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FOLDABLE COLLINEAR ANTENNA

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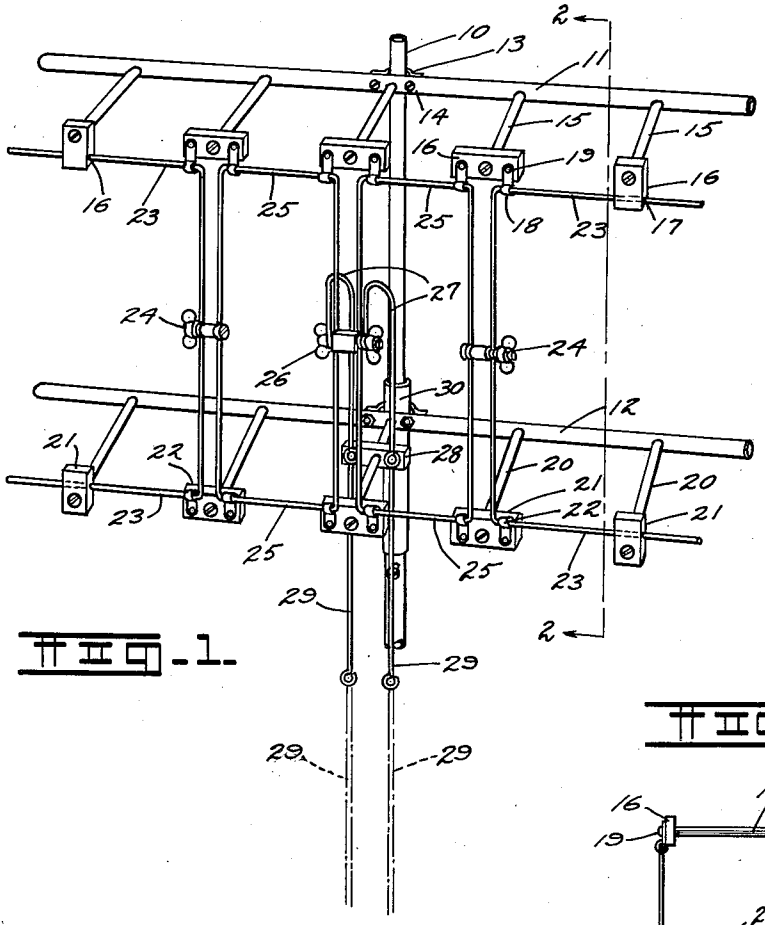


FIG. 1.

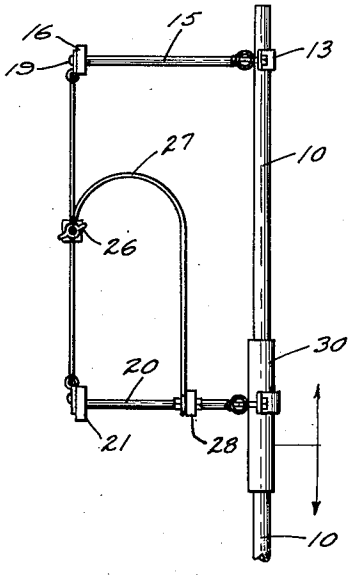


FIG. 2.

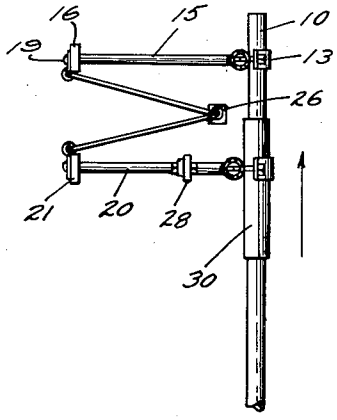


FIG. 3.

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FOLDABLE COLLINEAR ANTENNA

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4 Claims. (Cl. 250—33.59)

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This invention relates to antennas and more particularly to antennas of the collinear type and particularly as used in connection with multiple bays of such antennas.

The principal object of the invention is the provision of a multiple bay collinear antenna having the antenna elements arranged for foldable assembly whereby the normal vertical spacing of the multiple bays may be reduced to a minimum to facilitate the compact packaging of the antenna for handling and shipping.

A further object of the invention is the provision of a multiple bay collinear antenna wherein a relatively few antenna elements are employed and so positioned as to avoid the heretofore common practice of a relatively large number of connections between a relatively large number of antenna elements.

A still further object of the invention is the provision of a multiple bay collinear antenna wherein the horizontally disposed portions of the antenna elements are rotatably mounted and capable of revolving on their longitudinal axes when the multiple bay antenna is folded to or from open position.

The collinear antenna disclosed herein comprises a multiple bay collinear antenna such as used in connection with the reception of television signals and particularly in fringe area locations wherein a relatively high gain is necessary to efficiently operate the television receiver. The collinear antenna includes in its simplest form a plurality of antenna elements arranged in end to end alignment on a common horizontal plane and suitably supported in spaced relation to a combined support and reflector element which in turn is attached to a main supporting mast. In fringe areas which comprise areas lying a considerable distance from television transmitters, it has become customary to utilize multiple bays of such collinear antennas and wherein the bays are stacked vertically and supported on a common mast. Each of the bays comprises a combination support and reflector element disposed horizontally to the vertical mast and carrying the antenna element spaced forwardly therefrom.

The use of such multiple bay collinear antennas has necessitated the design of the antennas to permit the same to be pre-assembled at the time of manufacture and unfolded or opened into usable shape at the time of installation of the antenna. This is a necessary procedure as the antennas are quite extensive in size in final open usable position or shape and are incapable of

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being shipped or handled in such condition. It has therefore become common to arrange to move the plurality of vertically stacked bays into close position to one another by providing a multiplicity of pivoted interconnecting lead sections which required a multiplicity of connecting bolt and nut assemblies and the like to permit a pivotal movement and at the same time provide some means of securing the lead assemblies to the plurality of collinear antenna elements.

The present disclosure relates to a simple and economical construction of a collinear antenna particularly suitable for vertically spaced multiple bay assemblies and wherein only a very few connections are necessary between the antenna elements for the purpose of connecting the necessary leads which in turn connect with the transmission cable to the television receiver.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being the intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a perspective view of a two bay collinear antenna.

Figure 2 is a vertical section taken on line 2—2 of Figure 1.

Figure 3 is a vertical section of the two bay collinear antenna shown in Figure 2 and illustrates the bays in folded position.

By referring to the drawings and Figure 1 in particular it will be seen that an upper portion of a mast 10 is disclosed which is tubular in shape and which provides support for a pair of horizontally disposed combination support and reflector elements 11 and 12. The combination support and reflector element is secured to the upper end of the mast 10 by a clamp 13 which includes fasteners 14 and it is provided with a plurality of forwardly extending support elements 15—15 each of which has a block of insulating material 16 on its foremost end. The outermost insulating block 16 has horizontal openings 17 therein while the innermost of the insulating blocks 16 have depending U-shaped brackets 18 secured thereto. The lower portions of the U-shaped brackets 18 lie below the insulating block 16 and on a common horizontal line with the

openings 17 in the end insulating blocks 16 heretofore referred to. The U-shaped brackets 18 are preferably secured to the insulating blocks 16 by means of rivets 19.

Still referring to Figure 1 of the drawings it will be observed that the combination support and reflector element 12 carries a duplicate arrangement of the combination support and reflector element 11 and including forwardly extending support members 20 each of which has an insulating block 21 on its foremost end. It will be observed that the insulating blocks 21 are in reversed position with respect to the insulating blocks 16 so that the openings in the end blocks 21 and the U-shaped brackets 22 lie above the support members 20.

A plurality of L-shaped antenna elements 23 are positioned with their horizontal sections in the openings in the blocks 16 and 21, respectively, and in the U-shaped brackets 18 and 22, respectively, and with the ends of their vertical sections joined by bolt assemblies 24. For example, in Figure 1 of the drawings and the right hand portion thereof, the L-shaped antenna element 23 held by the insulating blocks 16 on the forward end of the support members 15, is arranged so that the vertical portions of the L-shaped antenna element 23 depend therefrom whereas the L-shaped antenna element 23 in the right hand end of the antenna assemblies carried on the supports 20 has the vertical portion of the L-shaped antenna element 23 vertically arranged so that the ends of the antenna elements may be joined by the bolt assembly 24.

The two antenna elements 23—23 at the left end of the collinear antenna shown in Figure 1 are similarly arranged and similarly joined. Intermediate these outer end antenna elements there are two pairs of U-shaped antenna elements 25. The horizontal portions of the U-shaped elements 25 are mounted in the brackets 18 and 22 for rotatable motion with respect thereto and the arms of the U-shaped antenna elements 25 extend toward one another and are joined by the bolt and nut assemblies 24 and by an insulating fastening 26. The insulating fastening 26 also provides terminals for the connection of a pair of inverted J-shaped conductors 27, the lower ends of which are secured to a terminal block 28 mounted on one of the forward support members 20 heretofore referred to.

In a two bay collinear antenna, as illustrated, the coaxial transmission cable may be connected directly to the terminal block 28 to the respective ends of the inverted J-shaped conductors 27. In a four bay collinear antenna (not shown) and which comprises the antenna shown in Figure 1 plus a duplicate double bay mounted therebeneath, the terminal block 28 is connected by conductors 29 to the duplicate terminal block 28 on the duplicate double bay assembly and the transmission cable connected to the conductors 29 intermediate their ends as is customary in the art.

By referring now to Figures 2 and 3 of the drawings it will be seen that the combination support and reflector element 11 is clamped to the upper end of the mast 10 and that the lower combination support and reflector and support element 12 is clamped to a sleeve 30 which is slidably positioned on the mast 10. By referring to Figure 3 of the drawings in particular it will be observed that by moving the combination support and reflector 12 upwardly along the mast 10, the antenna elements 23 and 25 will rotate on their longitudinal axes and the assemblies 24 and insulating fastening 26 will move inwardly in a hinge-like action so that the combination support and reflector element 12 may be moved into direct proximity with the combination support and reflector element 11.

Those skilled in the art will understand that the mast 10 is not a part of the collinear antenna assembly as commercially produced and pre-assembled as the same is added to the assembly at the time of the unfolding of the antenna. It will also occur to those skilled in the art that the folded antenna can be conveniently packaged and shipped as the multiple bays thereof which usually include four in number fold into a compact structure capable of being packed in a relatively small carton. At the time of installation of the antenna, the mast 10 is positioned through the sleeve 30 and clamp 13, the clamp 13 secured to the uppermost end of the mast, as shown in Figure 3 of the drawings, and the sleeve 30 moved downwardly on the mast with respect to the clamp 13 until the interconnecting portions of the antenna elements lie on a vertical plane as shown in Figure 2 of the drawings.

It will occur to those skilled in the art that when this action is taking place, the horizontal portions of the collinear antenna elements 23 and 25 rotate in the openings in the block 16 and 21 and in the U-shaped brackets 18 and 22. In opened position, the bolt assemblies 24 and insulating fastening 26 are tightened to effect suitable electrical and mechanical connections between the oppositely disposed ends of the antenna elements 23 and 25 and the antenna is then ready for use. In a four bay antenna the second pair of combination support and reflector elements are positioned on the mast 10 in spaced relation below the combination support and reflector element 12 and opened in the same manner and the four bays interconnected by the conductors 27 and 29 as heretofore disclosed.

The transmission cable is connected to the conductors 29 intermediate their ends as is customary. In this connection it will be observed that the conductors 29 pivot on a terminal block 28 and may therefore be preassembled along with the conductors 27 which also pivot on the terminal block 28. The upper ends of the conductors 27 are secured to the fasteners 26 when the antenna is in open or unfolded position as best shown in Figures 1 and 2 of the drawings.

It will thus be seen that the several objects of the invention are met by the construction herein disclosed in that the heretofore believed necessary multiplicity of fasteners secured connections between a plurality of stationary horizontally disposed collinear antenna elements and their interconnecting conductors are eliminated as the only mechanical and electrical connections between the otherwise integral antenna elements comprise the fasteners 24 and 26. The antenna thus formed additionally possesses a higher gain with respect to signal strength as the antenna elements are integral and there is no loss of signal strength through the heretofore necessity of a plurality of mechanical connections. Additionally, the antenna disclosed herein continues to maintain a high gain with respect to signal strength over an indefinite pe-

riod of time as natural corrosion and/or oxidation occurring in the metallic elements of the antenna do not interfere with the electrical connections of the same as the electrical connections are reduced to the fasteners **24** and **26** rather than the multiplicity of electrical connectors heretofore used and directly engaging each of the multiplicity of antenna elements **23** and **25**.

Having thus described my invention, what I claim is:

1. A multiple bay collinear antenna comprising at least two horizontally disposed combination support and reflector members, a plurality of forwardly extending support members carried on each of said combination support and reflector members, insulating blocks on each of the ends of said forwardly extending support members, horizontally disposed collinear antenna elements mounted on said insulating blocks for axial rotation with respect thereto, vertical extensions on each of said collinear antenna elements, the ends of said vertical extensions secured to one another in oppositely disposed pairs by mechanical fasteners whereby movement of the antenna elements on one of the combination support and reflector members toward the other causes axial rotation of the antenna elements and knee action folding of the vertical extension thereof permitting the antenna to be collapsed into a small area.

2. The collinear antenna set forth in claim 1

and further characterized by the formation of some of the horizontally positioned collinear antenna elements with vertical extensions on both ends and others of the collinear antenna elements with vertical extensions on one end.

3. The collinear antenna set forth in claim 1 and further characterized by the incorporation of a terminal block on one of the forwardly extending support members, a pair of J-shaped conductors pivotally affixed to spaced terminals on said terminal block and removably connected to the interconnected ends of two pairs of said vertical extensions on said collinear antenna elements.

4. The collinear antenna set forth in claim 1 and further characterized by said mechanical fasteners forming electrical connections between some of the vertical extensions and forming insulated spaced connections between adjacent pairs of others of said vertical extensions of the collinear antenna elements.

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