

Feb. 28, 1950

M. R. FRIEDBERG ET AL
CONCEALED ANTENNA SUPPORT

2,499,137

Filed May 13, 1947

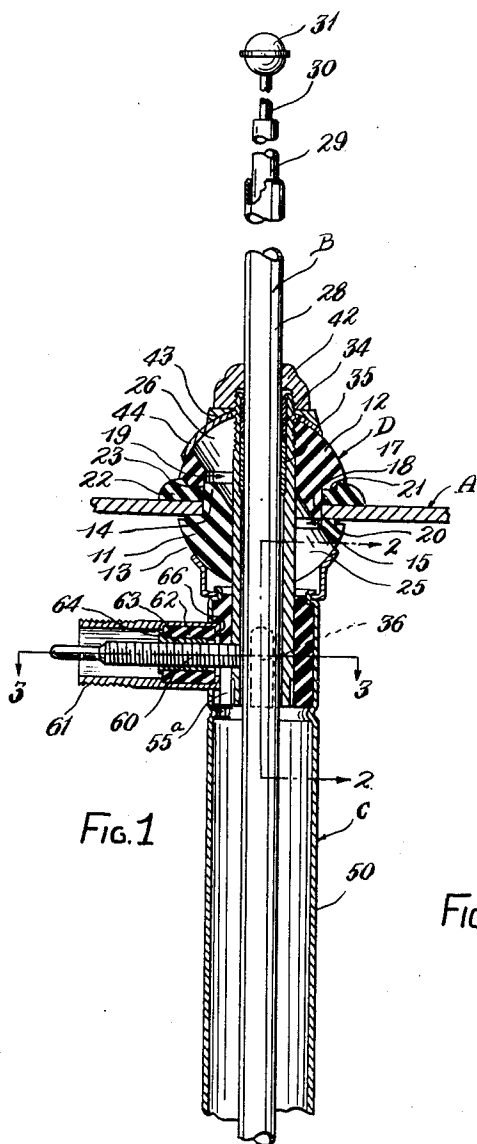


FIG. 1

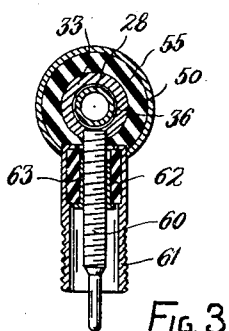


FIG. 3

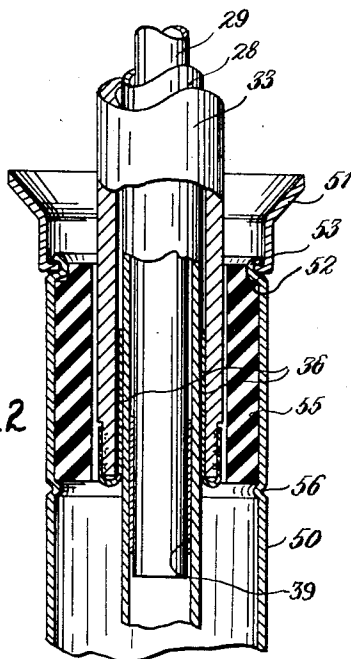
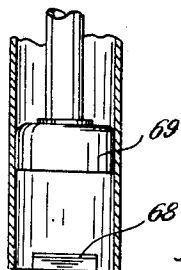


FIG. 2



INVENTOR.
MILTON R. FRIEDBERG
BY LEWIS H. FINNEBURGH JR.
THEODORE R. FINKE
Kewie, Hudson, Boughton & Williams
ATTORNEYS

UNITED STATES PATENT OFFICE

2,499,137

CONCEALED ANTENNA SUPPORT

Milton R. Friedberg and Lewis H. Finneburgh, Jr.,
Cleveland Heights, and Theodore R. Finke,
Euclid, Ohio, assignors to The Gabriel Com-
pany, Cleveland, Ohio, a corporation of Ohio

Application May 13, 1947, Serial No. 747,792

4 Claims. (Cl. 250—33)

1

2

This invention pertains to radio antennae for automotive vehicles and the like and, more particularly, to a tiltable radio antenna of the so-called telescoping and disappearing type and the support therefor.

An object of the invention is the provision of a new and improved radio antenna of the disappearing type having a concealed housing adapted to be mounted at desired positions on the body of an automotive vehicle or the like and adjustable to various angles relative to its supporting base, which radio antenna is attractive in appearance, has a minimum number of parts or members, is easily installed, has a minimum physical size, is tiltable or angularly adjustable relative to the mounting, and, when once adjusted, fixable in that position by a tightening operation performed on the exterior side of the body of the automotive vehicle on which mounted.

Another object of the invention is the provision of a new and improved radio antenna assembly for automotive vehicles or the like, comprising a telescoping retractable radio antenna proper, a housing for receiving the antenna on retraction thereof, a mounting base, and an elongated sleeve fixed to one end of the housing and extending through the base, the sleeve comprising a combined mounting bolt for the assembly, a guide sleeve for slidably supporting the antenna for movement into and out of the housing, and a stationary contact member for providing electrical contact between a lead-in connector and the antenna.

Another object of the invention is the provision of a new and improved radio antenna assembly, including a multiple piece base adapted to be mounted on opposite sides of the panel of an automotive vehicle, a housing having means for abutting against the lower side of the base, a guide sleeve fixed at one end to the housing and extending through enlarged openings in the base for angular adjustment relative thereto, a telescoping antenna slidably supported in the sleeve for movement into and out of the housing, and fastening means on the opposite end of the guide sleeve for bearing against the upper side of the base for retaining the base members in assembled relationship as well as fixing the housing and antenna in any adjusted angular position relative thereto.

Another object of the invention is the provision of a new and improved support for a radio antenna of the telescoping generally disappearing type including a housing, an insulating sleeve fixed in one end of the housing, an antenna guide

and mounting sleeve in electrical contact with the antenna and adapted to extend through a mounting base, one end of the sleeve extending into the insulating sleeve and having a lead-in conductor extending laterally through the insulating sleeve and abutting thereagainst for retaining the mounting sleeve in position in the insulating sleeve and in assembled relationship with the housing.

The invention resides in certain constructions and combinations and arrangements of parts, and further objects and advantages will be apparent to those skilled in the art to which it relates from the following description of the preferred embodiment described with reference to the accompanying drawing forming a part of this specification, and in which:

Fig. 1 is a side sectional view of an antenna and support embodying the present invention;

Fig. 2 is an enlarged fragmentary sectional view taken approximately on the line 2—2 of Fig. 1; and

Fig. 3 is a sectional view taken approximately on the line 3—3 of Fig. 1, the parts having been transposed through an angle of 90°.

Referring to the drawings, the invention is shown as embodied in a radio antenna assembly mounted on the panel A of an automotive vehicle body or the like, the assembly shown comprising a radio antenna proper B of the so-called retractable telescoping whip type, a housing assembly C, and a base D, which as shown supports the entire antenna assembly on the panel A.

The panel A is shown for the purposes of illustration only and may be any portion of an automotive vehicle body or the like, whether sloping, vertical, or horizontal, or at the front or rear thereof, and is preferably perforated or drilled to provide a suitable opening for passage of a lead-in connection from the antenna B on the exterior of the panel to the interior thereof, as well as a passage for clamping means to fasten the base D onto the panel.

As shown, the base D is generally ball or spherical shaped and comprises a pair of half ball members, an inner or lower half ball member 11 and an outer or upper half ball member 12, positioned in aligned relationship on opposite sides of the body panel A concentric with the opening thereof. As shown, the inner or lower half ball member 11 has a main generally hemispherical outer surface 13, and a plurality of generally flat chordal surfaces comprising an upwardly extending boss 14 and an inwardly or downwardly ex-

tending recess or aperture 15. Similarly, the upper or outer half ball member 12 has a main generally hemispherical outer surface 17, and a plurality of generally flat chordal surfaces comprising a downwardly extending boss 18 and an upwardly extending recess or aperture 19. The bosses and recesses or apertures in the respective half ball members are similarly dimensioned such that they will mate when the half ball members are assembled on the panel A and are preferably, although not necessarily, centrally positioned and semicylindrical in shape having a radius somewhat less than the radius of the ball members, thus leaving continuous ringlike flat chordal surfaces 20, 21 around the perimeters of the half ball members 11, 12, respectively. The surface 20 as shown abuts against its respective side of the body panel A. The size of the opening in the panel A is preferably of such a size to just pass the cylindrical boss formed by the mating semicylindrical bosses 14, 18. If desired, a sealing washer 22 of soft rubber or like sealing material may be positioned between the ringlike flat surface 21 on the half ball member 12 and the body panel A. As shown, the washer has an upwardly extending flange 23 on its outer edge which fits into a corresponding groove in the perimeter of the half ball member 12. The half ball members 11, 12 may be formed of any desired material but are illustrated as being comprised of an electrical insulating material such as, but not limited to, Bakelite or polystyrene. The construction of the half ball members just referred to is shown and described in greater detail and claimed in the copending patent application of Theodore R. Finke, Jack L. Stewart, and Lewis H. Finneburgh, Jr., entitled, "Swivel ball antenna support," Serial No. 748,048, filed May 14, 1948, now Patent No. 2,470,693, issued May 17, 1949.

Each ball member 11, 12 is provided with aligned openings 25, 26, respectively, which openings as shown taper from a slot on the surface of the ball members to a generally central aligned opening on the interior of the assembled ball or base D. These openings provide a passage for clamping means to fixedly position the half ball members relative to the body panel A as well as to provide a passage for a supporting member for the antenna B.

The antenna B may take any one of a number of different forms, and may be made of metal or plastic. As shown, however, the antenna comprises three rodlike members—a lower tubular member 28, an intermediate tubular member 29 of less diameter than and telescopically arranged with the lower member, and an upper rodlike member 30 of smaller diameter than and telescopically arranged with the intermediate member 29. A ball 31 preferably of plastic or the like may be suitably fixed to the upper end of the upper member 30 for reducing static discharges therefrom, as well as for appearance.

The lower antenna member 28 is supported for sliding movement in a guide sleeve 33, the upper end of which is counterbored to receive a pair of bearing sleeves 34, 35 which frictionally engage the outside of the lower antenna member 28, retaining it in any adjusted position and preventing it from rattling. As shown, the upper end of the guide sleeve 33 is turned or curved inwardly over the upper end of the bearing sleeve 34 to retain the sleeves permanently fixed in the counterbore. The lower end of the guide sleeve 33 is provided with a plurality of thin

resilient and elongated electrical contact fingers 36, see Fig. 2, positioned between the inner wall of the guide sleeve 33 and the surface of the antenna member 28. As shown, the lower ends of the contact members 36 extend below the lower edge of the sleeve 33 and are reversely bent upon themselves to terminate along the outside of the lower end of the guide sleeve 33 to which the ends are suitably welded or soldered. In the embodiment shown the lower end of the guide sleeve 33 has been slightly reduced in diameter to receive the reversely bent end of the contact members 36.

To provide a positive electrical connection between the intermediate antenna member 29 and the lower antenna member 28, the lower end of the intermediate member 29 has a plurality of elongated thin resilient contact fingers 39 suitably welded or soldered to its outer surface, which fingers as shown make sliding electrical connection with the interior of the lower antenna member 28. The wall of the upper end of the lower antenna member 28 is turned or curved inwardly to form a shoulder or stop against which the upper ends of the contact fingers 39 will abut when the intermediate member 29 is extended to its limit, although other forms of stops might readily be used. Similarly, the upper antenna member 30 may be provided with electrical contact fingers and a stop (not shown) and the wall of the upper end of the intermediate antenna member 29 may be turned or curved inwardly to form a shoulder or stop against which these contact fingers may abut when the upper antenna member 30 is extended to its full limit. The contact fingers shown may be of any desired construction but are preferably thin strips of spring bronze material.

As shown, the guide sleeve 33 is positioned in and extends through the aligned openings 25, 26 in the half ball members 11, 12 and a cap nut 42 is threadably engaged on the upper end thereof. The cap nut 42 is one of the means for clamping the half ball members 11, 12 in engagement with the sides of the body panel A as well as clamping the antenna and housing in any desired angular position relative thereto, and the clamping force of the nut 42 is transmitted to the spherical surface 17 of the upper half ball member 12 through a circular washer 43 having a flat upper surface and a concave lower surface and a thin cup shaped or concave washer 44 having its opening eccentrically positioned relative to the edges thereof. As shown, the washers 43, 44 are slipped over the upper end of the guiding sleeve 33 with the upper surface of the washer 43 in abutting engagement with the lower surface of the nut 42. It is preferred, as the cap nut 42 is tightened down, that the concave washer 44 engage the surface 17 of the upper ball member 12 principally at its outer edges, and for this reason the curvature of the washer 44 may be slightly less than the curvature of the surface 17, and if desired the edges of the washer may be curved inwardly at an even shorter radius of curvature providing sharp edges to bite into the spherical surface 17.

The guide sleeve 33 provides a means for slidably supporting the antenna B as well as a clamping or tie bolt for firmly securing the half ball members 11, 12 in fixed assembled relationship with the body panel A, and for this purpose the guide sleeve 33 extends below the lower surface of the lower half ball member 11. While a nut threaded on the lower end of the guide sleeve

33 and an eccentric concave washer similar to the concave eccentric washer 44 may be provided for engaging the spherical surface 13 of the lower ball member 11 and retaining the base D in assembled relationship, it is preferred for reasons of simplicity in structure and otherwise to utilize means on the upper end of the housing C for this purpose.

The housing C comprises an elongated thin walled tubular housing member 50 and a cup shaped or concave washer 51, the inner surface of which bears against the spherical surface 13 of the lower half ball member 11. The upper end of the housing member 50 is turned inwardly a short distance to provide a shoulder 52 and an extension 53 of reduced diameter around which the opening of the washer 51 is fitted. The extension is flared at its upper end, as shown, to retain the washer 51 and the housing member 50 in assembled relationship. As shown, the portion of the washer 51 defining the opening is offset axially to receive the reduced diameter extension 53 and prevent interference of the flared end with the spherical surface 13 of the lower half ball member 11 when assembled. The upper end of the housing member 50 below the shoulder 52 has a short hollow insulating sleeve or bushing 55 positioned therein, the upper end of which abuts against the shoulder 52 and the lower end of which abuts against a groove 56 in the wall of the housing member 50, and the sleeve 55 is thus positioned against axial movement relative to the housing member 50.

As shown, the lower end of the guide sleeve 33 extends into the bore of the insulating sleeve or bushing 55 and an elongated lead-in bolt 60 is threadably engaged in the wall of the lower end of the guide sleeve 33 and extends laterally therefrom through a suitable opening 55a in the wall of the sleeve 55 exteriorly of the housing member 50. The opening 55a as shown is a slot on the wall of the sleeve 55 opening from the lower end thereof, the base of which slot abuts the upper side of the bolt 60 and prevents removal of the guide sleeve 33 from the insulating sleeve 55. Thus any clamping forces resulting from the tightening of the nut 42 are transmitted through the insulating sleeve 55, the housing 50, and the concave washer 51 to the lower surface 13 of the lower half ball member 11. A hollow grounding sleeve 61 is positioned concentrically around the left end of the bolt 60 as viewed in Fig. 1 and is insulated therefrom by an inner insulating sleeve 62, in turn supported on the bolt 60 by an inner threaded metallic sleeve 63. The sleeve 63 is threadably engaged on the bolt 60 and has a short outwardly extending flange 64 on its left end in abutting engagement with the left end of the insulating sleeve 62. The grounding sleeve 61 has a short inwardly extending flange 66 at its right end abutting against the opposite or right end of the insulating sleeve 62. The right end of the grounding sleeve 61 extends into an opening in the wall of the housing member 50 and is preferably soldered thereto, providing a strong, permanent, and substantially unitary assembly. The insulating sleeve 55 may be apertured to receive the portion of the sleeve 61 extending interiorly of the housing as well as preventing electrical contact thereof with the guide sleeve 33, which as previously stated is part of the electrical circuit of the antenna.

The outer or left end of the grounding sleeve

61 is preferably threaded on its outer surface to receive the threads of a cap nut of a lead-in cable connector assembly of the type such as is shown and claimed in the copending application for patent of Milton R. Friedberg and Theodore R. Finke, entitled "Grooved connector," Serial No. 657,438, filed March 27, 1946.

As shown, the housing member 50 is generally elongated and preferably of such a length as to receive substantially the whole length of the lower antenna member 28. A stop 68 on the lower end of the housing member 50 prevents retraction of the lower antenna member 28 beyond a predetermined limit. The lower end of the lower antenna member 28 is provided with a cup shaped member 59 having a diameter approximately equal to the internal diameter of the housing member 50, which provides a guide support for the lower end of the lower antenna member 28 as well as insulating same from the housing member 50.

With the construction shown, a firm and positive electrical connection is continuously maintained between the antenna members 28, 29, 30 and the guide sleeve 33 by the contact fingers 36 previously referred to, and the lead-in bolt 60. When the entire assembly is positioned on the panel A of an automotive vehicle, the half ball members 11, 12 are held in assembled relationship by means of the cap nut 42, the guide sleeve 33, and the concave washer 51. As shown, the tension on the guide sleeve 33 tending to hold the half ball members in assembled relationship is transmitted to the lead-in bolt 60, thence to the insulating sleeve 55, thence to the housing member 50 at the shoulder 52, and thence to the concave washer 51. It will be appreciated that the antenna B and the housing C may be tilted as a unit to any desired angle relative to the base D and the body panel A, and that after the antenna and housing have been tilted to such an angle they may be permanently fixed in that position by tightening down the cap nut 42. As the cap nut is accessible from the exterior of the car body, the tightening operation is simply performed by one person, while physically retaining the antenna at the desired angle and without need of access to the lower or under side of the body panel A.

It will be appreciated that other means could be provided for transmitting the tightening force on the guide sleeve 33 to the insulating sleeve 55, such as by providing an outwardly extending flange in the lower end of the guide sleeve 33, by bonding the insulating sleeve 55 to the outer surface of the guide sleeve 33, or by providing a threaded connection therebetween. Also, the concave washer 51 could be formed integrally with the upper end of the housing member 50. If a ground from the housing member 50 to the body panel A is desired, a grounding washer may be positioned between the underside of the body panel A and the ringlike surface 26 of the lower half ball member 11 and suitably connected to the housing member 50 or the grounding sleeve 61 by flexible electric wire or braid. Alternatively, the guide sleeve 33 could be formed of an insulating material or could have an insulating sleeve on its exterior surface and the lower half ball member formed of an electrically conducting material, thus providing a grounding connection through the concave washer 51.

Although in accordance with the provisions of the patent statutes this invention is described as embodied in concrete form and structure and the

principle thereof has been described together with the best mode in which it is now contemplated applying that principle, it will be understood that the apparatus shown and described is merely illustrative and that the invention is not limited thereto, since alterations and modifications differing materially in appearance and structure will readily suggest themselves to persons skilled in the art without departing from the true spirit of this invention or from the scope of the annexed claims.

Having thus described our invention, we claim:

1. A concealed mounting support for an extensible and retractable radio antenna and adapted to extend through an opening in and to be secured to a body panel of an automotive vehicle and comprising, in combination, a base including a pair of separable members adapted to be located respectively on the outer and inner sides of said panel and each provided with an opening adapted to register with said panel opening, a guide sleeve through which said antenna slides and extending through said member openings and of a diameter to have substantial angular adjustment therein relative to said base and projecting beyond said members, an elongated housing of larger diameter than said guide sleeve and surrounding a portion thereof in spaced concentric relationship thereto and extending beyond the inner end of said guide sleeve a substantial distance, an insulating sleeve bushing interposed between said housing and said guide sleeve portion, said housing being provided internally with longitudinally spaced shoulders retaining said bushing in position and with means located intermediate said inner base member and said shoulders and engaging said inner base member, a lead-in bolt and grounding sleeve assembly carried by said guide sleeve and housing and extending through said bushing and operatively interconnecting said guide sleeve and housing, and means threadably carried by said guide sleeve and adjustably engaging the outer base member whereby when said last named means is suitably adjusted said base members will be clamped in position on the panel between both of said means and said guide sleeve and housing will be secured relative to said base in the desired angular relationship thereto.

2. A concealed mounting support for an extensible and retractable radio antenna as defined in claim 1 and wherein said spaced shoulders on said housing comprise inwardly offset portions of the housing material, while the offset portion adjacent to the inner base member interconnects the housing and said means which engages the inner base member.

3. A concealed mounting support for an extensible and retractable radio antenna as defined in claim 1 and wherein the openings through the base members increase in cross sectional area from the juxtaposed surfaces of said members to the outer and remote surfaces thereof.

4. A concealed mounting support for an extensible and retractable radio antenna as defined in claim 1 and wherein the lead-in bolt and grounding sleeve assembly comprises a grounding sleeve secured to said housing, a lead-in bolt secured to said guide sleeve and extending radially therefrom through said housing and concentrically of said grounding sleeve, said insulating sleeve bushing being provided with a slot extending longitudinally thereof for a part of the length of said bushing, said lead-in bolt extending through said slot and normally engaging said bushing at the inner end of said slot, and an insulating bushing interposed between said grounding sleeve and said lead-in bolt adjacent to said housing.

MILTON R. FRIEDBERG.
LEWIS H. FINNEBURGH, Jr.
THEODORE R. FINKE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,239,614	Martin	Apr. 22, 1941
2,252,671	Ludwig	Aug. 12, 1941
2,300,847	Russel	Nov. 3, 1942
2,343,944	Wagenknecht	Mar. 14, 1944
2,365,886	Lehmann	Dec. 26, 1944
2,454,897	Trowbridge	Nov. 30, 1948