Aug. 11, 1959 M. R. FRIEDBERG ET AL 2,899,485

ANTENNA MOUNTING DEVICE

Filed Oct. 20, 1954 2 Sheets-Sheet 1

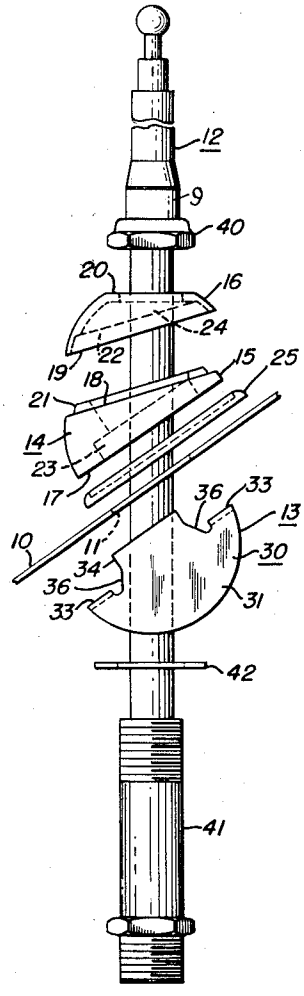

Fig. 1

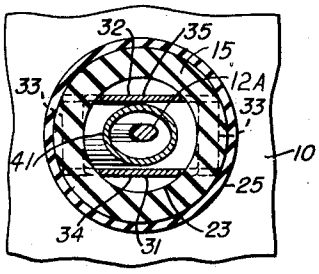

Fig. 3

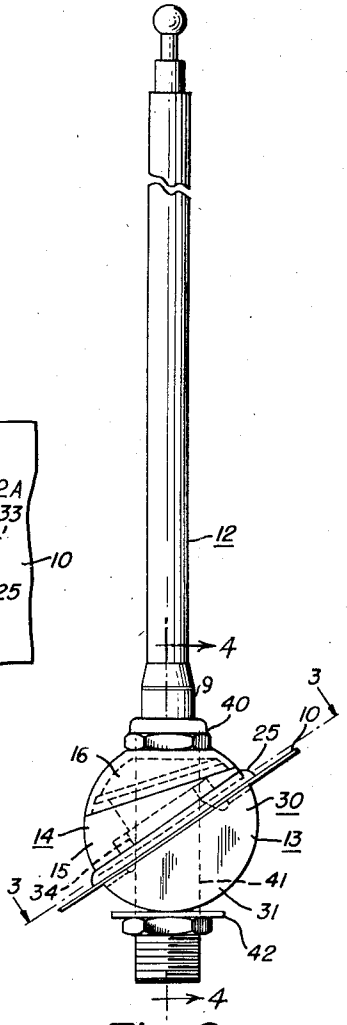

Fig. 2

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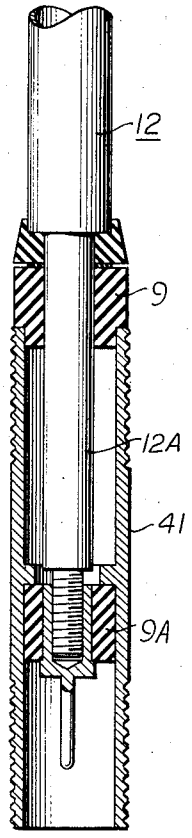

Fig. 4

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ANTENNA MOUNTING DEVICE

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3 Claims. (Cl. 174—153)

This invention relates generally to antennas and more particularly to antennas suitable for installation on vehicles and which may be positioned at various angles with respect to the supporting wall of the vehicle.

It is now common practice to install radio equipment such as broadcast radio receivers, in automobiles and in such application an antenna is required which may be mounted on the vehicle body. The recent automobile styling has made it desirable to provide mountings for such antennas which support the antennas at relatively widely differing angles with respect to the vehicle wall on which the antenna is mounted. Thus, one mounting device will suffice to mount the antenna in any one of a variety of positions upon the vehicle and upon any make and model of vehicle. Furthermore, it is generally the practice to install the antenna after the car is purchased and, accordingly, access to the underside of the body panel is not as readily accessible as might be during factory construction of the vehicle. Therefore, it is desirable to have the antenna mountable entirely from the exterior of the body. Due to vibration present in such vehicles, it is necessary that the mountings be very rugged and not subject to being disassembled by the vibration encountered.

Therefore, it is an object of the present invention to provide an improved, rugged, antenna structure including an antenna element and a mounting therefor.

Another object of this invention is to provide a mounting having an internal anchor portion and an external adjustable base member adapted to close over an opening through the panel wall and provide holding means to clamp the two mounting members toward one another over the opposed sides of the anchor and base member in such a manner that only true compression forces are exerted upon the mounting members with a complete absence of wedging or bending forces.

Still another object of this invention is to provide an antenna mounting which is installable from the exterior of the vehicle body.

Yet another object of this invention is to provide a mounting anchor member which will physically gouge into the clean-cut edge surfaces around a hole cut in the body panel to provide anti-rotation anchoring during installation and which will thereafter serve as a far superior electrical grounding for the antenna by reason of the anchor gouging into the metal and producing fresh cut surfaces.

A further object of this invention is to provide an antenna mounting structure which may be easily and securely installed on a vehicle body for supporting an antenna element at a desired angle with respect to the surface of the vehicle body on which it is mounted.

And another object of this invention is to provide an improved angular adjustment of the base and apex surfaces of an adjustable base member in order to provide the correct positioning of the antenna with respect to the panel upon which the antenna device is mounted.

Basic features of the present invention include the ease of installation from the exterior surface of the vehicle panel; the mechanical holding of the anchor portion for

anti-rotation during installation of the antenna which results in a superior electrical ground for the antenna; the straight-through compression holding of the mounting members as opposed to the wedging forces imposed upon various types of mountings, which wedging forces eventually cause the associated members to weaken and become loose; and the relative adjustment of the adjustable base member of the mounting by means of two sections mated on a mutual chordal surface.

A specific feature is to provide a composite antenna mounting structure which produces a spherical effect, and therefore provides tightening through a great circle regardless of the angular position of the antenna with respect to the mounting surface.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawing, in which:

Figure 1 of the drawing is an exploded side elevational view of the preferred embodiment of the invention;

Figure 2 of the drawing is a side elevational view of the assembled antenna and mounting;

Figure 3 is a sectional view taken along line 3—3 of Figure 2; and

Figure 4 is a sectional view taken along line 4—4 of Figure 2, omitting the mounting means which includes an anchor member on the interior of the mounting panel member, in order to illustrate the interior insulating structure without confusion from exterior structure.

The illustrated embodiment of the invention is illustrated in conjunction with a conventional telescoping type of antenna structure 12. However, a remotely controlled device for extending and retracting an antenna may be mounted by the improved mounting device of this invention.

In the drawing, for the purposes of illustrating the invention, a panel section 10 is shown to represent the panel surface of a vehicle upon which the mounting is engaged. Panel section 10 is provided with an opening 11 for the antenna mounting.

The mounting device of this invention is illustrated generally by the reference character 13 in Figure 2 of the drawing and this mounting means 13 includes an anchor member 30 and an adjustable base member 14 adapted to be positioned on opposite sides of the panel section 10 at the opening 11. The adjustable base member 14 is preferably a composite member having a first section 15 with a base surface 17 to seat over the opening 11 therein. Section 15 has a chordal upper surface 18 at an angle to the base surface 17. In the illustrated embodiment, the angle is at seventeen and one-half degrees with respect to the base surface 17. A second section 16 is provided with a flattened apex surface 20 and a base chordal surface 19. Surface 19 is mateable and rotatable upon the chordal upper surface 18 of the first section 15. The chordal lower surface 19 is also provided at a seventeen and one-half degree angle with respect to the apex surface 20. A rib 21 on the section 15 and a corresponding groove 22 on section 16 permit the sections 15 and 16 to be rotated with respect to one another and thereby adjust the angular relative position of the base surface 17 and the apex surface 20 between a parallel position and a thirty-five degree (35°) relative position. This amount of relative adjustment has been found to be satisfactory for the bulk of the installation positions.

A composite passageway through the adjustable base member 14 is provided by the passageway 23 through the first section 15 and a passageway 24 through the second section 16. The passageways in each instance open in the base of the particular section and extend through the top surface. The anchor member 30 in the illustrated embodiment of the invention, is constructed of two semi-circular

plate members 31 and 32 joined in side by side lateral position by means of joining ribs 33. Plates 31 and 32 are spaced to define a slot area therebetween through which the antenna device 12 may extend.

One method of connecting the antenna 12 to the panel 10 is to first place the various elements of the mounting means around the antenna. The sleeve 41 and the lower end of the antenna 12 are then passed through the hole 11. The anchor 30 is then tipped and also passed through the hole 11. It is placed in one position relative to the panel and passed sideways through the opening. The anchor 30 is then rotated to a second relative position and moved upwardly until the joining ribs 33 contact the panel 10. This contact is in a plane which is chordal to the semi-circular members 31. The sections of the adjustable base member 14 are then moved into position and relatively rotated to form the desired adjustment for supporting the antenna in a vertical position. The nut 40 is then threaded onto the sleeve and tightened.

As may be observed from the drawing, the preferred method of constructing the anchor member 30 is by stamping from sheet metal. A circular form is provided which is bent to provide the spaced lateral plates 31 and 32 having the semi-circular bottom areas which are desired for this invention. The joining ribs 33 are integrally formed in this manner. While so forming the anchor member 30, the tab members 34 and 35 are cut from the body of the metal and allowed to project upwardly as illustrated best in Figure 1 of the drawing. Each of the tab members 34 and 35 are of a width equal to a chord of a circular panel opening provided for the mounting 13. Thus, a snug fit of the tabs with the inner surface of the opening is assured. It has been found that if at least one of the tab members, but preferably both, is provided with shoulders 36 near the base of the tabs, these shoulders 36 will dig into the freshly cut surface outlining the opening 11. The tabs just fit the side of the opening at the chordal position. The wider shoulders will therefore cut into the panel when the tabs are forced into the opening. Cutting into the metal in this manner provides a convenient anti-rotation feature which aids in holding all of the parts properly aligned while the mounting is being installed. The antenna is grounded to the vehicle body through the anchor member and it has been found that with the provision of the shoulder 36 for anti-rotation purposes the electrical grounding is better after the antenna device is completely installed. The reason for the improved electrical properties is that the shoulders 36 cut or gouge into the edge of the metal surrounding the opening 11 and thus produce an intimate contact with fresh rubbed metal surfaces between the panel 10 and the anchor member 30. Protrusions at other locations, such as on rib 33, will penetrate into the panel and provide anti-rotation and grounding, but to a less satisfactory degree than by the use of shoulders 36. The shoulders 36 always contact fresh clean surfaces of the newly cut installation opening 11.

The upper portions of the tabs 34 and 35 extend through the opening 11 and into the bottom area of passageway 23. Passageway 23 is proportioned at the base surface 17 to closely receive the tabs and provide holding and alignment of the section 15 with respect to the anchor 30 and the hole 11.

In the particular antenna structure 12 used to illustrate the present invention, the sleeve 41 is carried at the lower portion of the antenna with a lock washer 42 between the anchor member 30 and the sleeve 41. Insulation necessary to insulate the antenna member from the mounting structure is carried within sleeve 41 as a sleeve bushing 9A and as bushing 9 at the top thereof. These bushings hold the antenna rod extension 12A spaced from grounding contact with sleeve 41. It is not necessary for any part of the external mounting members to be electrically non-conductive. The washer 42 thereby bridges across the plates 31 and 32 to provide an even fitting for the plates 31 and 32. A nut 40 engages the top threads of sleeve 41 as best illustrated in Figure 2. Tightening of the nut 40 will produce a tightening force diametrically across the entire mounting device for full compression clamping of the mounting device upon the panel 10 regardless of the angular position of the antenna structure 12 with respect to panel 10 and thus provides the most secure clamping means possible and one which will not tire with time and allow the mounting device to become loosened. The holding forces are always across a great circle regardless of angular position of the antenna with respect to the panel 11. A conventional weather-seal 25 is positioned between the panel 10 and the surface 17 of section 15 for the purpose of preventing water from entering the opening 11.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. An antenna structure for mounting on a vehicle body panel including rod-like antenna means and mounting means for supporting the antenna means at an opening in said body panel, with said rod-like antenna means extending at a selected angle with respect to said panel, said mounting means including an anchor portion and a composite cap portion, said anchor portion having first and second laterally spaced side members each with semi-circular bottom edge surface areas, each said side member having a top tab member proportioned to extend through said opening in said body panel near the side thereof, said anchor portion having contact portions to engage the panel portion and prevent said anchor portion from passing through said opening when the anchor portion is in operative position, said anchor portion being dimensioned to pass through said opening in another position for installation of the anchor portion from the opposite side of said panel, at least one of said top tab members having a width greater than the panel opening at the contact area of the tab and opening in said operative position to cut into the panel member and electrically ground said anchor portion, said cap portion including a first member having a panel seating surface, a chordal upper surface, a passageway opening through said first member opening from said seating surface and said upper surface, a socket recess to accept said top tab members of the anchor member protruding through said panel opening to align said anchor member with said first cap member, a second cap member having a chordal lower surface mateable with said chordal upper surface of said first cap member, a passageway through said second cap member opening through said lower chordal surface, said rod-like antenna means extending through said passageway openings of the first and second cap members and between the side members of the anchor portion, and clamp means associated with said antenna to clamp the parts of the mounting means upon the panel and hold the antenna fixed with respect to said mounting means.

2. An antenna structure for mounting on a vehicle body panel including rod-like antenna means and mounting means for supporting the antenna means at an opening in said body panel, with said rod-like antenna means extending at a selected angle with respect to said panel, said mounting means including an anchor portion and an exterior adjustable base member adapted to be positioned on opposite sides of the panel, said adjustable base member having a passageway therethrough to receive the antenna means, said anchor portion comprising two laterally spaced semi-circular plates, means joining said plates in fixed lateral position, each of said plates having a tab

member extending upwardly therefrom, each of said tab members having a width equal to a chord of a circular panel opening provided for said mounting means, at least one said tab having a width at the base thereof greater than said chord distance to cause a wedging of the tab into the edge surfaces of said panel outlining said opening and provide mechanical anti-rotation of said anchor and electrical grounding, said adjustable base member having recess surfaces to receive said tab members projecting through said panel opening and thereby be aligned with and held over said opening, and clamp means to clamp the parts of the mounting means upon the panel and hold the antenna fixed with respect to said mounting means.

3. An antenna structure for mounting on a vehicle body panel including rod-like antenna means and mounting means for supporting the antenna means at an opening in said body panel, with said rod-like antenna means extending at a selected angle with respect to said panel, said mounting means including an interior anchor portion and an exterior adjustable base member, said anchor portion and adjustable base member adapted to be positioned on opposite sides of the panel, said base member having a recess in the surface positionable against the surface of the panel, an apex seat for said antenna means, and a passageway from the recess to said apex seat, said seat and the antenna seated thereon are angularly adjusted with respect to the panel along a spherical field by adjustment of said base member, said anchor portion having peripheral surface areas proportioned and positioned with respect to

said base member to provide the effect of a spherical surface positioned diametrically opposite of said spherical field, said spherical field of the base member and the spherical surface effect being on a common geometrical sphere and thereby provides a constant distance thereacross with respect to the antenna axis, the antenna thereby being provided with the effect of a spherical mount having a constant clamp area, said anchor having shoulders defining a chordal plane with respect to the said geometrical sphere, opposed tab means proportioned to extend from said chordal plane through said opening in said body panel, said tab means providing a snug fit of the anchor to the opening, said tab means proportioned to extend through the opening and into said recess of the base, said recess fitted snugly to said tab means, the tab means thereby stabilizing the entire mounting means with respect to said panel opening, and said tab means having an area of width greater than the panel opening at the chordal plane area of the anchor to cut into the panel member and electrically ground said anchor portion and simultaneously provide non-rotative mechanical anchor action.

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