Oct. 15, 1963 J. C. FOX 3,107,353

FOLDING ANTENNA

Filed June 1, 1961

Fig. 1

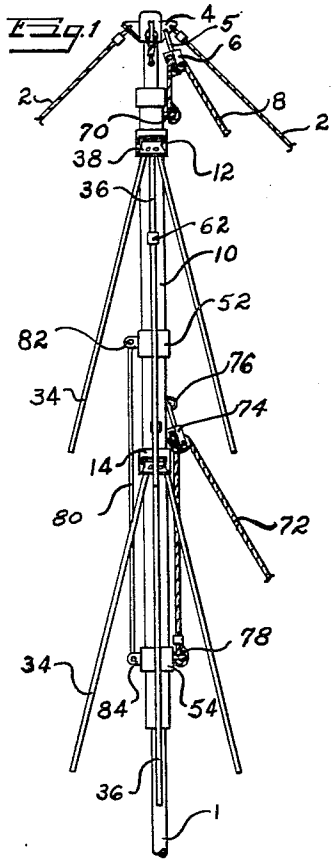


Fig. 2

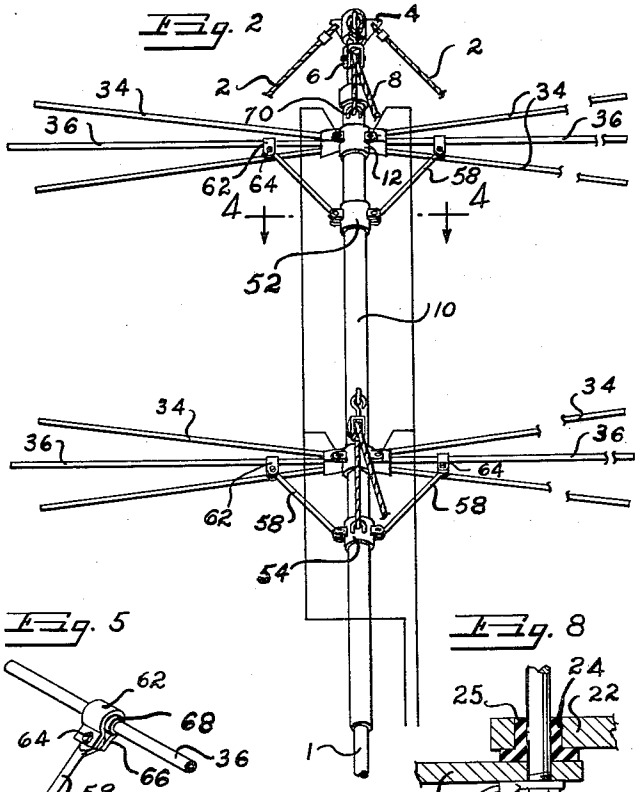


Fig. 5

Fig. 8

Fig. 4

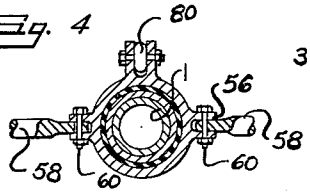


Fig. 6

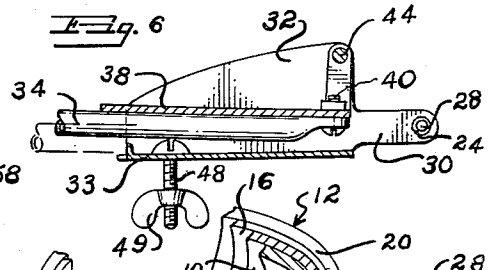


Fig. 3

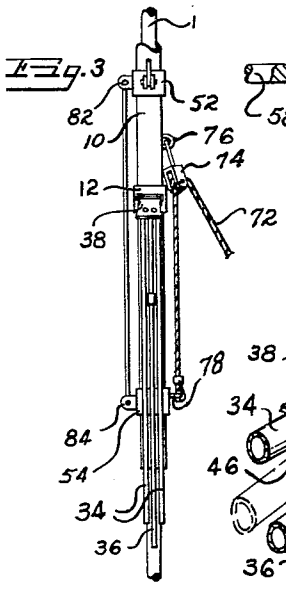
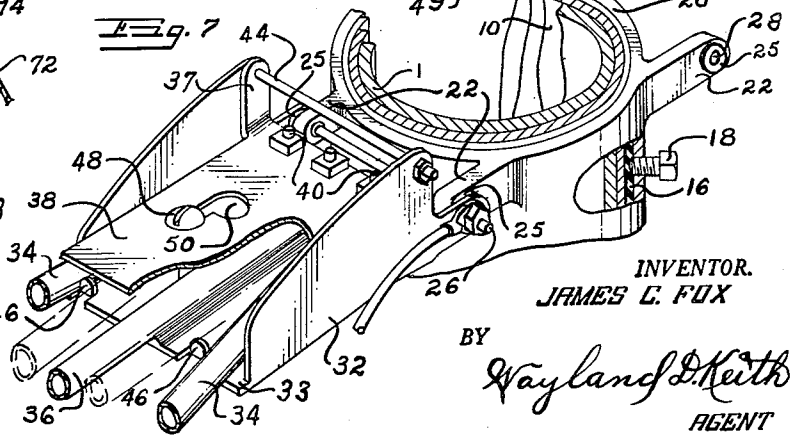


Fig. 7



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FOLDING ANTENNA

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This invention relates to folding antennae such as used in connection with television and the like, and more particularly to folding dipole antennae wherein the arms thereof may extend outward longitudinally and spread apart when in use, or they may be folded in side by side relation, and then moved into a position substantially parallel to the supporting pole, and further, the folded antennae may be lowered to the lower-most point on the support pole to obviate the dangers and hazards incident to storms. The folding of the antennae into compact form also enables ready transport, shipping or storage thereof.

Various knock-down antennae have been proposed heretofore, but these, for the most part, lacked the overall flexibility of an antennae which may be quickly set up and moved into position on a support post for receiving electronic waves such as used in television receivers and the like.

An object of this invention is to provide collapsible dipole antennae which may be readily set up and which may be moved into receiving position when desired, and which may be readily lowered in event of storms or the like, to obviate damage thereto.

Another object of the invention is to provide a collapsible television antennae which, when in extended and raised position, will receive electronic television signals, and which may be readily lowered and folded into a compact space for storage and/or shipping.

A still further object of the invention is to provide a dipole antennae which is simple in construction, effective in receiving electronic waves for television and the like, and which is low in the cost of manufacture, and which may be readily set up or taken down in a minimum of time.

With these objects in mind and others which will become manifest as the description proceeds, reference is to be had to the accompanying drawings in which like reference characters designate like parts in the several views thereof, in which:

FIG. 1 is an elevational view of the dipole antennae and the upper portion of a support member with the dipole antennae arms positioned in vertical planes in side by side relation to the support member, but with the arms spread apart and showing portions of the support member broken away, and showing guy wires extending therefrom;

FIG. 2 is a perspective view of the upper portion of the support member, showing the dipole antennae arms spread apart and extending horizontally outward, and showing a diagrammatic wiring diagram connected thereto;

FIG. 3 is a fragmentary, elevational view of the lower dipole antennae, showing the arms folded in side by side relation on the support element, with the arms collapsed in side by side parallel relation;

FIG. 4 is an enlarged sectional view of one of the guide collars taken on the line 4—4 of FIG. 2, looking in the direction indicated by the arrows;

FIG. 5 is a perspective view showing a dipole raising arm brace, with a portion of the dipole arm shown therein;

FIG. 6 is an enlarged fragmentary, elevational view taken longitudinally through the dipole arm mounting bracket, showing the dipole arms in one position in full

outline, another position thereof being shown in dashed outline;

FIG. 7 is an enlarged, fragmentary, perspective view of the dipole arms mounting bracket which is hingeably secured to a stationary mounting collar on a tubular sleeve which is slidably mounted on an upright support member, and showing parts broken away and parts being shown in section to bring out the details of construction, and showing the dipole arms both in full outline and in dashed outline to indicate alternate positions which the arms may occupy; and

FIG. 8 is an enlarged, fragmentary detail view of a hinge joint between the arm support member and the antennae arm support member, showing the insulation therebetween;

With more detailed reference to the drawing, the numeral 1 designates generally a standard or support member such as a pipe mounted in the ground and extending upward and having guy wires 2 attached to lugs 4 at the upper end thereof. One of the lugs 4 is apertured to receive a hook 5 or the like of block 6, which block is of the type that has a sheave therein to receive a rope 8 therethrough to form a block and tackle arrangement, as will be more fully brought out hereinafter.

The present dipole antennae may be made either in single or in multiple units depending on the set to which it is to be attached, and the particular distance over which electronic waves are received. An elongated tubular sleeve 10 is slidably fitted on upright member 1, and is shown to have two sets of folding dipole arms. However, in some instances, only one set of arms is necessary, in which case the sleeve 10 could accordingly be made much shorter, to receive only one set of dipole arms thereon.

The elongated sleeve 10 has dipole arm support member designated generally at 12, mounted on and secured to the upper end thereof, and a similar dipole antennae support member 14 mounted on and secured to the elongated sleeve 10, a spaced distance downward from dipole support member 12, the construction of which members 12 and 14 is best seen in FIG. 7. The dipole arm support members 12 and 14 each has a tubular insulating element 16 therein, as will best be seen in FIG. 7, so that the members 12 and 14 may be anchored in secure relation to the elongated tubular sleeve 10 by means of set screws 18, which set screws 18 press the insulation element 16 inward against the sleeve 10 which surrounds the upright support member 1. When two or more dipole units are used, one above the other, such as shown in FIGS. 1 and 2 these are connected together on sleeve 10 in such manner as to give simultaneous operation, when raising the antennae from the ground level to the uppermost end of upright support member 1, as will be more fully brought out hereinafter.

The dipole arm support members 12 and 14 each have an outer cylindrical portion 20, with pairs of lugs 22 extending therefrom in opposite directions, which lugs are apertured, as indicated at 24, to receive insulation bushings 25 therein and bolts 26 therethrough, which bolts are adapted to pass through holes 28 in the respective pairs of lugs 30 on the dipole arm support member, designated generally by the numeral 32.

It is preferable to have the dipole arm support members 12 and 14 made of dielectric material to avoid the necessity of having to insulate the dipole arm support members 32 with insulating bushings and washers, as shown in FIG. 8. However, when the antennae arm support members 12 and 14 are made of metal or other conductor material, the arm support members 32 are insulated therefrom by bushings and washers 25 of insulating material,

as shown in FIG. 8. The same results are obtained as if the members 12 and 14 were made of dielectric material.

The dipole arm support members 32 are constructed with the respective dipole arms 34 and 36 connected to an upper plate 38, each by bolts 40. The dipole arm support members 32 each have upturned, apertured lugs, which apertures are adapted to receive bolts 44 therethrough which bolts also extend through lugs 37 on hinge plate 38 so that the hinge plate 38 hinges upward to the position as shown in full outline in FIG. 6, as the plate 38 pivots about bolt 44, which will enable the dipole arms 34 to be moved above dividing lugs 46, from the position as shown in full outline in FIGS. 6 and 7, to that shown in dashed outline therein, upon moving bolt 48 into the enlarged portion of keyhole slot 50, the bolt 48 will drop downward to enable dipole arms 34 to be passed thereover, and into side by side relation with dipole arms 36, whereupon, the bolt 48 may be moved back into the narrow portion of keyhole slot 50, and the wing nut 49 tightened to hold the dipole arms 34 in close fitting relation between plate 38 and the bottom 33 of dipole arm support member 32.

Insulated, slidable sleeve members 52 and 54 are slidably mounted on elongated sleeve 10, below the respective members 12 and 14, which slidable sleeve members each have lugs 56 thereon to pivotally mount braces 58 for movement about pivot bolts 60. The upper end of the braces 58 are apertured and are pivotally connected to a sleeve member 62 by bolts 64, which bolts pass through the aperture in the respective braces 52 and the aperture within each of the lugs 66 of the sleeve 62. Each of the sleeves 62 has an insulating member 68 therein as will best be seen in FIG. 5, which insulating member is preferably in the form of a sleeve, with the bore thereof sufficiently large to permit the sliding of the sleeve on the respective dipole elements 36.

The rope 8 of the block and tackle 6 is attached at one end to an eye 70 secured to the upper end of elongated sleeve 10 and which rope 8 is of sufficient length that the elongated sleeve 10 may be lowered downward on the upright support member 1 to a point near the lower end thereof, which sleeve is so constructed that the dipole antennae arms 34 and 36 may be lowered, by rope 8, either in outwardly extended position, as shown in FIG. 2, which arrangement enables the quick and ready manipulation of the antennae to avoid danger of damage or destruction by high winds or the like, or, by loosening rope 72, slidable sleeve members 52 and 54, which are connected by link 80, the arms 34 and 36 may be lowered into the position as shown in FIG. 1. By lowering the dipole arms from horizontal position to a substantially vertical position, as shown in FIG. 1, damage to the dipole arms during high winds can usually be avoided. Upon lowering the dipole arms 34 and 36 on pole 1 to a lowermost position thereon, it is possible to loosen the wing nuts 49, thereby the dipole arms may be moved from the position as shown in FIGS. 1 and 2, into the position as shown in FIG. 7, in dashed outline, and in FIG. 3 in full outline.

To move the dipole arms from the position as shown in FIG. 2 to that shown in FIG. 1, a block and tackle arrangement, comprising a rope 72, and a pulley 74, having a sheave therein, is so mounted that the pulley 74 is supported on an eye 76 intermediate the length of the elongated sleeve 10, and with an end of rope 72 connected to an eye 78 of the slidable sleeve member 54, the lowermost set of dipole arms 34 and 36, which are hingeably connected to dipole arm support member 14, may be lowered into the position as shown in FIGS. 1 and 3, and simultaneously with the lowering of the lowermost dipole arms, a connecting link 80, which extends between lugs 82 and 84 on the respective slidable members 52 and 54, will automatically lower the uppermost set of dipole arms 34 and 36. In this manner, it can be readily understood that only three operations are necessary to lower the dipole arms from the position as shown in FIG. 2, to that shown in FIG. 3, whereupon, the dipole arms are relatively safe from the danger of storms.

A dipole unit comprises either a single set of arms, such as shown in FIG. 3, or two or more sets of arms, as shown in FIGS. 1 and 2, which arms may be folded in side by side relation on sleeve 10 for storage, or for shipment. In this manner a complete antenna can be shipped ready for installment on a pole without requiring skilled technicians to come to the site of the installation to assemble the various parts preparatory to erection.

While guy wires 2 have been shown at the top of pole 1, it is to be understood that these are required only on poles of high slenderness ratio which could not otherwise withstand the prevailing wind pressure.

Having thus clearly shown and described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. An antenna comprising an upright standard, a first sleeve slidably mounted on said upright standard, two sets of first arms pivotally mounted on said first sleeve in opposed relation, to pivot about horizontal axes, means insulating said respective sets of first arms from each other, a second sleeve mounted on said first sleeve and being slidable thereon, a first pair of braces, one end of each first pair of braces being pivotally connected in opposed relation to said second sleeve at the respective lower ends of said braces, which braces extend upwardly and pivotally connect to the respective first sets of arms and being insulated therefrom, a second two sets of arms pivotally mounted on said first sleeve in opposed relation a longitudinal spaced distance from said first two sets of arms, which said second sets of arms pivot about horizontal axes, means insulating said respective second sets of arms from each other and from said respective first sets of arms, a third sleeve mounted on said first sleeve a spaced longitudinal distance from said second sleeve and being slidable on said first sleeve, a second pair of braces, the lower end of each second brace being pivotally connected in opposed relation to said third sleeve, which second braces extend upwardly and pivotally connect with said second respective sets of arms and being insulated therefrom, a pulley mounted near the upper end of said upright standard, a rope passing through said pulley and being connected to said first sleeve for moving said first sleeve longitudinally of said standard, linkage means interconnecting said second sleeve and said third sleeve, a pulley mounted on said first sleeve, a rope passing through said pulley and being connected to one of said slidable sleeves so as to move said sets of arms about their respective horizontal axes.

2. An antenna as defined in claim 1; wherein said arms are further pivoted on an axis at right angles to the horizontal axis of the first mentioned pivot, the axis of which further pivot is transverse to a plane which passes longitudinally through said standard to enable said arms to be moved into substantially parallel relation with the axis of said upright standard when said arms are in one position.

3. An antenna comprising an upright standard, a first sleeve fitted on said standard, means selectively securing said first sleeve against longitudinal movement with respect to said upright standard, two sets of arms pivotally mounted in opposed relation on said first sleeve, means insulating said respective sets of arms from each other, a second sleeve mounted on said first sleeve and being slidable thereon, a pair of braces, one end of each brace being pivotally connected in opposed relation to said second sleeve, which braces extend upwardly and pivotally connect, at the upper ends thereof, to said respective sets of arms and being insulated therefrom, a pulley secured to said first sleeve above said second sleeve, a rope passing through said pulley and having one end thereof connected to said second sleeve to move said arms about their respective pivot points on said first

mentioned sleeve, a second antenna arrangement complementally mounted on said first sleeve, which second antenna has substantially the same component parts as said first antenna, means interconnecting said second sleeve of said first antenna and said second sleeve on said second antenna, so when said second sleeve on either antenna is moved on said first sleeve, the arms of the complementary antenna are moved in coordinated

relation with respect to the arms of said first mentioned antenna.

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