through 4f respectively. These mounting means are substantially identical and one such mounting means is illustrated in FIGS. 2 through 5.

Each of the mounting means 4 has an essentially cylindrical portion 5 for the reception of the antenna element 3a through 3f as the case may be. This cylindrical portion includes a longitudinal gap 6 of appreciable width along the top thereof and a groove 7 along the bottom to provide a narrow longitudinal section of reduced thickness. A pair of downwardly and outwardly extending plates or legs 8 and 9 are preferably formed integrally with the cylindrical portion 5. One of the legs 8 is attached to one half of the cylindrical portion 5, while the other leg 9 is attached to the other cylindrical portion 5. With this arrangement it is evident that as the legs 8 and 9 are spread apart they will cause the cylinder 5 to clamp tightly around the associated antenna element.

The lower edges of the legs 8 and 9 have arcuate shaped cut-out portions 10 and 11 to closely conform to the cylindrical contour of the supporting arm 1. These cut-outs engage the arm 1 and since they are inclined outwardly, will function to clamp the associated antenna element when the mounting means is secured to the arm 1.

Attachment of the mounting means 4 to the arm 1 is provided by an elongated threaded screw 15 having a rectangular head 16. The mounting means is arranged to accommodate the screw and hold it against rotation so that the latter can be tightened in position by a wing nut 18. For this purpose the mounting means 4 is provided with a rectangular opening 14 in the top side of the cylindrical member 5 and perpendicular to the central axis thereof. Immediately beneath the opening 14 is an essentially rectangular hollow body of material 12 which is hollowed out to provide a recess for the accommodation of the screw head 16 immediately beneath the antenna element 3 when in position in the mounting means. A circular opening 13 aligned with the opening 14 accommodates the body of the screw or bolt 15.

With the screw as described above and an antenna element 3a through 3f as the case may be inserted within the mounting means 4, the arcuate cut-outs 10 and 11 are placed in engagement with the surface of the arm 1. At the same time the bolt 15 extends through aligned openings 17 in the arm 1. As the wing nut 18 is tightened, the bolt 15 will be drawn downwardly and this action will cause the legs 8 and 9 to spread apart and to tightly clamp the element 3.

This improved mounting means 4 for the elements also facilitates attachment of the lead wires or feeders 2 to the receiving element 3a. It is well recognized that the receiving element in a dipole antenna consists of two individual elements which are axially aligned and insulated one from the other. With this improved mounting

bracket the two elements can be placed in position in the mounting means 4a as shown in FIG. 1 and at the same time metal ribbons can be interposed between each antenna element and the inner face of the supporting means. When the bolt 15 is tightened a firm contact will be made between each ribbon and its associated antenna element. The feed wires 2 may then be readily connected to portions of the ribbons extending from the mounting means 4a.

Another advantage of the antenna in accordance with the invention is that its gain can be decreased by reducing one or more of the elements and rotating the support members with respect to the arm 1 to a position corresponding to that shown in FIG. 6. By placing an element such as the element 3a in approximate axial alignment with the arm 1 its effectiveness as a director will be minimized. Furthermore, the improved mounting means facilitates folding of the entire antenna to assume a configuration shown in FIG. 6 which facilitates packing, transportation and storage. The antenna can be assembled for operation by merely rotating the elements to the position shown essentially in FIG. 1 and with the marks 19 on each of the elements aligned with the openings 14 on each of the mounting means.

Each of the element supporting means 4 is preferably made of a molded resinous material and can readily be molded in one piece. As a result these element supporting means can be produced in large quantity at relatively low cost. Any suitable resin may be utilized which affords good electrical insulation, durability and sufficient mechanical strength and flexibility.

While only one form of the invention has been illustrated and described, it is apparent that other modifications, changes and alterations may be made without departing from the true scope and spirit thereof as defined by the appended claims.

What is claimed is:

1. In a high frequency antenna having at least one element adapted to be mounted transversely of a supporting rod, means for securing said element to said rod comprising supporting means having an elongated cylindrical body part adapted to receive said element, the wall of said body part including a gap extending longitudinally thereof and a longitudinal portion of reduced thickness extending along the opposing side of said body portion, a pair of opposing legs secured to opposing portions of said cylindrical body between said slot and said portion of reduced thickness, said legs extending from their respective body portions in a direction away from said gap to form divergent angles with a plane defined by said gap and said portion of reduced thickness, and a bolt car-

ried by said cylindrical member and extending outwardly therefrom between said legs in substantial alignment with said plane whereupon said bolt upon engagement of a transverse opening in said rod to secure said element supporting means thereto will cause said legs to engage the rod and enlarge said angles to firmly clamp the antenna element extending through said body.

2. In a high frequency antenna according to claim 1 wherein the legs of said element mounting means each has an arcuate rod engaging recess to automatically align the mounting means transversely of said rod.

3. In a high frequency antenna according to claim 1 wherein the cylindrical body of said element supporting means includes a central opening and a hollow body of material centrally positioned between said legs and in alignment with said central opening and said body of material includes an opening to slidably accommodate said bolt with the head portion of the bolt clearing the longitudinal opening of said cylindrical portion, the head of said bolt having a configuration corresponding to the inner configuration of said hollow body to prevent rotation of said bolt relative to said element supporting means.

4. In a high frequency antenna according to claim 1 wherein the cylindrical body of said element supporting means includes a central opening and a hollow body of material centrally positioned between said legs and in alignment with said central opening and said body of material includes an opening to slidably accommodate said bolt with the head portion of the bolt clearing the longitudinal opening of said cylindrical portion, the head of said bolt having a configuration corresponding to the inner configuration of said hollow body and wherein said legs each include an arcuate recess for engagement of the surface of said rod.

5. In a high frequency antenna according to claim 1 wherein said antenna includes a plurality of antenna elements and a plurality of said element supporting means securing the elements to said rod.

6. In a high frequency antenna according to claim 5 wherein said element supporting means is a unitary structure formed of molded synthetic resin.

7. In a high frequency antenna according to claim 4 wherein said element supporting means is a unitary structure formed of molded synthetic resin.

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