Sept. 3, 1957 J. H. LESLIE, JR 2,804,950

TV ANTENNA MAST

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FIG. 1

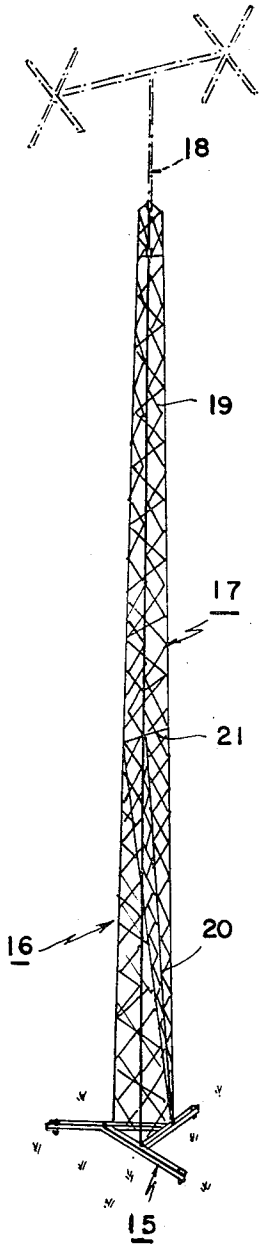


FIG. 2

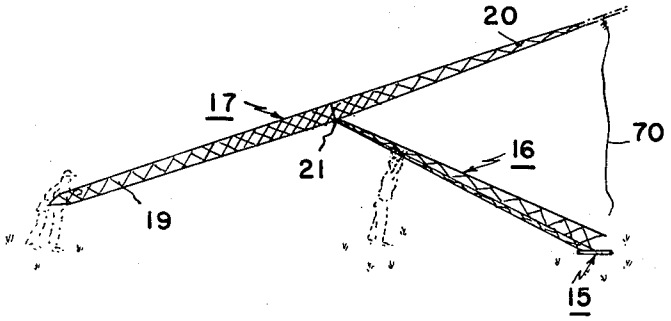


FIG. 3

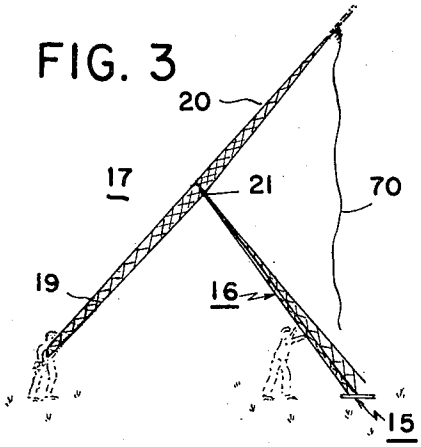
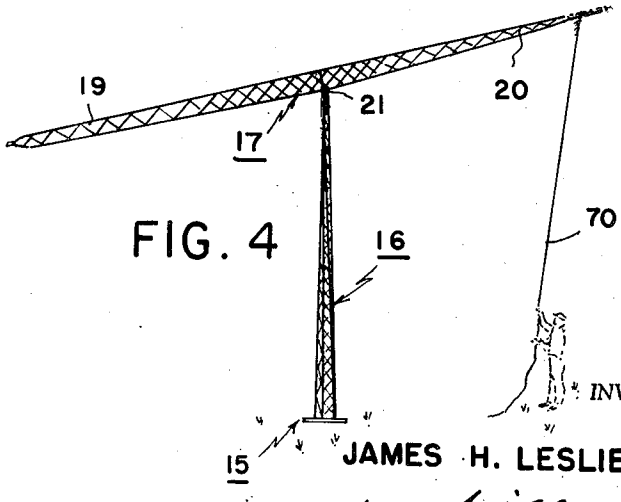


FIG. 4



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FIG. 5

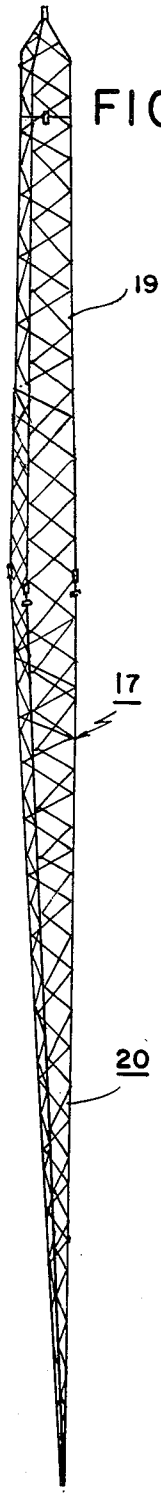


FIG. 6

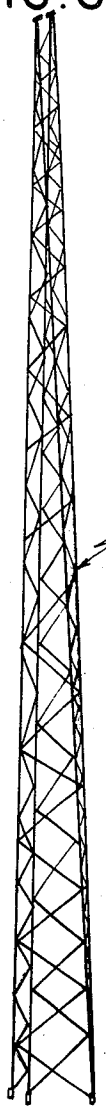


FIG. 10

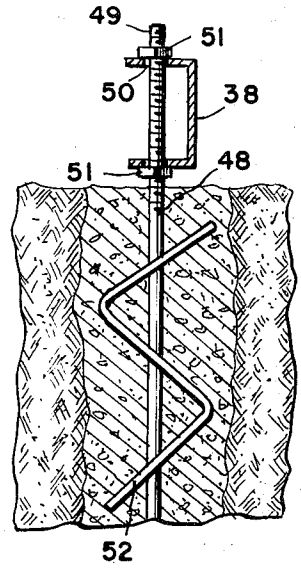
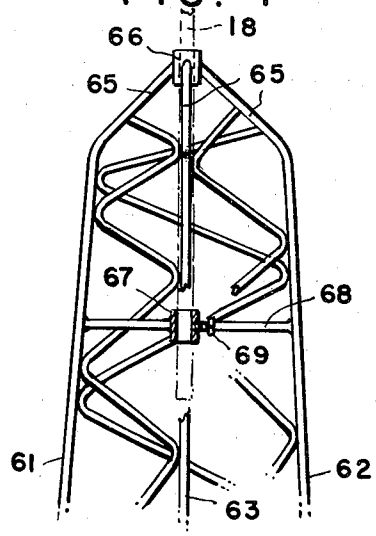


FIG. 7



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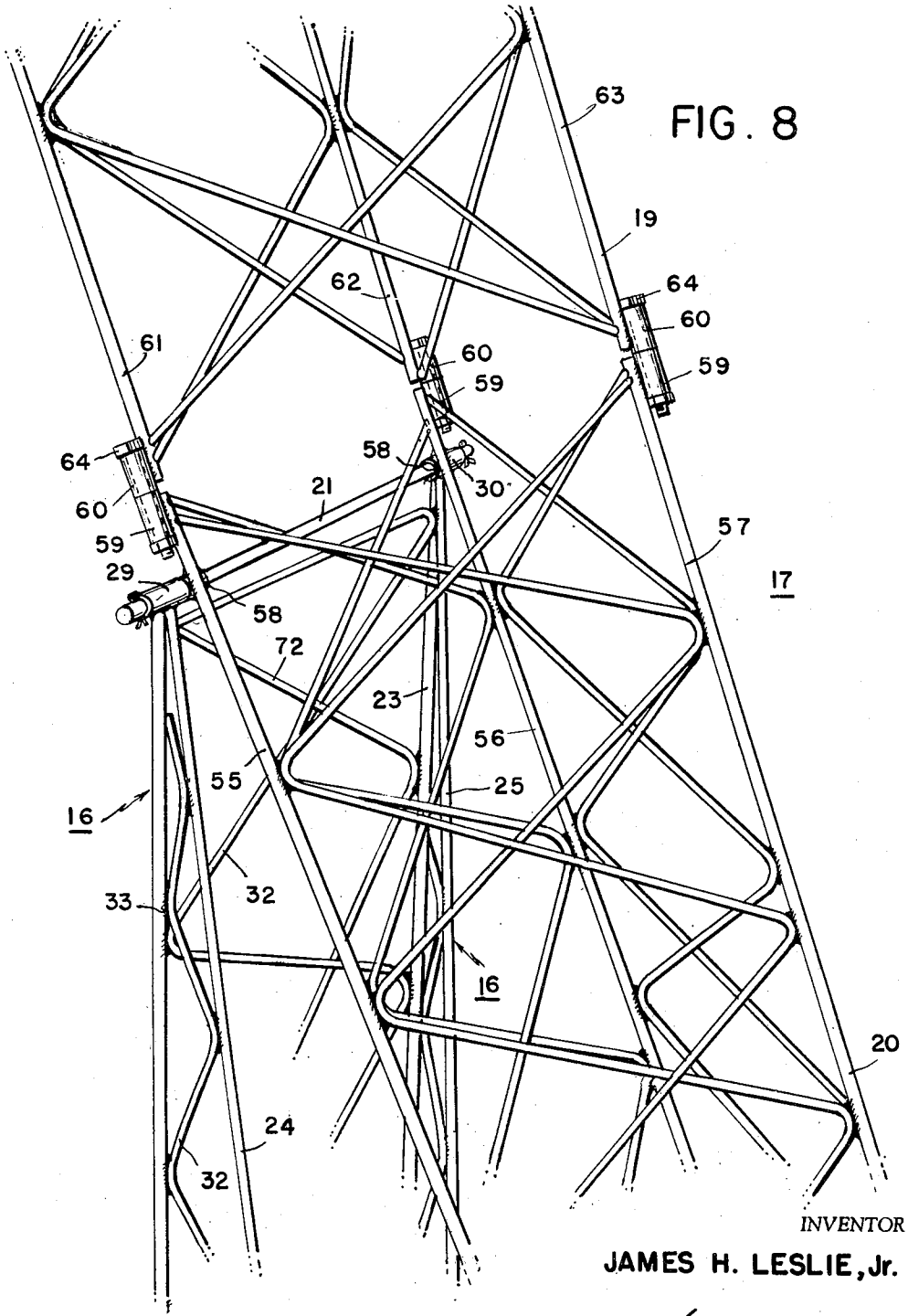
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FIG. 8



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FIG. 9

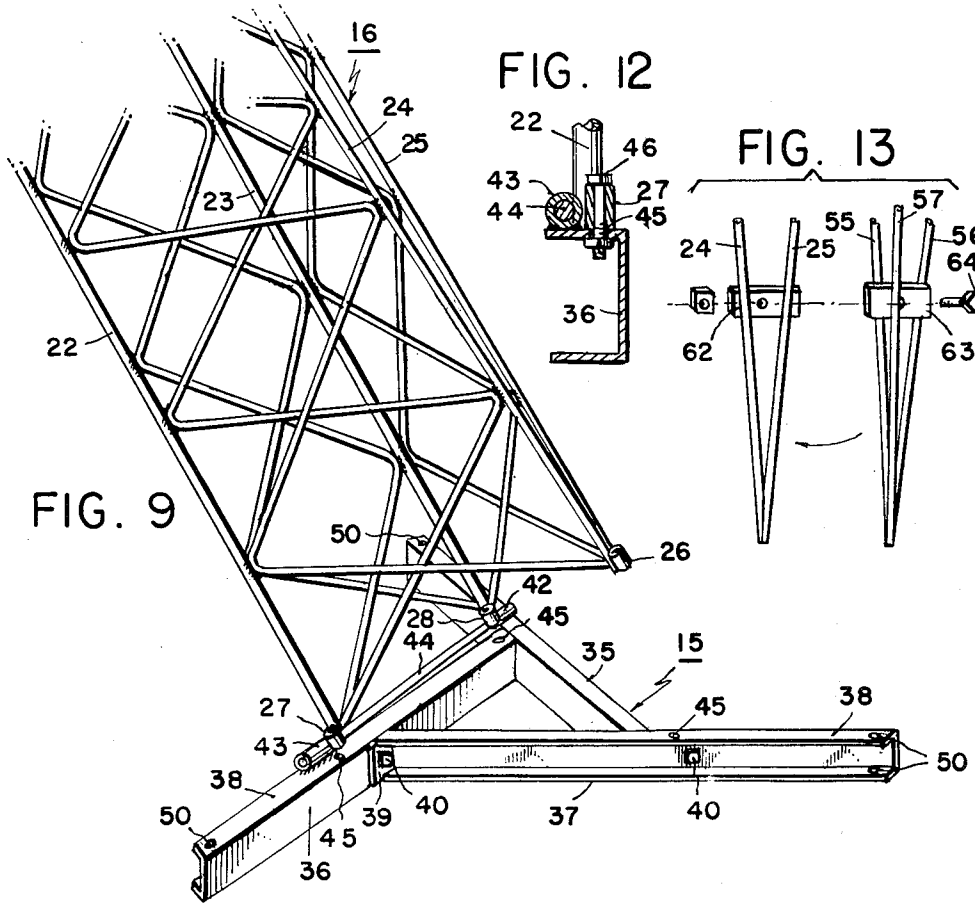


FIG. 12

FIG. 13

FIG. 14

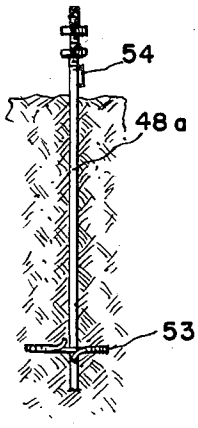
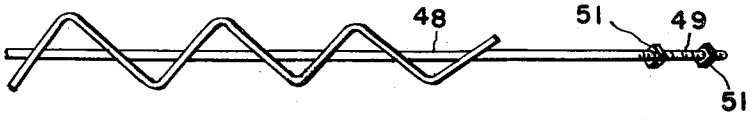


FIG. 11



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United States Patent Office 2,804,950 Patented Sept. 3, 1957

2,804,950

TV ANTENNA MAST

James H. Leslie, Jr., Hutchinson, Kans.

Application June 13, 1955, Serial No. 514,896

6 Claims. (Cl. 189—15)

This invention relates to masts or towers for supporting television and radio antenna, and particularly towers of the tiltable or foldable type.

One object of the invention is to provide a tilting television tower which will be self supporting without the use of hazardous guy wires, and which may be easily installed and raised, and also readily lowered to a substantially horizontal position in case of high wind storms, by two men and without the use of a winch or special tools.

Another object of the invention is to provide a tower of this character ranging in height from thirty to sixty or more feet and having a base width of about twenty-four inches and which is of triangular shape in cross section, the tower gradually tapering to the top, and the sections of the tower being formed of metal rods connected by welded cross bracing so that the tower has its greatest width and weight at the bottom and decreases in weight and wind resistance as it gains height.

Another object is to provide a sectional mast or tower of this character embodying a normally stationary lower section and an upper tiltable section composed of two or more separable units, and pivotally mounted between its ends on the top of the lower section so that the antenna may be readily raised or lowered, the lower section having its lower end hinged to a triangular base for folding downwardly from its normally upright position so that the tower may be raised by two men without equipment or lowered to the ground in an emergency such as a high wind storm.

Another object is to so construct the sections of the tower as to combine strength with lightness in weight and obtain a very rugged construction, the lower section of the tower being about twenty feet in length and composed of seven upright rods with at least seven angles of bracing.

Another object is to provide a triangular metal base to which the lower section of the tower is permanently hinged for folding and to which the triangular bottom of that section may be securely fastened by three bolts when the tower is in its upright usable position, means being provided for easily leveling the base to insure a true upright positioning of the tower.

With the above and other objects and advantages in view, the invention resides in the novel combinations and arrangements of parts and the novel features of construction hereinafter described and claimed, and illustrated in the accompanying drawings which show the present preferred embodiment of the invention.

In the drawings:

Fig. 1 is a perspective view of the tower in its upright position on a very reduced scale;

Figs. 2, 3 and 4 are further reduced diagrammatic perspectives to show the manner in which two men may install or erect the tower;

Fig. 5 is a perspective view of the upper two-part section of the tower, on a slightly enlarged scale, parts being broken away;

Fig. 6 is a similar perspective view of the lower section of the tower;

Fig. 7 is a further enlarged detail view of the antenna supporting end of the upper section of the tower parts being broken away and in section;

Fig. 8 is an enlarged perspective view of the top portion of the lower section and the central portion of the two-part upper section of the tower;

Fig. 9 is a perspective view of the metal base and the lower hinged part of the lower section of the tower;

Fig. 10 is a detail vertical section showing one of the anchor bars set in concrete and a part of the base adjustably supported on it;

Fig. 11 is a perspective view of one of the anchor bars or rods;

Fig. 12 is a detail vertical section through a portion of the base showing one of the hinge elements of the tower and one of the bolt connections for fastening the latter to the base;

Fig. 13 is a detail view on an enlarged scale showing the clamping means for fastening to the lower section the tapered end of the upper section when the latter is in its upright position; and

Fig. 14 is a detail showing a modified form of anchor bar usable with low towers.

Referring more in detail to the drawings the numeral **15** denotes, as a whole, a metal base which is adjustably supported from and anchored to the ground; **16** denotes the lower section of the tower permanently hinged to the base for folding from its normally fixed upright position to a lowered substantially horizontal position on the ground; **17** denotes the upper tilting section of the tower pivoted between its ends on the top of the lower section; and **18** denotes an antenna carrying pole longitudinally adjustable at the free or upper end of the tiltable section so that the antenna may be supported at a height greater than the overall height of the tower. I have found that by constructing the tower as herein disclosed, two men without the aid of special tools or equipment may readily install and raise and lower a tower as tall as about sixty feet and one which does not require the use of guy wires to maintain it erect under ordinary weather conditions. The lower section **16** is preferably about 20' in length while the upper section is at least twice that long when a tower of about 40' is desired to support an antenna from 40' to 50' above the ground.

The upper section **17** is of triangular shape in cross-section through its length but is largest at its central or intermediate portion where it is pivoted to the top of the lower section and tapers toward both its upper or antenna carrying end **19** and its lower manipulating end **20** which is adapted to be clamped against one side of the lower section **16** when the tower is in use as an antenna mast. The lower section **16** is also of triangular shape in cross section at its lower end and tapers upwardly to a wedge shaped upper end which carries a pivot shaft **21** about the axis of which the upper section tilts. While the lower section has a triangular bottom it is composed of four longitudinal metal bars or rods **22**, **23**, **24** and **25** which form leg members. The bars or legs **24** and **25** have their lower ends brought together and welded to a bolt receiving collar or tube **26** to form one of three points or angles of the triangular base of the section **16**, the lower ends of the bars **22** and **23** having welded to them similar collars **27** and **28** respectively to form the other two angles. The upper portions of the bars **24** and **25** diverge from each other and converge relative to the leg bars **22** and **23**. They have their upper ends welded to the upper ends of the leg bars **22** and **23** respectively and to transversely extending and alined bearing collars **29** and **30** through which the pivot or hinge shaft **21** extends. The shaft may rotate in these sleeves or collars and be

retained therein by cotter pins as shown in Fig. 8. The bars 22 and 23 converge upwardly so that the side of the section which they form is of less width at its top but the bearing collars 29 and 30 are spaced apart a distance slightly greater than the width of a side of the triangular upper section at its greatest width. All sides of the lower section 16 have angular bracing formed by metal rods 32 bent back and forth into zig-zag shape and have their ends and their angles welded at 33 to the opposed bars which form the sides of the section, as will be readily understood on reference to Figs. 8 and 9. For a 40' tower the angular bracing may be ¼" stock and the longitudinal bars 7/16" stock but the bars 22 and 23 which form the hinged side of the section 16 are preferably made heavier of ½" stock. The bars and rods may be of aluminum or other metal alloy but I find the use of steel satisfactory when it has a heavy galvanized coating.

The metal base 15 is preferably of triangular shape and formed by three channel metal beams 35, 36 and 37 arranged as seen in Fig. 9 so that the triangular portion has outwardly extending arms 38 adapted to be anchored to the ground as seen in Fig. 10. The channel beams have their web portions disposed vertically, and at their inner ends the opposed flanges are cutaway and the adjacent web portions are bent to form attaching flanges 39 disposed against the midportion of the web of an adjacent beam and fastened thereto by a bolt 40 or other fastening means. Welded on the beams 35 and 36, as seen in Fig. 9, are alined tubular bearings 42 and 43 for the ends of a pivot shaft 44 which serves as a hinge about which the section 16 folds. The shaft 44 may be welded to the lower ends of the bars 22 and 23 adjacent the collars 27 and 28, and those collars and the third collar 26 are so disposed that when the section 16 is in its erect position the three collars will rest on the top flanges of the three beams and be in alinement with bolt holes 45 in those flanges for the reception of fastening bolts 46, as will be understood upon reference to Fig. 12. The section 16 will thus be securely fastened to the base 15 but when the three bolts 46 are removed the section may be folded down to the ground on the hinge formed by the shaft 44 and its bearings 42, 43.

The base 15 is anchored to the ground in a manner which permits it to be leveled or adjusted at any time to dispose the tower in a perpendicular position. That is accomplished by adjustably supporting the base on three upright anchor members in the form of metal rods or bars 48 having screw threaded upper ends adapted to pass freely through vertically alined holes 50 formed in the flanges of the channel beams at the outer ends of the arms 38. Nuts 51 on the threaded ends 49 engage the flanges of the beams and may be adjusted to raise or lower the arms 38. When the anchor bars or posts 48 are to be set in concrete, as seen in Fig. 10, a zig-zag rod 52 is welded at intervals to it so that it will be securely anchored in the concrete. For a small size tower the anchor bar or post 48a shown in Fig. 14 may be used and it may be screwed or turned into the ground so that concrete need not be used. The bar 48a has at its lower end an auger or screw portion 53 and is similar to the ordinary fence post hole auger. Near its threaded end 49 is a tool engaging projection 54 to facilitate screwing it into the ground.

The tiltable upper section 17 of the tower is preferably made in two approximately equal length parts 19 and 20 which are detachably connected, as seen in Fig. 8, for convenience in shipment. Each of these two parts or members 19 and 20 is composed of three longitudinal rods or bars in end to end alinement, the opposed bars on all three sides being connected by angular or diagonal brace rods similar to the bracing 32 in the lower section 16. Of the three bars 55, 56 and 57 of the lower part 20, the bars 55 and 56 are welded at 58 a short distance from their upper ends to the shaft 21, and on these ends

of all three bars are welded longitudinally extending coupling sleeves or tubes 59. Similar and alined coupling sleeves 60 are welded on the inner or lower ends of the longitudinal bars 61, 62 and 63 of the antenna carrying section 19. Bolts 64 in the pairs of alined sleeves 59 and 60 detachably fasten the parts 19 and 20 of the tilting section. The lower half or part 20 of that section has its three bars converging to a single point and welded together. That point is opposite the converging lower ends of the bars 24 and 25 of the lower section 16 when the upper section is in its erect position. These opposed portions of the two sections may be readily clamped together to hold the upper section erect by using two clamp plates 62 and 63 and a connecting bolt 64, as shown in Fig. 13. This clamp is disposed slightly above the converging ends of the bars, the plate 63 being disposed beneath the bar 57 and across the bars 55 and 56 and the plate 62 being disposed beneath the bars 24 and 25.

While the three bars 61, 62 and 63 of the part 19 converge, their upper ends have inwardly bent portions 65 which are welded to a centrally positioned longitudinally extending sleeve or tube 66 adapted to receive the antenna pole 18, as seen in Fig. 7. In order to securely mount the post or pole a second similar sleeve 67 is supported in line with the sleeve 66 by three radially disposed rods 68 welded to the bars 61, 62 and 63 within the section in spaced relation to the sleeve 66. The two sleeves are of a size to slidably receive a 1" or 1½" antenna pole which may be fixed in an adjusted position by a set screw 69.

In erecting the tower, the base 15 is anchored to the ground and adjusted to a level position by means of the nuts 51. The lower section 16 while in a horizontal position is then hinged to the base and the upper section 17 while substantially horizontal is hinged to the free end of the lower section. A suitable pull cord or line 70 is fastened to the lower end of the section 17. As will be evident upon reference to Figs. 2, 3 and 4, two men may then elevate the two sections, and when the lower section is upright it is fastened to the base by the three bolts 46. By then pulling on the line 70, the upper section may be swung from the position shown in Fig. 4 to the erect position shown in Fig. 1, and fastened in that position by the clamp plates 62 and 63 and the bolt 64. Any time that the antenna needs servicing the clamp may be removed and by means of the line 70 the heavier upper end 19 of the section 17 may be lowered to the ground. In case of a severe wind storm, both sections may be readily lowered by two men to the ground, and as readily returned to the upright usable position. If desired double bracing by zig-zag rods 72 such as the rods 32 may be provided at the lower hinged portion of the section and also at the detachably connected ends of the two parts of the upper section 17, that is, on each side of the hinge 21, 29, 30. This cross bracing will greatly strengthen these parts of the tower. By vertically adjusting the pole 18, the antenna may be raised or lowered with respect to the top of the section 17 up to about 10'.

From the foregoing, taken in connection with the accompanying drawing, it will be seen that novel and advantageous provision has been made for carrying out the objects of the invention, and while preferences have been disclosed, attention is invited to the possibility of making variations within the scope of the invention as claimed.

I claim:

1. A tiltable antenna supporting tower structure which is self supporting without the use of guy wires and which may be raised from or lowered to the ground by two men without the use of special tools, said tower structure comprising a flat metal base including three straight beams each having one end fastened at substantially the mid point of an adjacent beam to provide an inner triangular portion with anchoring arms extending outwardly from its angles, a lower tower section of upwardly tapered open work construction having a triangular lower end of sub-

stantially the same area as the triangular portion of the base and a wedge-shaped upper end, said section comprising four metal bars forming legs connected by brace rods, two of said leg bars having their lower ends associated with two of the angles of the triangular portion of the base and having their converging upper ends spaced apart, the other two of said leg bars having their upper ends fixed to said spaced upper ends of said first two leg bars and being disposed in downwardly converging relation with their lower ends fixed to each other at the third angle of the triangular portion of the base, means hingedly connecting the lower ends of the first mentioned two leg bars to the base at the said associated angles, means for rigidly securing the lower ends of the lower section to the base when the former is in an upright position the last mentioned means including a detachable fastening means between the connected lower ends of said other two leg bars and the base at the said third angle, whereby the lower section may be fixed in an upright position or swing to a horizontal position on said hinge means, an upper tower section of open work construction and of triangular shape in cross section, said upper tower section being wide at its intermediate portion and tapering toward each end, means hingedly connecting one side of said intermediate portion of the upper section to the connected upper ends of the two first mentioned leg bars to dispose the said one side of the upper section against the two second mentioned leg members when the upper section is in an upright position, a flexible pull line attached to the lower end of the upper section, means at the upper end of the upper section to fasten an antenna pole thereto, and means to detachably fasten together said contacting portions of the two sections when the upper section is in an upright position.

2. The structure of claim 1 in which said last mentioned detachable fastening means comprises two apertured clamping plates, one extending across the lower portions of the two second mentioned leg bars and the other extending across portions of the lower end of the upper section, and a removable fastening element in the apertures of the two plates.

3. The structure of claim 1 in which the beams of said base are of channel shape and have their flanges disposed horizontally and provided with alined apertures near the outer ends of the said anchoring arms, upright anchor rods having means on their lower portions for anchoring them beneath the surface of the ground, their projecting

upper ends being screw threaded and extending through said apertures in the flanges, and nuts on the threaded portions of said anchor rods and engaged with the outer faces of said flanges to permit vertical adjustment of the arms of the base on said anchor rods.

4. The structure of claim 1 in which the beams of said base are of channel shape and have their flanges disposed horizontally, in which said means hingedly connecting the lower ends of the two first mentioned leg bars comprises a shaft to serve as a pivot for the hinge and fastened to the lower ends of said two first mentioned leg bars with its ends projecting beyond those bars and alined tubular bearings for the projecting ends of the shaft fixed on top of the upper flanges of certain of said channel beams.

5. The structure of claim 4 in which said means for rigidly securing the lower end of the lower section to the base when the latter is in an upright position comprises three tubular elements fixed to the lower ends of the leg bars at the angles of the lower end of the lower section and adapted to rest on the upper flanges of the beams when the upper section is in an upright position and clamping bolts passed through said elements and through holes in said flanges, one of said elements and one of said bolts forming the said detachable fastening means between the connected lower ends of said other two leg bars and the base.

6. The structure of claim 1 in which said upper section includes longitudinal bars arranged in triangular relationship and connected by bracing, and in which said means hingedly connecting one side of the upper section to the connected upper ends of the two first mentioned leg bars comprises a shaft forming the hinge pivot and fastened to two of the longitudinal bars of the upper section with the ends of the shaft projecting beyond such bars, and a pair of alined tubular bearings receiving the projecting ends of that shaft and fixed to the connected upper ends of the leg bars of the lower section.

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