

Jan. 22, 1952

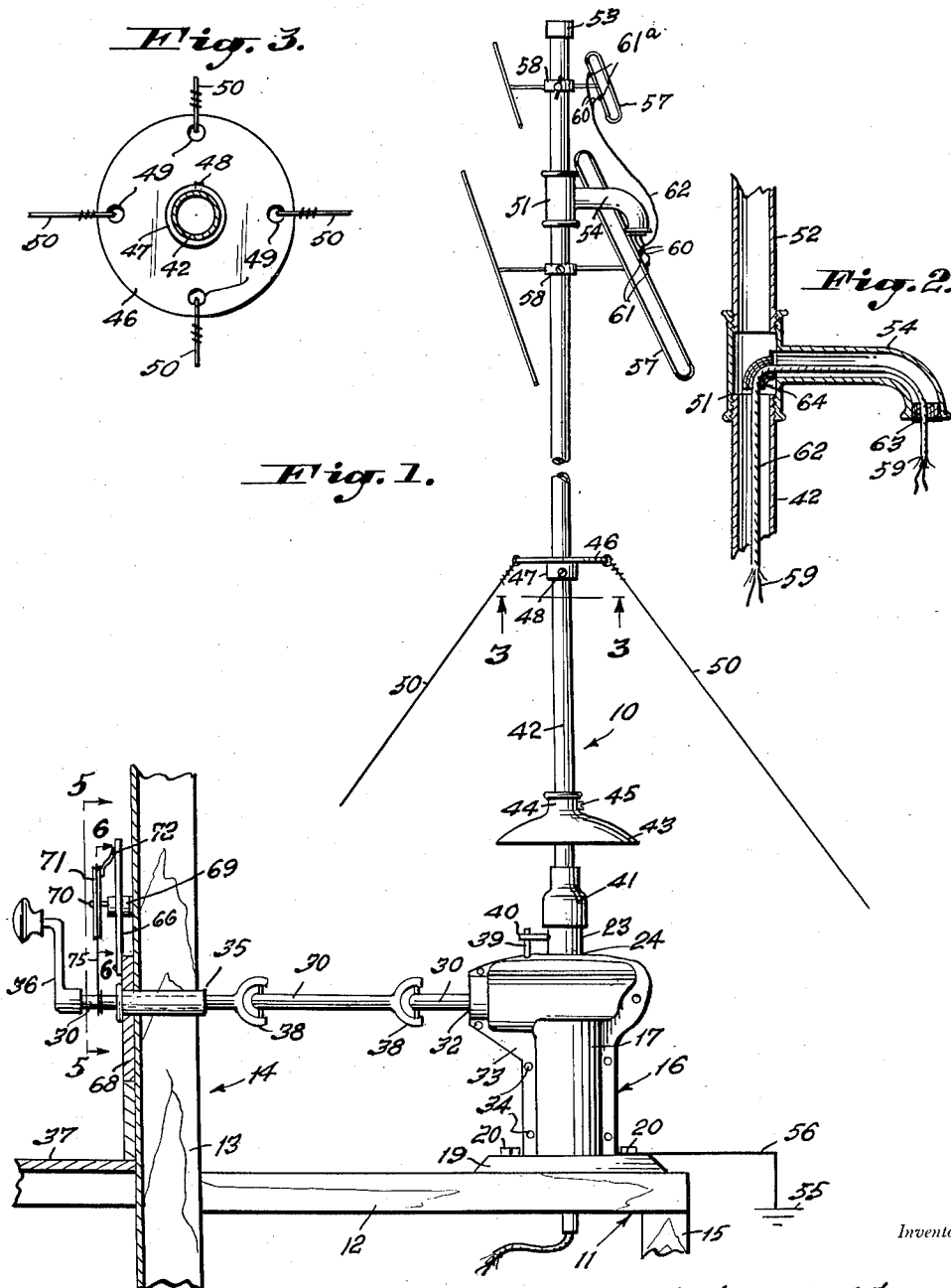
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2,583,210

MANUALLY ROTATABLE DIRECTIONAL ANTENNA

Filed Jan. 5, 1951

2 SHEETS—SHEET 1



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Jan. 22, 1952

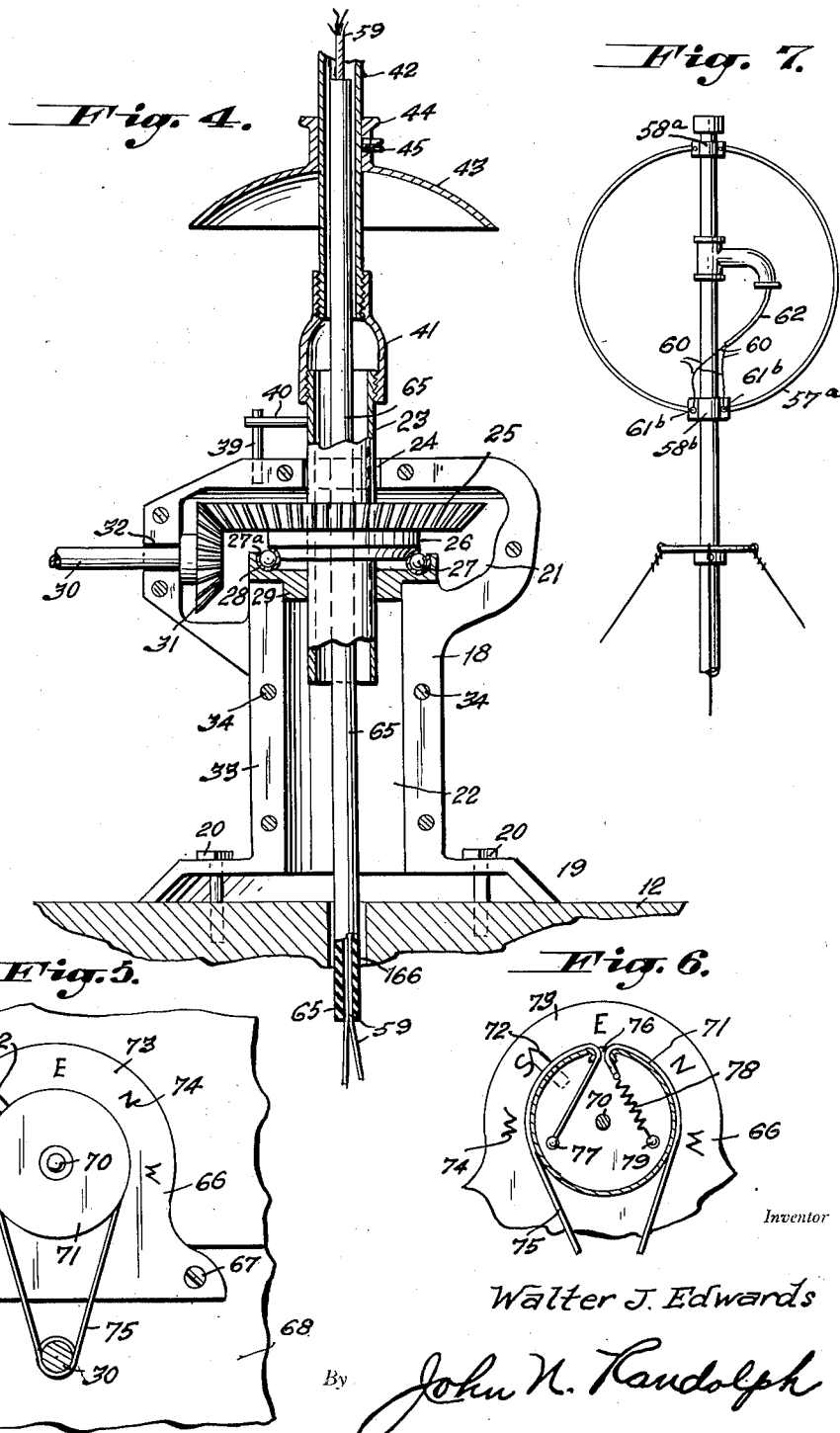
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2 SHEETS—SHEET 2



UNITED STATES PATENT OFFICE

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MANUALLY ROTATABLE DIRECTIONAL
ANTENNA

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Application January 5, 1951, Serial No. 204,586

7 Claims. (Cl. 250—33.51)

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This invention relates to an improved construction of support for a television or FM radio antenna and more particularly to a rotatable support capable of being manually turned about its longitudinal axis for varying the direction of a dipole attached thereto for disposing the dipole in the most advantageous position to receive the signal wave beamed from transmission points in different localities and thus directed in different directions toward the antenna.

More particularly, it is an aim of the present invention to provide a structure of extremely simple construction capable of being utilized for supporting an antenna dipole for turning movement in substantially a horizontal plane to position the dipole in different positions for most advantageously receiving signals from different stations or transmission points and which is so constructed that it can be operated from within a building on the outer side of which the antenna mast is disposed.

A further object of the invention is to provide a manually rotatable antenna structure which will additionally function as a shield and ground for grounding electric current caused by lightning to thus prevent injury to the apparatus or to any radio or television receiver attached thereto.

A further object of the invention is to provide a device of extremely simple construction having means to protect and shield the working parts thereof from the elements and which is capable of being easily erected and easily operated for rotating the antenna dipole and for accurately positioning the dipole for most advantageously receiving signals from transmission points positioned in different directions from the antenna.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is a side elevational view showing the invention in its entirety and in an operative position;

Figure 2 is a fragmentary vertical sectional view of a portion of the antenna mast, on an enlarged scale;

Figure 3 is an enlarged horizontal sectional view taken substantially along a plane as indicated by the line 3—3 of Figure 1;

Figure 4 is an enlarged central vertical sectional view partly in side elevation of another portion of the apparatus;

Figures 5 and 6 are enlarged cross sectional

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views taken substantially along planes as indicated by the lines 5—5 and 6—6, respectively, of Figure 1, and

Figure 7 is an elevational view of the upper portion of the mast illustrating another form of dipole and its mounting upon the mast.

Referring more specifically to the drawings, the manually rotatable television and FM radio antenna in its entirety is designated generally 10 and is shown supported primarily by a supporting framework or stand 11 including a platform 12 one end of which may be secured to a wall 13 of a building, such as a dwelling, partially illustrated at 14, and the opposite end of which platform 12 is supported by a depending leg 15.

A gear housing, designated generally 16 which is preferably formed of corresponding sections 17 and 18, includes a base 19 which is secured to the platform 12 by suitable fastenings 20 to support the housing 16 in an upright position on said platform, as illustrated in Figures 1 and 4. The casing sections 17 and 18 combine to form a gear cavity 21 in the upper portion of the casing 16 and a tubular bore 22 having an upper end opening into the cavity 21 and a lower end opening outwardly of the bottom of the base 19.

A tubular shaft or sleeve 23 extends rotatably through a bearing opening 24 in the top of the casing 16 and has a large beveled gear 25 fixed to its intermediate portion and disposed with the gear cavity 21. A thrust bearing cone 26 is fixed to the shaft 23 beneath the gear 25 and seats against a plurality of bearing elements 27 which are disposed in an annular groove 28 which opens into the cavity 21 and which is formed in the bearing base 29 which rests on the casing part surrounding the upper end of the bore 22. The bearing base 29 has a portion extending into the bore 22 which is loosely disposed around a part of the shaft 23. The parts 26, 27 and 29 combine to form an anti-friction thrust bearing for supporting the shaft 23. A cage 27a may be provided for the bearing elements 27. The lower portion of the shaft 23 extends downwardly into the bore 22 and terminates below the bearing base 29. A shaft 30 extends into the gear cavity 21 at substantially a right angle to the hollow shaft 23 and has a beveled pinion 31 fixed to the end thereof disposed in the casing 16, which pinion meshes with the beveled gear 25. The shaft 30 is journaled in a bearing opening 32 of the gear casing 16 adjacent the pinion 31. The bearing openings 24 and 32 each include half sections formed by each of the two gear casing sections 17 and 18 and said gear cas-

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ing sections each likewise includes a half of the base 19, or if desired, the base may constitute an integral part of only one of the casing sections. The casing sections 17 and 18 have complementary flanged edges 33 arranged in abutting engagement and which are secured together by a plurality of threaded fastenings 34 for detachably connecting the casing sections 17 and 18.

The shaft 30 extends from the gear casing 16 laterally thereof toward the building 14 and through an opening in the wall 13 thereof, said wall 13 having a sleeve bearing 35 extending therethrough for accommodating a portion of the shaft 30 and in which the shaft portion is journaled, adjacent its opposite end. The opposite end of the shaft 30 which is disposed in the building 14 has a hand crank 36 fixed thereto and which is adapted normally to be disposed adjacent a floor 37 of the building 14 although the shaft 30 and crank 36 may be disposed at any desired level. Between the wall 13 and gear casing 16, the shaft 30 is provided with spaced universal joints 38 to prevent binding of the shaft ends in the bearings 32 and 35.

A stop pin 39 is fixed to and rises from the top portion of the casing section 18 and is disposed in the path of rotation of a stop pin 40 which is fixed to and projects radially from the hollow shaft 23, above the casing 16, to limit the extent that the hollow shaft 23 and gear 25 can be revolved by the shaft 30 and pinion 31 to permit the hollow shaft 23 to revolve slightly less than a complete revolution.

The upper end of the hollow shaft 23 is externally threaded to receive the enlarged internally threaded lower end of a reducer coupling 41 the restricted internally threaded upper end of which threadedly receives the externally threaded lower end of a pipe 42 forming the antenna mast and which may extend above the gear casing 16 to any desired elevation and which may be formed of one or a plurality of sections. A concavo-convex canopy 43 has a central boss 44 which engages loosely around the mast 42 and is adjustably secured thereto by a setscrew 45 which is threaded radially through the wall of the boss 44 into the bore thereof to detachably engage the mast 42 to clamp the boss 44 thereto for positioning the canopy 43 at any desired level above the coupling 41. The canopy 43 has its concave side facing downwardly and its convex side uppermost and is normally disposed adjacent the coupling 41 to provide a shield over the gear casing 16 to protect the gear casing and the parts contained therein from the elements. A disk 46 has a central opening which engages loosely around the mast 42 and is rotatably supported thereon at any desired level by a collar 47 which is adjustably disposed on the mast 42 beneath the disk 46 and detachably secured thereto by a setscrew 48 so that the mast 42 and collar 47 may rotate relatively to the disk 46. The disk 46 is apertured as seen at 49 to be engaged by the adjacent ends of a plurality of guide wires 50 which are anchored thereto and the opposite ends of which may be anchored to the earth or to any other rigid support for maintaining the mast 42 in an upright position.

A coupling 51 has a lower end threaded onto the upper end of the mast 42, as best seen in Figure 2, and a short length of pipe 52 forming an extension of the mast 42, has a lower end threaded into the upper end of the coupling 51 and is closed at its upper end by a cap 53. The coupling 51 is provided intermediate of its ends

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with a laterally projecting tubular extension 54, shaped similar to a faucet bib and having a downturned open free end.

The mast 42 is grounded at 55 by a ground wire 56 through the gear casing 16, hollow shaft 23 and coupling 41, said ground wire 56 being connected in any suitable manner to the gear casing 16 as by one of the fastenings 20. A dipole 57 is connected at its high frequency to the pipe section 52 by a connector 58 so that the mast 42 constitutes a lightning arrester so that any current from lightning may be carried directly to the ground without impairing incoming radio or television signals, and also a shield for a lead in or transmission line 59 which extends therethrough to protect the transmission line against local interference. The lower bay or low frequency of the dipole 57 may be attached to the mast 42 beneath the joint 51 by a second connector 58. Corresponding ends of the two wire strands 60 of the transmission line 59 are attached to the two contact posts 61 of the low frequency of the dipole 57 and the two posts 61a of the high frequency. The transmission line, which is enclosed in a casing of electrical material 62, extends from the low frequency of the dipole 57 through the coupling extension 54 and coupling 51 and thence downwardly through the mast 42. The insulation 62 is provided with additional wrapping as seen at 63 where it extends through the down turned open end of the tubular extension 54 to prevent the transmission line from being drawn inwardly of the extension 54 and also at the point where it is turned downwardly in the coupling 51, as seen at 64, to prevent the insulation from being worn off at this point. A rubber tube 65 extends downwardly from above the lower end of the mast 42 through the hollow shaft 23 and the gear casing 16 and downwardly through an opening 166 in the platform 12 to enclose and protect the portion of the transmission line 59 which is disposed adjacent the moving parts of the device. The transmission line 59 extends from the lower end of the tube 65 to a radio or television receiver, not shown.

If a circular dipole 57a is employed, as illustrated in Figure 7, diametrically opposite portions thereof may be secured by a connector 58a to the extension section 52 and by an insulator 58b to the mast 42 below the coupling 51. The ends of the strands 60 are then attached to the contact posts 61b which are located at the ends of the insulator 58b and insulated thereby from the mast 42.

A dial 66 is secured by fastenings 67 to a baseboard 68 through which the sleeve bearing 35 extends and is supported thereby on the inner side of the wall 13 and spaced therefrom. The dial 66 is provided with a centrally disposed bearing 69 in which is journaled one end of a short shaft 70 to which is fixed a grooved pulley 71. The pulley 71 has a pointer 72 fixed thereto and which projects radially from a portion of its periphery to overlie a portion of the face 73 of the dial 66 which is inscribed with circumferentially spaced letters 74 indicating compass directions. A flexible member 75 is wound several times about the shaft 30 below the pulley 71 and has its ends extending upwardly on opposite sides of the periphery of the pulley, as seen in Figure 6, and thence inwardly through an opening 76 in the pulley periphery and which communicates with the hollow interior of the pulley. One end of the flexible member 75 is anchored within the

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pulley 71 at 77 and the opposite end thereof is connected to one end of a contractile spring 78 the opposite end of which is anchored in the pulley at 79. The pinion 31 is of a diameter relatively to the gear 25 so that the shaft 30 will make at least three and one-half rotations to each rotation of the hollow shaft 23 and the shaft 30 is sized relatively to the pulley 71 so that said pulley will turn through an arc of at least 180° while the shaft 23 is turning slightly less than 360°. Accordingly, when the stop pin 40 is engaging against one side of the stop pin 39 the pointer 72 will be disposed over one of the letters "W" representing West and when the shaft 23 is rotated by manual rotation of the shaft 30 the pointer 72 will pass over the initials 74 representing "South," "East" and "North" before eventually stopping over the other initial representing "West." However, if desired the pulley 71 could be reduced in diameter and the flexible member 75 made endless to be frictionally engaged in the groove thereof so that the pointer 72 would turn through a complete revolution. It will thus be readily apparent that by turning the hand crank 36 the mast 42 will be revolved through the beveled gear and pinion drive 25, 31 to turn the dipole 57 in a horizontal plane to cause it to face in any direction from which waves are being beamed from a transmission point to thereby obtain the most efficient results from the aerial. It will also be obvious that the dial face 73 can be marked to indicate the proper setting for each transmitting station after such setting has once been determined.

As previously pointed out, the mast 42 provides a shield to protect the transmission line 59 from local interference and additionally functions to ground the aerial to prevent damage to the receiver, not shown, to which the lead in 59 is connected resulting from an electric current produced by lighting. It will also be apparent that the mechanically operated rotatable antenna as herein disclosed may be operated substantially as conveniently as an electric or hydraulic unit for rotating an antenna mast and is capable of being much more economically manufactured and sold and much more readily installed and maintained in efficient operating condition.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A manually operated rotatably supported directional antenna comprising a gear casing, a stationary support on which the gear casing is secured in an upright position, a hollow shaft journaled in the gear casing longitudinally and vertically with respect thereto, a drive shaft having one end projecting into the gear casing and journaled therein and disposed at an angle to said hollow shaft, a beveled gear and pinion drive connecting said end of the drive shaft to an intermediate portion of the hollow shaft, a hollow mast having a lower end coupled to the

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upper end of the hollow shaft above the gear casing and forming an upright extension of the hollow shaft, a dipole secured to the mast adjacent its upper end and grounded through said mast, said mast having a tubular branch extending laterally therefrom and disposed adjacent the dipole provided with a downwardly opening outer end, a transmission line connected at one end to the dipole and extending therefrom into said lateral branch extension through its downwardly opening end and downwardly through the mast and hollow shaft, said gear casing having a bore opening outwardly of its lower end into which the lower end of the hollow shaft extends and through which the transmission line extends from said hollow shaft, said platform having an opening extending downwardly therethrough communicating with the bore of the gear casing through which the transmission line extends from the gear casing, and manually actuated means connected to the opposite end of said drive shaft remote to the gear casing for revolving the hollow shaft, mast and dipole.

2. An antenna as is in claim 1, a stationary dial face having compass indicia thereon disposed adjacent the last mentioned end of the drive shaft, a pointer, rotatably mounted means supporting said pointer for movement over the dial face indicia, and means connecting the drive shaft and rotatably mounted pointer supporting means for causing said means to be turned by the drive shaft in a predetermined relationship relatively to the hollow shaft and mast for visually indicating the directional disposition of the dipole.

3. An antenna as in claim 2, said dial and pointer being adapted to be disposed within an enclosure together with said manually operated means of the drive shaft, and said mast and gear casing being disposed externally of the enclosure.

4. An antenna as in claim 1, a tubular rubber casing enclosing the transmission line from above and adjacent the lower end of the mast to below said platform.

5. An antenna as in claim 1, and means for limiting the rotation of said mast including an element fixed to the gear casing and a second element fixed to and projecting radially from the hollow shaft above the gear casing and disposed to engage said first element when the hollow shaft is turned a predetermined distance in either direction.

6. An antenna as in claim 1, said gear casing and hollow shaft being provided with anti-friction thrust bearing means disposed within the gear casing and providing an anti-friction support for the hollow shaft, mast and dipole.

7. An antenna as in claim 1, said mast having a closed upper end, and a canopy having a convex upper surface adjustably supported by the mast above and adjacent the gear casing for shielding the gear casing and the parts disposed therein from the elements.

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No references cited.