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ANTENNA LEAD-IN CONNECTOR

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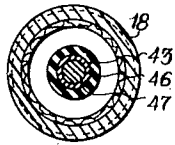


FIG. 3

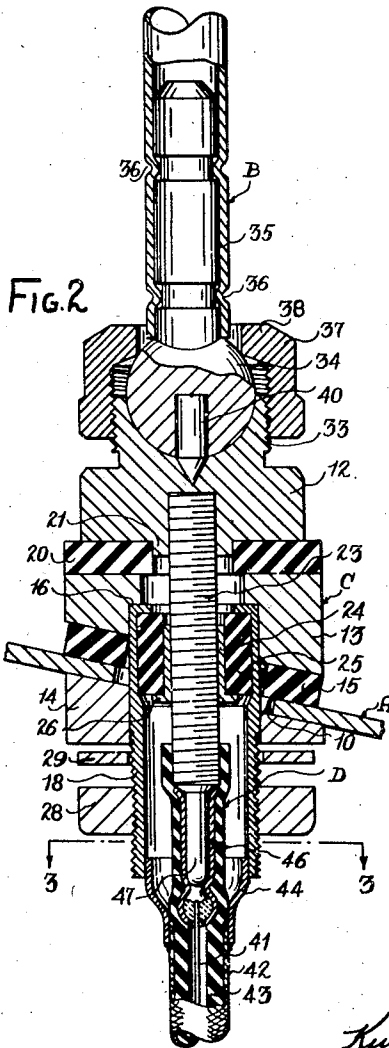


FIG. 2

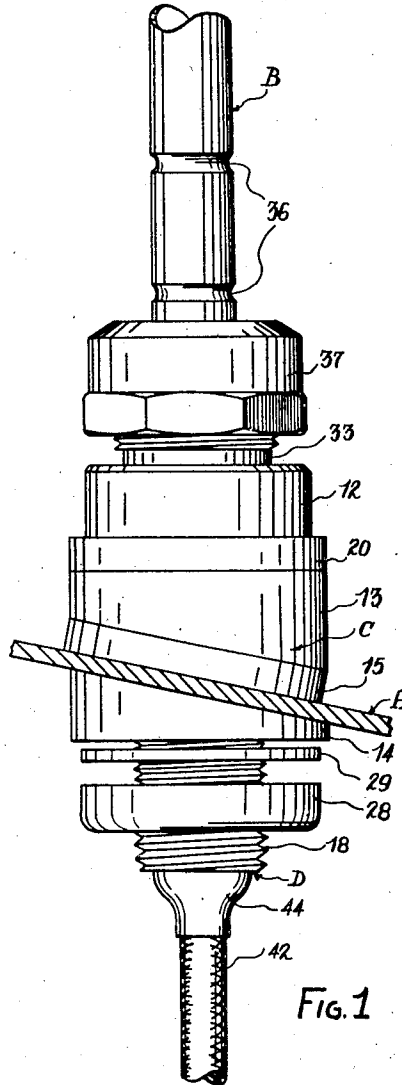


FIG. 1

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ANTENNA LEAD-IN CONNECTOR

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8 Claims. (Cl. 174-153)

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This invention pertains to radio antennae for automotive vehicles or the like and, more particularly, to an antenna mounting and connection to a coaxial lead-in cable.

An object of the invention is the provision of a new and improved antenna mounting for supporting a radio antenna on the body panel of an automotive vehicle, which is attractive in appearance, simple in structure, economically manufactured, easily and quickly installed, and which, when once installed, provides a firm and secure mounting for the radio antenna and a firm and secure connection to the lead-in cable.

Another object of the invention is the provision of a new and improved combined radio antenna mounting and shielded lead-in cable connector wherein an antenna lead-in conductor pin and an outer concentric lead-in shield extension coact to form clamping means for the antenna mounting.

Another object of the invention is the provision of a new and improved antenna mounting for positioning a radio antenna on the panel of an automotive vehicle or the like wherein the means for clamping the mounting on the panel comprise concentrically arranged relatively insulated members, the inner member forming a lead-in conductor for the antenna and the outer member being connected to and forming an extension for the shield of a lead-in cable and supporting a connector for electrically connecting the inner member and the radio-frequency conductor of the lead-in cable.

Still another object of the invention is the provision of a new and improved lead-in cable connector for connecting a shielded coaxial cable to an antenna of the type used on automotive vehicles or the like, which connector comprises a hollow member fastened to the shield of the lead-in cable and an inner telescoping contact connected to the radio-frequency conductor of the lead-in cable and supported in insulated relationship to the hollow member, the hollow member also supporting concentrically thereto and in insulated and adjustable relationship an antenna supporting and radio-frequency conducting member having a portion adapted to telescopically contact the first mentioned contact.

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 accom-

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panying drawing forming a part of this specification, and in which:

Fig. 1 is a side elevational view of a radio antenna mounting and connection to a lead-in cable embodying the present invention;

Fig. 2 is a sectional view of Fig. 1; and

Fig. 3 is a sectional view taken approximately on the line 3-3 of Fig. 2.

Referring to the drawings, a radio antenna assembly embodying the present invention is shown mounted on the panel A of an automotive vehicle body or the like, the assembly comprising an antenna proper B, a base assembly C, and a lead-in cable connector assembly D.

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 10 for passage of a lead-in connection from the antenna B to the interior of the panel, as well as a passage for clamping means to fasten the base C onto the panel.

The base C shown comprises an antenna supporting member proper 12 and a pair of hollow mounting sleeves 13, 14 having central openings, which sleeves are located, respectively, on the upper and lower sides of the body panel A with their openings aligned with the opening 10. The upper side of the lower sleeve 14 may abut directly against the lower side of the panel A while a sealing washer 15 of rubber or the like may be positioned between the lower surface of the sleeve 13 and the upper surface of the body panel A. The sides of the sleeves adjacent the sides of the panel A are preferably at an angle relative to the axis of the opening of the sleeves whereby by suitably rotating the sleeves, at the time of installation of the base, the angle of the axis of the base C relative to the body panel A may be adjusted or inclined within limits, as desired.

The lower end of the opening in the upper positioning sleeve 13 is counterbored to form a shoulder 16 against which the upper end of an elongated hollow sleeve 18 abuts, the sleeve extending downwardly from the shoulder through the opening 10 and the opening of the lower sleeve 14. A flat washer 20 formed of an electrically non-conducting material or the like is located on the upper end of the sleeve 13 and supports the antenna supporting member 12 in spaced and electrically insulated relationship relative to the sleeve 13. As shown, the lower side of the antenna supporting member 12 has a short cen-

trally located boss 21 extending downwardly into the opening of the insulating washer 20 for positioning same. The lower side of the antenna supporting member 12 also has a central threaded aperture into which a threaded bolt 23 is threaded and extends downwardly concentrically into the hollow sleeve 18. The bolt 23 and the member 12 could be formed integrally if desired. The bolt 23 supports an internally threaded sleeve 24, which sleeve in turn has mounted thereon a short cylindrical insulating bushing 25 positioned interiorly of the upper end of the sleeve 18. As shown, the sleeve 18 is counterbored slightly to receive the bushing 25 and its upper end is flared or flanged inwardly to abut against the upper end of the bushing 25 and retain same in assembled relationship. The lower end of the threaded sleeve 24 has an outwardly extending flange 26 which abuts against the lower end of the insulating bushing 25 such that as the sleeve 24 is moved upwardly by threading it on the bolt 23 in the appropriate direction, the bushing 25 is forced upwardly into abutting engagement with the flange on the upper end of the sleeve 18, which forces the sleeve 18 upwardly into abutting engagement with the shoulder 16 of the sleeve 13, and pulling the bolt 23, the antenna mounting member proper 12, and the insulating washer 23 downwardly into relationship with the positioning sleeve 13 and the sleeve 18.

The lower end of the sleeve 18 which extends downwardly through the opening in the positioning sleeve 14 is preferably externally threaded to receive a retaining nut 28 and a lock washer 29, which retaining nut when tightened upon assembly of the base C and the body panel A draws the entire base into firm assembled relationship. Preferably the lock washer 29 has teeth or the like such as to insure firm electrical contact between the retaining nut 28 and the lower side of the positioning sleeve 14. If desired, the upper side of the positioning sleeve 14 may have suitable points or projections adapted to bite through any rust, film, or paint on the underside of the body panel A and make a firm electrical contact therewith. By rotating the positioning sleeves 13, 14, the axis of the bolt 23, and thus the axis of the base, may be tilted, within limits, relative to the panel A.

The antenna supporting member proper 12 may be formed integral with the antenna B or it may have provision for supporting same such that the antenna B may be adjusted angularly relative to the base C. In the embodiment of the invention shown, the member 12 has an upwardly extending externally threaded boss 33 having a hemispherically shaped socket in its upper end which has positioned therein a similarly dimensioned ball member 34 connected to and supporting the antenna B for angular movement relative to the base. Alternatively, the member 12 could be so formed as to support the antenna B in a generally perpendicular direction relative to the axis of the bolt 23.

The portion of the antenna B shown is tubular and may be mounted on the ball 34 in any suitable manner, but in the embodiment shown the ball 34 has a boss or pin 35 extending into the lower end of the antenna B, which pin has a pair of spaced grooves 36 in its outer surface into which the walls of the antenna B are grooved.

A cap nut 37 is threadably engaged with the threads on the boss 33 of the antenna supporting member 12 and its upper end has an inwardly extending flange 38 surrounding the lower end of

the antenna B and engaging on its inner lower corner the upper curved surface of the ball 34. By tightening down on the cap nut 37, the ball 34 is forced into firm immovable engagement with the surfaces of the hemispherical socket of the antenna supporting member 12. If desired, a hardened steel pin 40 may be inserted in an aperture in the ball diametrically aligned with the axis of the antenna B, which pin 40 has a point extending beyond the surface of the ball 34 such that as the cap nut 37 is tightened down the pin will be forced into the surface of the hemispherical socket for providing a firm and vibration proof angular positioning of the antenna relative to the base C. For this purpose, the member 12 is preferably of a relatively soft material, such as brass. This construction is shown and claimed in the copending application of Milton R. Friedberg entitled "Antenna mounting," Serial No. 742,637, filed April 19, 1947.

With the construction shown, the antenna supporting member 12 and the bolt 23 form a part of the electrical circuit of the antenna B, insulated from the body panel A. To provide a lead-in connection for the antenna B, the bolt 23 extends through the interior of the sleeve 18 to approximately the lower end thereof, where electrical contact is made with the lead-in cable connector assembly D. The assembly D includes a lead-in cable, comprising an inner radio-frequency conductor 41, an outer concentric conducting member 42 of braided construction forming an electrical shield for the inner conductor, and an intermediate hollow insulating member 43. The outer conductor or shield 42 has a diameter less than the diameter of the interior of the sleeve 18. A coupling sleeve 44 having an end of reduced diameter fits over the end of the outer conductor and is fastened thereto by soldering or otherwise. The other end of the sleeve 44 is enlarged and fits into the interior of the sleeve 18 and is similarly fastened thereto. A substantially integral assembly results. The end of the hollow insulating member 43 extends a substantial distance beyond the end of the outer conducting or shielding member 42 and into the sleeve 18 and is counterbored a short distance to receive a concentric hollow resilient connecting member 46 soldered at its lower end to the radio-frequency conductor 41. As shown, the lower end of the bolt 23 is reduced in diameter to form a dog or contact pin 47 for slidable insertion into the upper end of the hollow connecting member 46, thus providing an electrically complete circuit from the antenna to the lead-in cable conductor 41, which circuit is completely and electrically shielded from any stray electrical impulses, interference, or motor ignition noise generally present on the lower or inner side of an automotive body panel. Dirt or other extraneous matter which might introduce noise or even short the antenna lead-in circuit to ground is completely excluded from the interior of the sleeve 18.

The antenna assembly shown may be readily assembled on the body panel A by first positioning the retaining nut 28, the lock washer 29, and the positioning sleeve 14 on the hollow sleeve 18, which is then passed upwardly through the opening 10 of the body panel A. The sealing washer 15 and the upper positioning sleeve 13 are then positioned on the portion of the sleeve 18 extending through the opening, with the shoulder 16 of the sleeve 13 in abutment with the upper end of the sleeve 18. The bolt 23 may then be inserted into the threaded sleeve 24 and threaded

thereinto until the dog or pin 47 on its lower end extends into the hollow connecting sleeve 46.

The antenna supporting member proper 12 with its insulating washer 20 positioned about the boss 21 on its lower side is then threaded onto the bolt 23 and screwed up tight. Further rotation of the member 12 rotates the bolt 23, threading it in the sleeve 24 and moving the sleeves 24 and 18 upwardly, forcing, in a manner as previously described, the upper end of the sleeve 18 into firm engagement with the shoulder 16 on the positioning sleeve 13, at which time the positioning sleeve 13 and the antenna supporting member 12 are firmly assembled and may be considered as a unit with the member 12 in insulated relationship with the positioning sleeve 13. With the base C so mounted, the positioning sleeves 13, 14 may be suitably rotated to tilt the axis of the bolt 23 relative to the body panel A. When the desired tilt has been attained, the retaining nut 28 is threaded upwardly so as to draw the upper positioning sleeve 13 downwardly through the mechanical connection of the insulating bushing 25, the threaded sleeve 24 and the bolt 23 and force the positioning sleeve 14 upwardly into firm engagement with the lower side of the body panel A.

With the assembly so mounted, the ball 34 on the lower end of the antenna B may be positioned in the hemispherical socket of the antenna supporting member proper 12 and the cap nut 37 partly threaded onto the boss 33. The antenna B is then positioned in any desired angle relative to the axis of the base within the limits of the structure and the cap nut 37 then further tightened down, driving the point of the pin 40 into and below the surface of the hemispherical socket and fixedly positioning the angle of the antenna B relative to the antenna supporting member proper 12 and, of course, the base C.

Thus it will be seen that an embodiment of the invention has been described which accomplishes the objects of the invention hereinbefore enumerated and others and provides an antenna mounting and connection to a coaxial lead-in cable which is easily assembled on the body panel of an automotive vehicle, which provides a maximum of insulation for the antenna and the lead-in circuit from the ground circuit or the body panel, which is impervious to moisture, which is physically strong, and which will maintain its high electrical efficiency in even the severest types of use.

Although in accordance with the provisions of the patent statutes this invention is described as embodied in concrete form 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 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. In an antenna mounting for fastening an antenna to a supporting body having a mounting aperture therethrough, a lead-in and hold-down bolt adapted to extend through said opening, means including insulating means associated with one end of said bolt adapted to engage one side of said supporting body, a hollow member concentrically positioned about said bolt, means for adjustably positioning said member on and insulating it from said bolt, means associated with

said member adapted to engage the opposite side of said supporting body, said member forming a lead-in cable shield extension, and a lead-in cable electrically connected to said bolt and operatively connected with said hollow member.

2. In an antenna mounting for fastening an antenna to a supporting body having a mounting aperture therethrough, a lead-in and hold-down bolt adapted to extend through said opening, an antenna supporting member fixed to one end of said bolt, means adapted to insulate said member from one side of said supporting body, a hollow member concentrically positioned about said bolt, means adjustably positioning said member on and insulating it from said bolt, fastening means threaded on the exterior of said hollow member and adapted to engage the opposite side of said body and make electrical contact therewith, said member forming a lead-in cable shield extension, and a lead-in cable electrically connected to said bolt and operatively connected to said hollow members.

3. In an antenna mounting for fastening an antenna to a supporting body having a mounting aperture therethrough, a lead-in and hold-down bolt adapted to extend through said opening, means including insulating means associated with the upper end of said bolt and adapted to engage one side of said supporting body, a hollow member concentrically positioned about said bolt and having an upper inwardly extending flange, an insulating bushing in said hollow member abutting at its upper end against said flange, a sleeve positioned internally of said insulating bushing and having at its lower end an outwardly extending flange abutting against the lower end of said bushing, said sleeve being adjustably positioned on said bolt, means associated with said member adapted to engage the opposite side of said body, said member forming a lead-in cable shield extension, and a lead-in cable electrically connected to said bolt and operatively connected to said hollow member.

4. In an antenna mounting for fastening an antenna to a supporting body having a mounting aperture therethrough, a lead-in and hold-down bolt adapted to extend through said opening, means including insulating means associated with one end of said bolt adapted to engage one side of said supporting body, a hollow member concentrically positioned about said bolt, means for adjustably positioning said member on and insulating it from said bolt, means associated with said member adapted to engage the opposite side of said supporting body, a lead-in cable comprising an inner conductor, an outer concentric conductor, and an intermediate non-conductor, said outer conductor being fastened to said hollow member, and means comprising a telescoping male and female connection for detachably connecting said inner conductor to the lower end of said bolt.

5. In an antenna mounting for fastening an antenna to a supporting body having a mounting aperture therethrough, a lead-in and hold-down bolt adapted to extend through said opening, an antenna supporting member fixed to one end of said bolt, means adapted to insulate said member from one side of said supporting body, a hollow member concentrically positioned about said bolt, means adjustably positioning said member on and insulating it from said bolt, fastening means threaded on the exterior of said hollow member and adapted to engage the opposite side of said body and make electrical contact therewith, a lead-in cable comprising an inner conductor, an

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outer concentric conductor, and an intermediate non-conductor, said outer conductor being fastened to said hollow member, and means comprising a telescoping male and female connection for detachably connecting said inner conductor to the lower end of said bolt.

6. In an antenna mounting for fastening an antenna to a supporting body having a mounting aperture therethrough, a lead-in and hold-down bolt adapted to extend through said opening, means including insulating means associated with the upper end of said bolt and adapted to engage one side of said supporting body, a hollow member concentrically positioned about said bolt and having an upper inwardly extending flange, an insulating bushing in said hollow member abutting at its upper end against said flange, a sleeve positioned internally of said insulating bushing and having at its lower end an outwardly extending flange abutting against the lower end of said bushing, said sleeve being adjustably positioned on said bolt, means associated with said member adapted to engage the opposite side of said body, a lead-in cable comprising an inner conductor, an outer concentric conductor, and an intermediate non-conductor, said outer conductor being fastened to said hollow member, and means comprising a telescoping male and female connection for detachably connecting said inner conductor to the lower end of said bolt.

7. In a cable connector for the lead-in cable of a radio antenna, an outer hollow member, a lead-in cable comprising an inner conductor, an outer concentric conductor, and an intermediate non-conductor, said outer concentric conductor being fastened to said hollow member and an electrical connector secured to said inner conductor and adapted to have telescoping contact with a lead-in member connected to an antenna and extending into said hollow member, said inter-

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mediate non-conductor extending beyond the free end of said electrical connector and adapted to embrace a portion of said lead-in member.

8. In a cable connector for the lead-in cable of a radio antenna, an outer hollow member, a lead-in cable comprising an inner conductor, an outer concentric conductor, and an intermediate non-conductor, said outer conductor being fastened to one end of said hollow member, an electrical contact member connected to said inner conductor and positioned in said one end, said non-conductor extending beyond said electrical contact member, an insulating bushing in the other end of said hollow member and positioned against movement relative thereto in at least one direction, and an antenna supporting and lead-in member threadably supported in said bushing and having an end detachably engaged with said electrical contact member.

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