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2,682,609

ROTATING ANTENNA INSTALLATION

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2 Sheets-Sheet 1

Fig-1

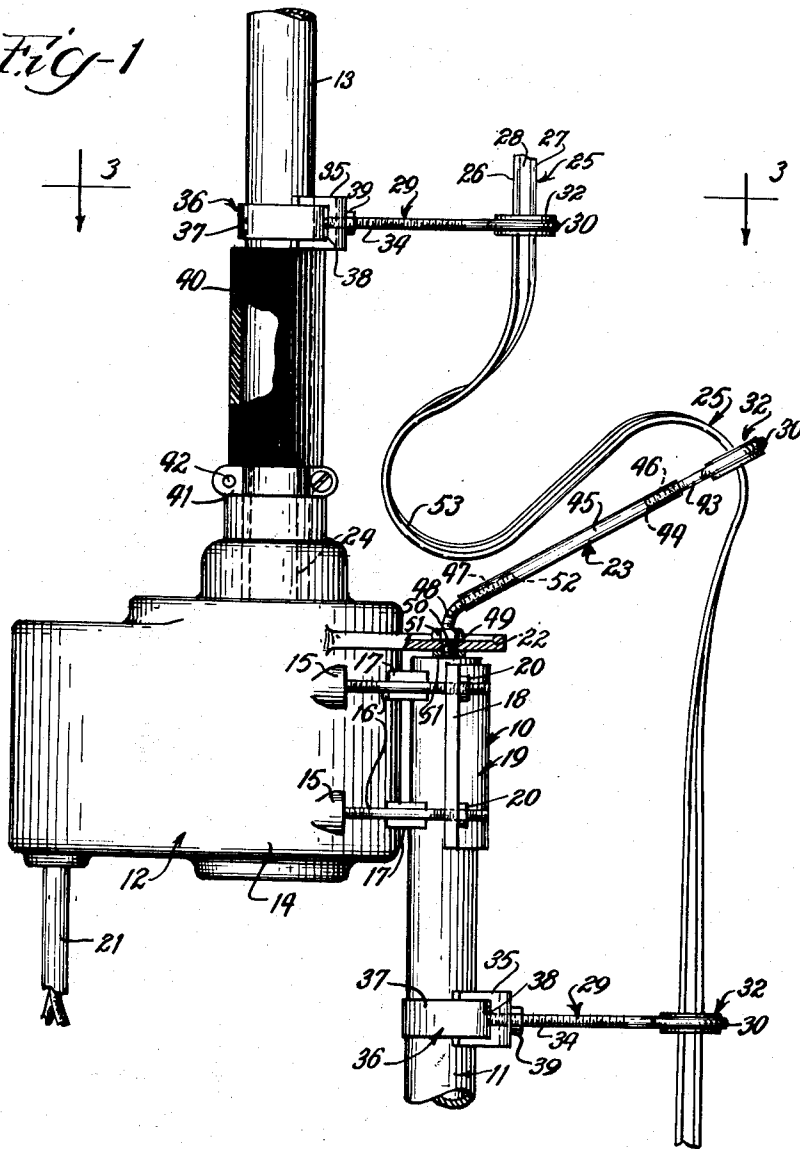
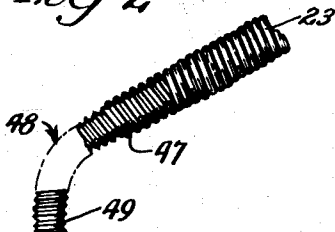


Fig-2



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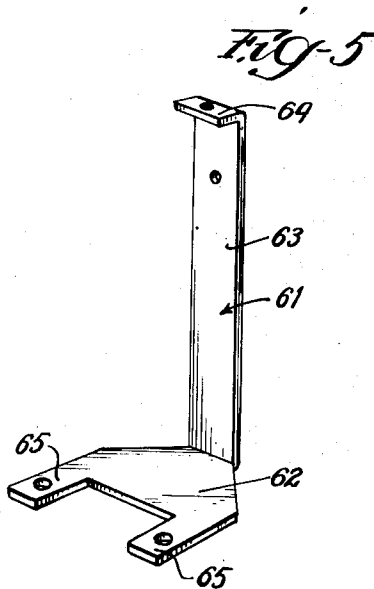
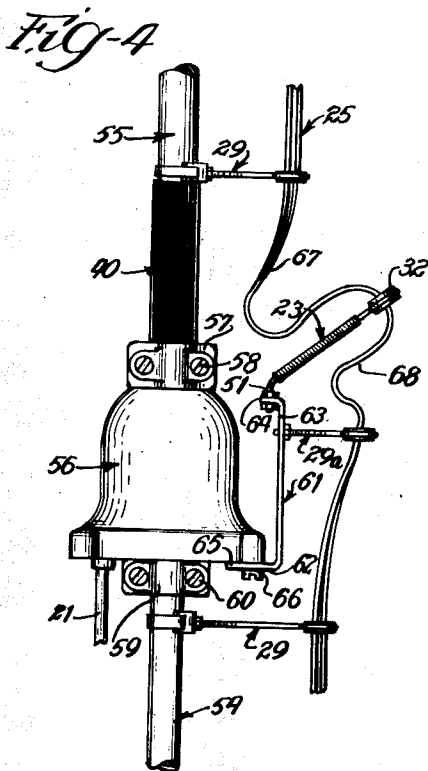
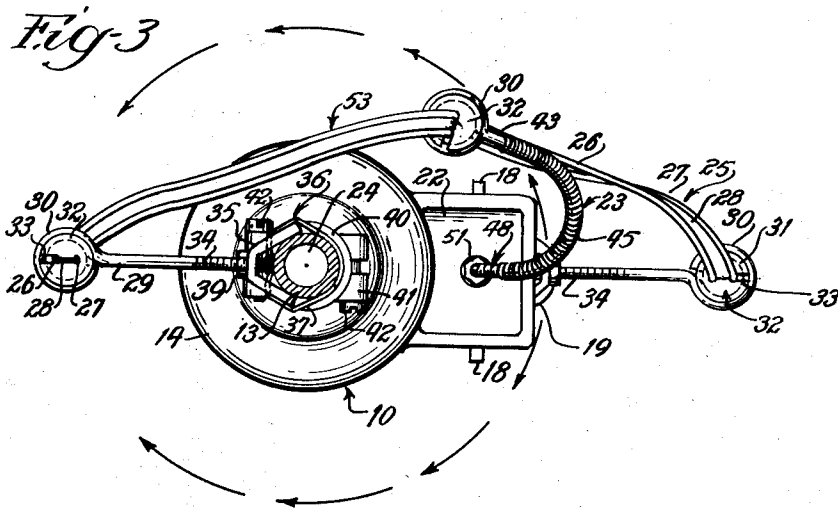
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2 Sheets-Sheet 2



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ROTATING ANTENNA INSTALLATION

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12 Claims. (Cl. 250—33)

1 The present invention relates to rotating antenna installations, and is particularly concerned with such installations as are ordinarily used for television receivers.

One of the objects of the invention is the provision of an improved rotary antenna installation provided with a motor and with lead-in conductors in which the lead-in conductors are adapted to be held in spaced relation and insulated from the pipes and motor and other metal parts which support the antenna, although the antenna supporting pipe is adapted to be rotated through the entire range of 360 degrees.

Another object of the invention is the provision of an improved construction for the support of the antenna lead-in in spaced relation to the pipes and motor in such manner that the motor may rotate the antenna and its supporting pipe 180 degrees in either direction, while still causing the lead-in conductors to be spaced from and out of contact with the metal parts of the motor, pipes, etc.

Another object of the invention is the provision of improved structures for holding the lead-in antenna in spaced relation and insulated from the antenna supporting pipes and motor, including a bendable resilient strut which is adapted to bend and permit the movement of its insulated grommet with the lead-in conductors while still holding the lead-in conductors at a predetermined distance from the motor and pipes.

Another object of the invention is the provision of an improved construction of a bendable strut adapted to be attached to an antenna supporting structure for holding the antenna lead-in conductors spaced from and insulated from the adjacent metal structure, which strut is adapted to permit its supporting grommet and the lead-in conductors to move with the rotating antenna supporting pipe which may rotate over substantially 180 degrees without danger of the lead-in contacting the pipe.

Another object of the invention is the provision of improved antenna lead-in supporting arrangements which are sturdy, capable of economical manufacture, adapted to be used in all kinds of weather, and to permit the movement of the lead-in conductors under ice and snow conditions, and adapted to be used for a long period of time without any necessity for repair or replacement.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which sim-

ilar characters of reference indicate similar parts throughout the several views.

Referring to the two sheets of drawings accompanying this specification,

Fig. 1 is a fragmentary side elevational view partially broken away to show the structure of my rotating antenna installation;

Fig. 2 is a fragmentary enlargement of the lower end of the resilient supporting strut;

Fig. 3 is a fragmentary top plan view taken on the plane of the line 3—3 of Fig. 1, looking in the direction of the arrows;

Fig. 4 is a view similar to Fig. 1 of a modification showing the arrangements used when the motor is concentric with both pipes;

Fig. 5 is a view in perspective on a reduced scale of the strut supporting bracket employed in Fig. 4.

Referring to Fig. 1, 10 indicates in its entirety the rotating antenna supporting structure which includes a fixed vertical pipe 11, extending upward from the ground, a motor 12 and a rotating antenna supporting pipe 13.

The motor 12 may have an exterior housing 14, provided with laterally projecting lugs 15 on each side for receiving the stud bolts 16, by means of which the motor is secured to the pipe 11.

The motor housing 14 may be spaced from the pipe by spacers 17, shaped to fit the side of the motor on the left, and shaped on the other side to fit the pipe 11.

The bolt 16 may pass through apertures in the radially extending flange 18 of a partially cylindrical clamping member 19, which has a similar attaching flange 18 on the other side of the motor and pipe provided with bolts 16.

The nuts 20 on the bolts 16 clamp the motor against the spacers and frictionally secure the clamping members 17 and 19 on the pipe 11.

The motor 12 is provided with the energizing and controlling conductors 21, extending from its housing, and with a laterally projecting supporting flange or plate 22 above the pipe 11, which I employ for supporting my improved spacing strut 23.

The motor has a driven shaft 24 projecting from its upper end into the pipe 13 to which the shaft 24 is secured, so that the motor may rotate the shaft 13. Motor 12 may be provided with a suitable type of reduction gears whereby a relatively small motor 12 may rotate the antenna supporting pipe 13 at a low speed.

The general object of such a rotating antenna assembly is to orient the antenna in such a

direction that the signal which is to be utilized is at its maximum strength.

The lead-in conductors are indicated in their entirety by the numeral 25, extending from the antenna down to the lead-in conductors of the television set.

The lead-in conductor assembly may comprise a pair of electrical conductors 26, 27, preferably of the stranded type for maximum flexibility insulated by an integral covering of rubber or plastic which has a spacing and insulating web 28.

Various types of lead-in conductors may be employed, including bare lead-in conductors, spaced at regularly spaced points by plastic spacers in which the conductors are imbedded.

Such lead-in conductors are supported on the pipes 11 and 13 by means of threaded supporting rods 29, each of which has a circular curved end formation 30, Fig. 3, located in the groove 31 of a rubber grommet 32.

The rubber grommet 32 has a radially extending slot 33, the inner portion of which is shaped to fit the external cross-sectional outline of the lead-in conductor assembly 25. When the grommet is placed in the circular portion of each supporting rod 29, the lead-in conductors 25 being inside the groove 33 and engaging the complementary inner surface thereof, the rubber grommet 32 is clamped on the lead-in conductors by the circular portion 30 of the rod which may be given additional closing movement by means of pliers.

The supporting rods 29 are provided with a threaded shank 34 in each case, threaded into a heavy U-shaped metal member 35 of a hose clamp assembly 36. The hose clamp assembly 36 includes a flexible steel band or strap 37, one end of which is riveted to the U-shaped member 35, and the other end of which is threaded through slots 38 in the two legs of the U-shaped member 35.

The threaded shank 34 has its end engaging the strap 37, inside the U-shaped member 35, and when the threaded shank is driven inward it takes up the slack in the strap 37 and clamps the strap on the pipe 11.

A lock nut 39 may lock the hose clamp in fixed position. One of such lead-in supporting members 29 is preferably located on the pipe 11, just below the motor 12, and another such supporting member 29 is preferably located on the pipe 13 and spaced upwardly from the motor 12.

A sleeve 40 of molded insulating plastic may be placed on the upper pipe 13 and clamped in fixed position by a pair of partially cylindrical clamping members and screw bolts 42. This sleeve is particularly important where the lead-in conductors are bare but may be omitted in other embodiments of the invention.

The lead-in conductors 25 are clamped by the upper grommet 32 of the upper rod 29 and by the lower grommet 32 of the lower rod 29.

The plate 22, carried by the motor housing 14, preferably supports a spacing strut member 23, which may extend diagonally at an angle of about 60 degrees to the horizontal.

Supporting strut 23 has the same circular rod formation 30 clamping a grommet 32 on the lead-in conductors 25, but the shank 43 of this strut is short and may terminate at 44, inside a closely wound resilient, helical coil spring 45.

The helical coil spring 45 is threaded on a threaded portion 46 of the shank 43, the threads of which are complementary to the inside of the

coil spring. At its other end the coil spring 45 is also threaded on a threaded portion 47 which fits the inside of the coil spring and is a part of a threaded stud 48, which extends diagonally upward and outward at one end and downward at the other end.

The downward end 49 is threaded into a threaded bore 50 in the plate 22, and secured by a lock nut 51, or a pair of nuts 51 may be employed. Thus the resilient strut 23 is fixedly secured to the plate 22, extending diagonally upward and away from the motor 12.

Between the end 52 of the lower stud 48 and the end 44 of the shank 43, the strut 23 has only the closely wound coils of the spring 45, which permit it to bend laterally at a point substantially midway between the ends of the spring. This leaves half of the strut, that is, from its middle to the inner end, still extending outward and spacing the other parts of the strut even though the strut has been bent laterally.

The lead-in conductors 25 are provided with a slack portion 53 in the form of an inwardly extending loop which extends inward along the strut 23, and is bowed and extends outward to the upper grommet 32, while being spaced at all times from the strut 23, motor 12 and pipe 13.

This slack permits the upper supporting rod 29 to rotate throughout substantially 180 degrees in either direction, making a total range of movement of 360 degrees for the upper pipe 23 by utilizing both directions of rotation.

The motor 12 is preferably provided with limit switches for preventing it from rotating beyond the position shown in Fig. 3 in either direction. The limit switches cut off the motor if an effort is made to rotate it too far.

Fig. 1 and Fig. 3 deal with the eccentrically mounted motor installation, while Figs. 4 and 5 show a modification for a concentric pipe installation.

In Fig. 4, 54 indicates the lower fixed pipe and 55 the upper rotating pipe which is located substantially the same axis.

56 indicates a motor having a drive shaft which is secured to the upper pipe 55 by semicircular clamping members 57 and screw bolts 58, so that the upper pipe 55 rotates with the motor shaft.

The motor is supported fixedly on the lower pipe by means of semicircular clamping members 59 and screw bolts 60, which are carried by the bottom of the motor housing.

21 again indicates the motor energizing and controlling conductors. 40 indicates the insulating sleeve on the upper pipe 55. 29, 29 indicate the lead-in conductor supporting members carried by the upper pipe 55 and the lower pipe 54.

Such an installation is preferably provided with a bracket 61 of the type shown in Fig. 5, comprising a sheet metal member having a base flange 62, a column 63 and an upper attaching flange 64.

The base flange 62 has two attaching flanges 65 with apertures for receiving screw bolts 66, which are threaded into the motor housing 56 for supporting the bracket fixedly on the motor housing.

The column 63 is long enough to locate the resilient strut 23, with its lower end at the top of the lower housing. The resilient strut 23 may be of the same construction as described with respect to Fig. 1 and Fig. 2, having an insulating grommet 32 and secured to the attaching flange 64 by means of nuts 51.

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An auxiliary supporting member 29a may be secured to the column 63, just below its attaching flange 64.

The lead-in conductors 25 are again provided with a slack loop 67, above the resilient strut 23, and a slack loop 68 below the resilient strut 23.

The operation of both installations is substantially the same.

Referring to Fig. 3, this shows the upper antenna pipe 13 rotated 180 degrees counterclockwise. The resilient strut 23 has been bent by the pull on the slack portion 56 of the lead-in conductors, but the resilient strut 23 still spaces the lead-in conductors from the pipes and motor housing from which it is insulated at all times by grommets 32.

The parts may take any intermediate position between Fig. 1 or Fig. 3, or the upper pipe 13 may be rotated clockwise from Fig. 1 through an angle of 180 degrees.

The same is true of the concentric motor stud installation of Fig. 4. Thus it is possible to rotate the antenna throughout the full range of 360 degrees to point the antenna in such direction as will give a maximum signal for the desired television channel.

It will thus be observed that I have invented improved forms of rotating antenna installation, in which the lead-in conductors are kept spaced at all times from the pipes and other metal parts; and I have found by experience that the present installation will not become fixed by the accumulation of ice or snow, or if they do accumulate some ice it will be cracked off by the bending of the slack portions of the lead-in conductors and by the bending of the resilient strut.

The present installations take care of both eccentric and concentric motor arrangements and operate satisfactorily in all kinds of weather, involving only a minimum amount of additional expense over the prior art devices which were not satisfactory.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a rotating antenna installation, the combination of a lower fixed supporting member with a motor for rotating the antenna fixedly supported on said lower supporting member; an upper antenna supporting member carried by a motor driven shaft to be rotated thereby, and an antenna lead-in conductor assembly extending in the general direction along said upper and lower supporting members; insulated rigid supporting struts carried by said upper antenna supporting member and by said lower supporting member for spacing, insulating and supporting the lead-in conductor assembly spaced from all metal parts, and an auxiliary spacing strut carried by the lower supporting member, and having insulation engaging the lead-in conductor assembly, located substantially at the top of the motor and projecting upwardly and away from the motor in one position; said latter strut being provided with a resilient, bendable intermediate portion and said lead-in conductor being provided with a slack loop spaced from all metal parts above said latter strut, permitting substantially

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180 degrees rotation of the upper antenna supporting member in either direction while taking up said slack, the said latter strut maintaining the lead-in conductor assembly spaced from metal parts at all times.

2. In a rotating antenna installation, the combination of a lower fixed supporting member with a motor for rotating the antenna fixedly supported on said lower supporting member; an upper antenna supporting member carried by a motor driven shaft to be rotated thereby, and an antenna lead-in conductor assembly extending in the general direction along said upper and lower supporting members; insulated rigid supporting struts carried by said upper antenna supporting member and by said lower supporting member for spacing, insulating and supporting the lead-in conductor assembly spaced from all metal parts, and an auxiliary spacing strut carried by the lower supporting member, and having insulation engaging the lead-in conductor assembly, located substantially at the top of the motor and projecting upwardly and away from the motor in one position; said latter strut being provided with a resilient, bendable intermediate portion and said lead-in conductor being provided with a slack loop spaced from all metal parts above said latter strut, permitting substantially 180 degrees rotation of the upper antenna supporting member in either direction while taking up said slack, the said latter strut maintaining the lead-in conductor assembly spaced from metal parts at all times, said latter strut comprising a closely wound helical coil spring fixedly attached at one end to the lower supporting member and carrying an insulating grommet supporting the lead-in conductors at the other end.

3. A rotating antenna assembly comprising a lower supporting pipe, a motor fixedly secured to said lower supporting pipe, an upper antenna supporting pipe, rotatably carried by a shaft driven by said motor, insulated spacing struts carried by the upper pipe spaced from said motor and carried by the lower pipe spaced from said motor, each strut having an insulating grommet, a lead-in conductor assembly extending in the general direction of said pipes and mounted in said grommets, and a third resilient bendable strut fixedly mounted at one end on said motor, and having its other end provided with an insulating grommet supporting the lead-in conductor assembly, there being a slack loop in the lead-in conductors spaced from all metal parts but located above said resilient strut, the said assembly permitting a rotation of the upper pipe by said motor in either direction while still constantly spacing the lead-in conductors from all metal parts by virtue of the lateral bending of said resilient strut.

4. A rotating antenna assembly comprising a lower supporting pipe, a motor fixedly secured to said lower supporting pipe, an upper antenna supporting pipe, rotatably carried by a shaft driven by said motor, insulated spacing struts carried by the upper pipe spaced from said motor and carried by the lower pipe spaced from said motor, each strut having an insulating grommet, a lead-in conductor assembly extending in the general direction of said pipes and mounted in said grommets, and a third resilient bendable strut fixedly mounted at one end on said motor, and having its other end provided with an insulating grommet supporting the lead-in conductor assembly, there being a slack loop in the lead-in conductors spaced from all metal parts

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but located above said resilient strut, the said assembly permitting a rotation of the upper pipe by said motor in either direction while still constantly spacing the lead-in conductors from all metal parts by virtue of the lateral bending of said resilient strut, said resilient strut comprising a threaded stud mounted on the motor, and threaded into one end of a coil spring, said coil spring having its other end in threaded engagement with a rod having a loop engaging a grommet for supporting the lead-in conductors.

5. A rotating antenna assembly comprising a lower supporting pipe, a motor fixedly secured to said lower supporting pipe, an upper antenna supporting pipe, rotatably carried by a shaft driven by said motor, insulated spacing struts carried by the upper pipe spaced from said motor and carried by the lower pipe spaced from said motor, each strut having an insulating grommet, a lead-in conductor assembly extending in the general direction of said pipes and mounted in said grommets, and a third resilient bendable strut fixedly mounted at one end on said motor, and having its other end provided with an insulating grommet supporting the lead-in conductor assembly, there being a slack loop in the lead-in conductors spaced from all metal parts but located above said resilient strut, the said assembly permitting a rotation of the upper pipe by said motor in either direction while still constantly spacing the lead-in conductors from all metal parts by virtue of the lateral bending of said resilient strut, the said motor being eccentrically supported upon said lower pipe by means of clamping members, securing the lower pipe against the side of said motor.

6. A rotating antenna assembly comprising a lower supporting pipe, a motor fixedly secured to said lower supporting pipe, an upper antenna supporting pipe, rotatably carried by a shaft driven by said motor, insulated spacing struts carried by the upper pipe spaced from said motor and carried by the lower pipe spaced from said motor, each strut having an insulating grommet, a lead-in conductor assembly extending in the general direction of said pipes and mounted in said grommets, and a third resilient bendable strut fixedly mounted at one end on said motor, and having its other end provided with an insulating grommet supporting the lead-in conductor assembly, there being a slack loop in the lead-in conductors spaced from all metal parts but located above said resilient strut, the said assembly permitting a rotation of the upper pipe by said motor in either direction while still constantly spacing the lead-in conductors from all metal parts by virtue of the lateral bending of said resilient strut, the said motor being concentrically supported upon said lower pipe by means of clamping members carried by the motor.

7. A rotating antenna assembly comprising a lower supporting pipe, a motor fixedly secured to said lower supporting pipe, an upper antenna supporting pipe, rotatably carried by a shaft driven by said motor, insulated spacing struts carried by the upper pipe spaced from said motor and carried by the lower pipe spaced from said motor, each strut having an insulating grommet, a lead-in conductor assembly extending in the general direction of said pipes and mounted in said grommets, and a third resilient bendable strut fixedly mounted at one end on said motor, and having its other end provided with an insulating grommet supporting the lead-in conductor assembly, there being a slack loop in the

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lead-in conductors spaced from all metal parts but located above said resilient strut, the said assembly permitting a rotation of the upper pipe by said motor in either direction while still constantly spacing the lead-in conductors from all metal parts by virtue of the lateral bending of said resilient strut, the said motor being concentrically supported upon said lower pipe by means of clamping members carried by the motor, said latter motor being provided with a bracket having a column and said resilient structure being supported by said bracket substantially at the top level of said motor.

8. In a rotary antenna installation, the combination of a lower fixed pipe and a motor carried thereby, and an upper rotating pipe mounted to be rotated by a shaft driven by said motor, an insulating spacing member carried by the upper pipe and another insulating spacing member carried by the lower pipe supporting a lead-in conductor assembly spaced and insulated from all metal parts, and an intermediate bendable insulating strut carried by said lower pipe and extending outwardly from said pipes and motor on the side on which the lead-in conductor assembly is located, there being a slack loop above said bendable strut whereby the rotation of the upper pipe takes up the slack and bends the bendable strut to maintain the lead-in conductor assembly constantly spaced from all metal parts.

9. In a rotary antenna installation, the combination of a lower fixed pipe and a motor carried thereby, and an upper rotating pipe mounted to be rotated by a shaft driven by said motor, an insulating spacing member carried by the upper pipe and another insulating spacing member carried by the lower pipe supporting a lead-in conductor assembly spaced and insulated from all metal parts, and an intermediate bendable insulating strut carried by said lower pipe and extending outwardly from said pipes and motor on the side on which the lead-in conductor assembly is located, there being a slack loop above said bendable strut whereby the rotation of the upper pipe takes up the slack and bends the bendable strut to maintain the lead-in conductor assembly constantly spaced from all metal parts, the said upper pipe being provided with an insulating sleeve about the pipe above the motor.

10. In a rotary antenna installation, the combination of a lower fixed pipe and a motor carried thereby, and an upper rotating pipe mounted to be rotated by a shaft driven by said motor, an insulating spacing member carried by the pipe and another insulating spacing member carried by the lower pipe supporting a lead-in conductor assembly spaced and insulated from all metal parts, and an intermediate bendable insulating strut carried by said lower pipe and extending outwardly from said pipes and motor on the side on which the lead-in conductor assembly is located, there being a slack loop above said bendable strut whereby the rotation of the upper pipe takes up the slack and bends the bendable strut to maintain the lead-in conductor assembly constantly spaced from all metal parts, said bendable strut being carried by a bracket secured to the bottom of said motor and extending upward to the top level of said motor.

11. In a rotary antenna installation, the combination of a lower fixed pipe and a motor carried thereby, and an upper rotating pipe mounted to be rotated by a shaft driven by said motor, an insulating spacing member carried by the upper pipe and another insulating spacing

member carried by the lower pipe supporting a lead-in conductor assembly spaced and insulated from all metal parts, and an intermediate bendable insulating strut carried by said lower pipe and extending outwardly from said pipes and motor on the side on which the lead-in conductor assembly is located, there being a slack loop above said bendable strut whereby the rotation of the upper pipe takes up the slack and bends the bendable strut to maintain the lead-in conductor assembly constantly spaced from all metal parts, said bendable strut being resilient for causing it to resume its normal unbent position extending away from said motor.

12. In a rotary antenna installation, the combination of a lower fixed pipe and a motor carried thereby, and an upper rotating pipe mounted to be rotated by a shaft driven by said motor, an insulating spacing member carried by the upper pipe and another insulating spacing member carried by the lower pipe supporting a lead-in conductor assembly spaced and insulated from all metal parts, and an intermediate bendable insulating strut carried by said lower pipe and extending outwardly from said pipes and

motor on the side on which the lead-in conductor assembly is located, thereby being a slack loop above said bendable strut whereby the rotation of the upper pipe takes up the slack and bends the bendable strut to maintain the lead-in conductor assembly constantly spaced from all metal parts, said bendable strut being carried by a bracket secured to the bottom of said motor and extending upward to the top level of said motor, the said bracket carrying an auxiliary spacing member near its upper end below said bendable strut and the lead-in conductor assembly having a slack loop above said auxiliary spacing member.

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