May 31, 1966 J. J. ROHRS 3,254,344

REMOVABLE TELESCOPIC ANTENNA

Filed Feb. 6, 1964 3 Sheets-Sheet 1

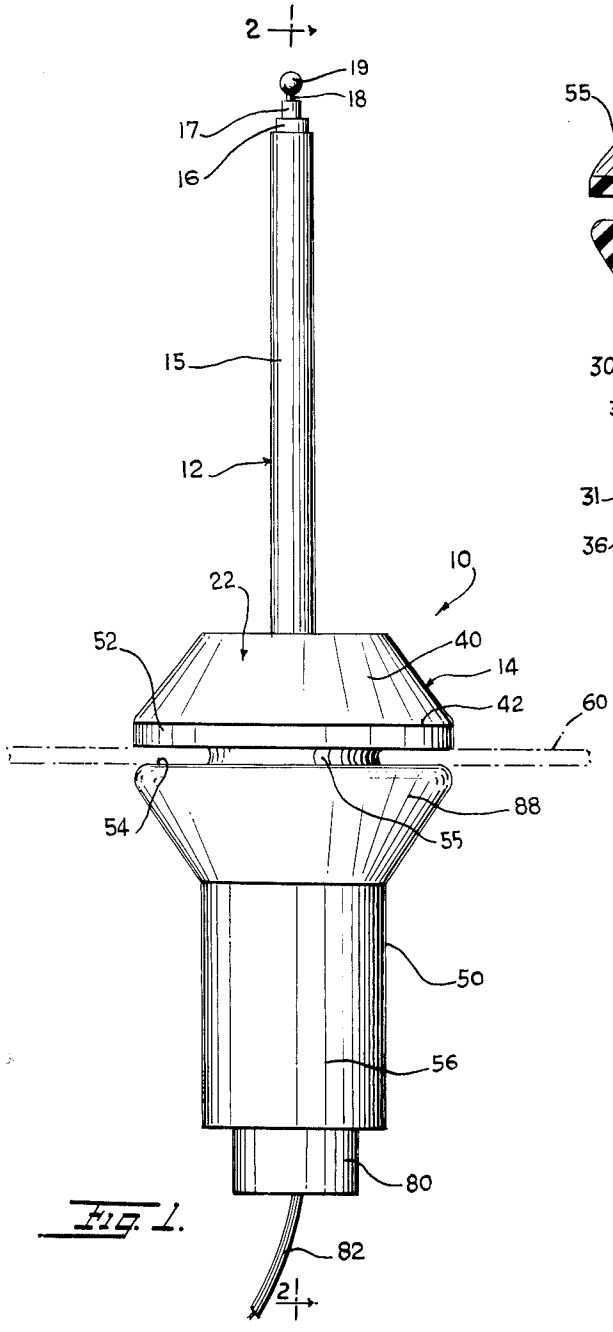


Fig. 1.

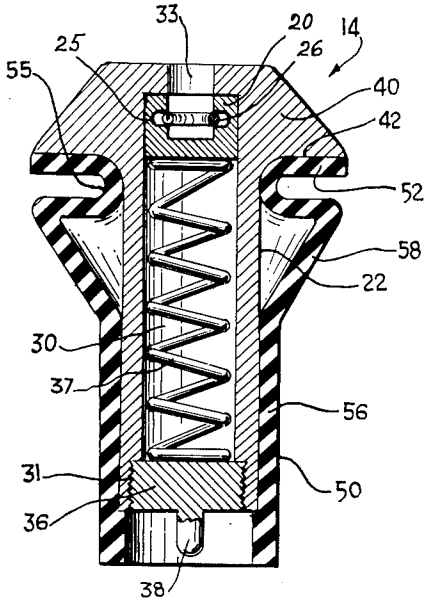


Fig. 4.

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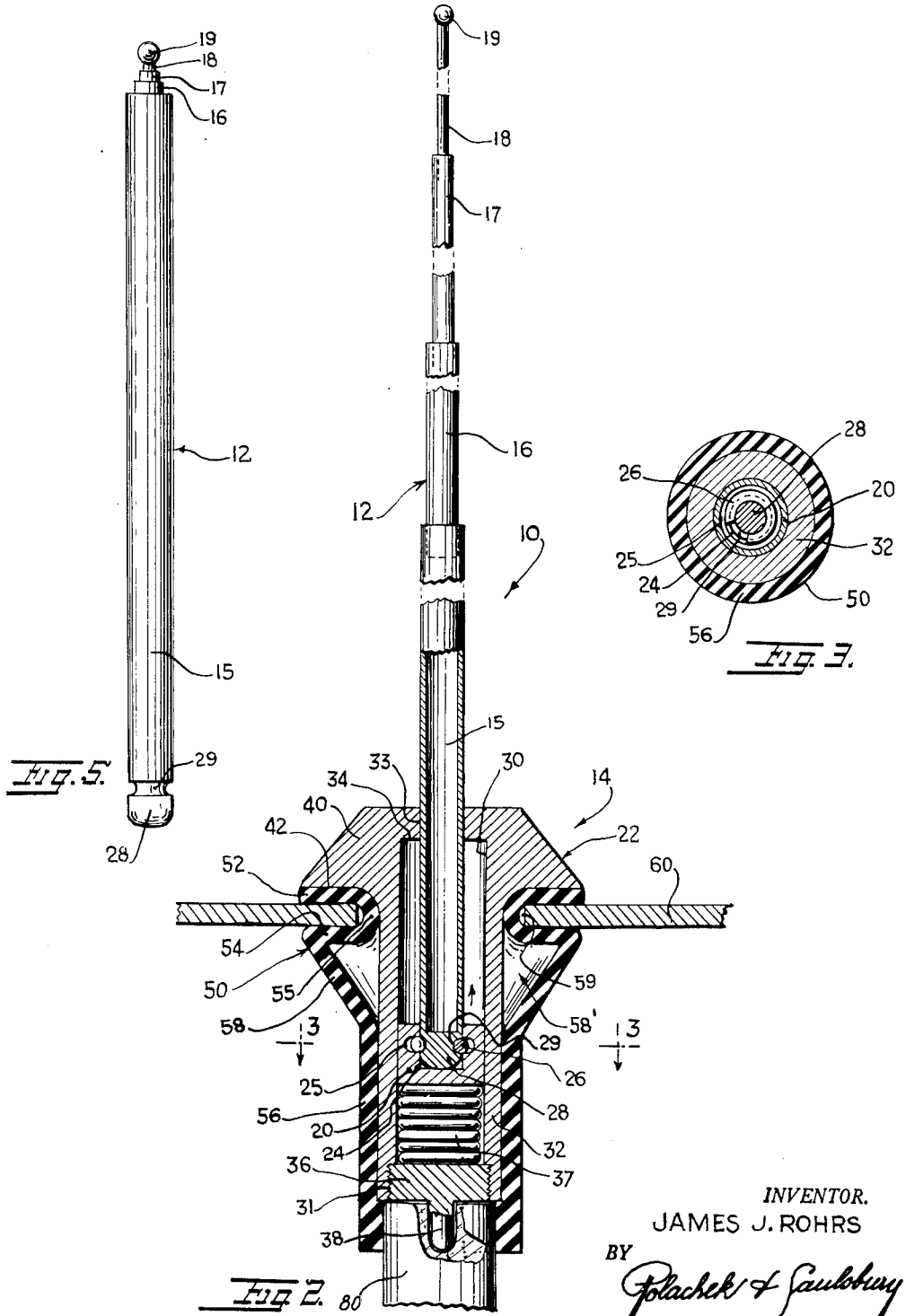


Fig. 5.

Fig. 2.

Fig. 3.

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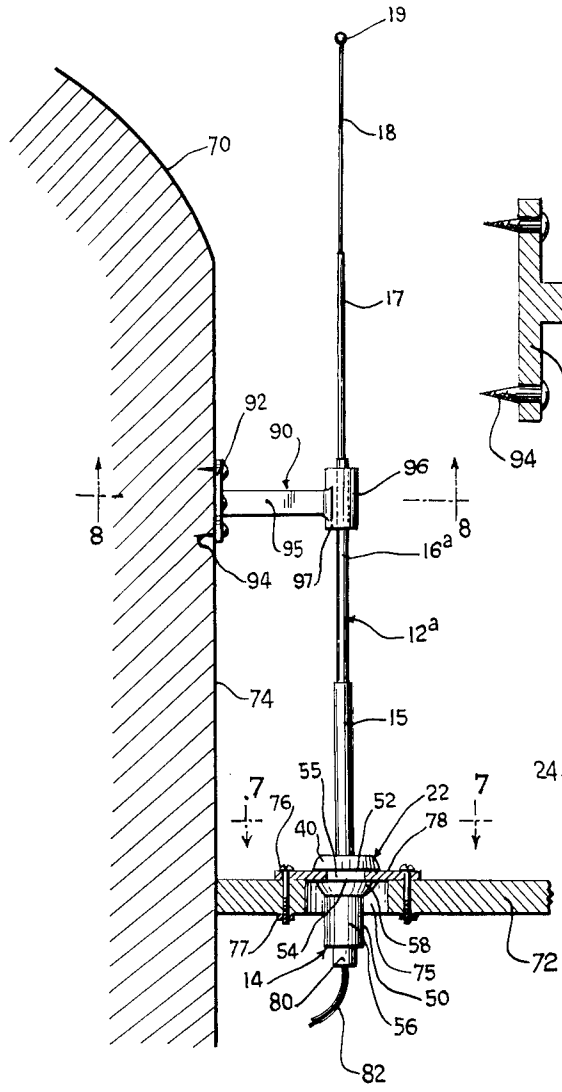


Fig. 6.

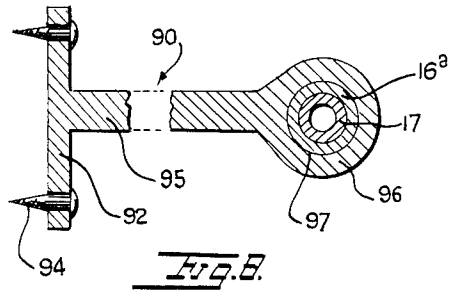


Fig. 8.

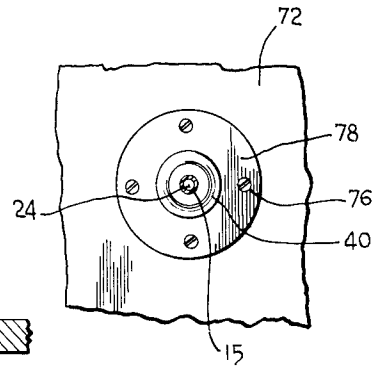


Fig. 7.

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REMOVABLE TELESCOPIC ANTENNA

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This invention relates to a telescopic antenna assembly which can be used on an automobile, boat and other vehicle for radio reception and transmission.

A principal object of the invention is to provide a radio antenna assembly with a telescopic whip antenna detachably engaged with a stationary fixture so that the whip portion can be removed and stored away when not in use.

A further object is to provide a radio antenna fixture which includes a cylindrical housing, a resilient jacket enclosing the housing and serving as a support, and a spring loaded receptacle in the housing for receiving a removable telescopic whip antenna, the receptacle including detent means for removably retaining the antenna in the fixture.

Still another object is to provide a radio antenna assembly as described with means for mounting the same on a boat.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a side elevational view of a radio antenna assembly embodying the invention, with the telescopic whip antenna in retracted position.

FIG. 2 is a vertical sectional view of the radio antenna assembly shown mounted on a part of a vehicle, the view being taken on line 2—2 of FIG. 1, with sections of the telescopic whip antenna in extended position and parts being broken away.

FIG. 3 is a cross-sectional view taken on line 3—3 of FIG. 2.

FIG. 4 is a sectional view of the fixture alone, the whip antenna being removed.

FIG. 5 is a side elevational view of the telescopic whip antenna alone, with sections shown in retracted position.

FIG. 6 is a side elevational view of another radio antenna assembly on a reduced scale, shown mounted on a side of a boat.

FIG. 7 is a horizontal sectional view taken on line 7—7 of FIG. 6.

FIG. 8 is an enlarged horizontal sectional view taken on line 8—8 of FIG. 6, part being broken away.

Referring to FIGS. 1–5, there is shown radio antenna assembly 10 including a telescopic whip antenna 12 and mounting fixture 14. The antenna has a plurality of tubular metal sections 15, 16 and 17 of progressively smaller diameter slidably disposed in one another. The outermost section 15 of largest diameter has an open upper end in which slides the next section 16 of next smaller diameter. Section 17 has the smallest diameter and slides in section 16. A metal rod 18 slides inside of section 16. Rod 18 terminates in a ball tip 19 at its outer end. The sections are in tight frictional engagement with each other to remain in any position of extension or retraction in which they are set.

The bottom end of outer section 15 detachably engages in a socket or receptacle 20 movably disposed inside an electrically conductive metal housing or shell 22 of fixture 14. The receptacle has a central recess or bore 24 in which is a circumferential groove 25. A spring C-ring 26 is engaged in the groove 25. This ring normally extends radially into the recess or bore 24 and is expanded

outwardly when the lower rounded end 28 of section 15 is inserted into the bore 24. Bore 24 has the same diameter as that of the end 28 of section 15. A circumferential groove 29 is formed near the bottom free end of section 15 to receive the C-ring 26. Then the antenna is held in the receptacle 20 since the outer periphery of the C-ring is engaged in groove 25.

The receptacle is axially and slidably disposed inside central bore 30 of lower cylindrical portion 32 of the housing. The upper end of the bore has a constricted portion or opening 33 defined by an annular shoulder 34 which retains the receptacle 22 in bore 30. The section 15 fits snugly in bore portion or opening 33 so that shoulder 34 supports the antenna in an axial upright position in cooperation with receptacle 20. The bottom end of bore 30 is provided with an internally threaded portion 31 which receives a plug 35. This plug has a prong 38 extending axially downward therefrom for receiving a suitable electric connector to connect the antenna to a remote radio receiver and/or transmitter. A coil spring 37 is located in bore 30 below the movable receptacle. This spring is normally compressed by the weight of antenna 12 when in the fixture. When the antenna is removed, the spring expands and raises receptacle 20 up to shoulder 34 to close the bore 30. However, the recess or bore 24 of receptacle 20 is exposed at bore portion 33 for receiving the lower end of section 15 when the antenna is replaced inside the fixture 14. It will be apparent that the antenna can be snapped into and out of engagement with respect to the receptacle at lower and upper ends, respectively, of bore 30. The detent action is made possible by the spring ring 26. When the antenna is removed it can be collapsed as shown in FIG. 5 to be stored away until it is again needed for use.

Housing 22 has an enlarged, flat head 40 at its upper end in which the upper end of bore 30 terminates. The diameter of head 40 is considerably larger than the diameter of the cylindrical portion 32 of the housing. At the underside of head 40 is a flat annular surface 42 extending radially outward in a plane perpendicular to the axis of the housing. On the outside of housing portion 32 is a resilient rubber or plastic jacket 50. The jacket has an upper annular flange 52 abutting the surface 42 at the underside of head 40. Another annular flange 54 extends radially outwardly of the jacket and is spaced from flange 52 by a short cylindrical neck 55. The outer periphery of flange 54 is connected to the cylindrical body portion 56 of the jacket by a resilient conical section 58. A tapered groove 53' is defined betwen the inner surface of flange 54 and the inner surface of conical section 58. Groove 58' extends circumferentially entirely around the cylindrical housing portion 32.

The fixture can be mounted in a hole 59 formed in a sheet metal plate-like, horizontal support 60 which has a thickness substantially equal to the axial length of neck 55 or the space between flanges 52 and 54. The bottom narrow end of the fixture, with antenna removed, is inserted into hole 59, the fixture being in an axially vertical position. The fixture is inserted downwardly to conical section 58. The the fixture can be twisted and pressed, or hammered down on the support 60 until the conical section 58 and flange 54 pass through the hole 59, and flange 54 engages underneath support 60. The jacket 50 serves as both an electrical insulator and mounting grommet between the metal electrically conductive housing 22 and the metal support 60. The support 60 may be part of a fender, cowl, or other portion of the body of a vehicle. The fixture 14 remains permanently in place while the antenna 12 is removed and replaced whenever desired. Heretofore, radio antennas for automobiles have been permanently installed by means of threaded nuts and other threaded parts. As

a result the antennas corroded when exposed out-of doors for long periods of time; and the threaded parts corroded and froze so the antennas could not be removed. Also the antennas were often bent or broken accidentlly, or purposely, by vandals when the vehicles were parked and unattended. The present invention avoids these undesirable conditions, since the antenna is removable so that the antenna always remains bright and uncorroded. The several sections remain easily telescopic within one another, and the useful life and efficiency of the antenna assembly are considerably extended.

FIGS. 6–8 show another antenna assembly 10*a* in which parts similar to those of assembly 10 are identically numbered. The assembly 10*a* is especially intended for installation at the side of a boat 70 on a catwalk or deck section 72 extending horizontally outward of the vertical wall 74 of a cabin of the boat. The antenna 12*a* when fully extended should be long enough to receive and transmit radio broadcasts on the long wave lengths assigned to marine radio transmission. A total extended length of about twelve feet will generally suffice. This contrasts with the shorter length of an antenna required for short-wave bands, AM and FM broadcast bands and police radio bands, any of which may be required on an automobile radio receiving and transmission system.

A hole 75 is formed in the catwalk 72 over which is secured by bolts 76 and nuts 77 a plate 78. Plate 78 has a thickness equal to the spacing of jacket flanges 52, 54 or the axial length of neck 55. The fixture 14 is anchored in hole 79 in the plate 78, with jacket 50 serving as both insulator and supporting grommet. A connector 80 is attached to the fixture and a cable 82 extends from the connector and terminates at the radio apparatus of the boat.

A bracket 90 is provided to support the antenna at an intermediate point thereof as shown in FIGS. 6 and 8. This bracket includes a plate 92 which is secured by screws 94 to the side wall 74. The bracket has an arm 95 extending horizontally outward of the plate 92. An axially vertical, cylindrical sleeve 96 is secured to the outer end of arm 95. Section 16*a* of the antenna 12*a* is axially slidable in the axial bore 97 of sleeve 96. The sleeve 96 engages the section 16*a* so as to prevent lateral movement thereof and minimize lateral bending and swaying movements of the antenna. The bracket 90 thus cooperates with the fixture 14 in supporting and stabilizing the antenna 12*a*. The antenna is removably mounted in the fixture 14 so that it can be stowed away inside the boat when not in use. This removable feature results in a longer and more useful life of the antenna installation than has heretofore been experienced with permanent antenna installations in boats of all types.

Since the antennas 12 and 12*a* are removable, it is possible to provide a motorist or boat owner with several antennas of different maximum lengths which he can use selectively for different purposes, such as reception of FM broadcasts, which requires a short antenna, while short-wave, regular AM, police and marine broadcasts require much longer antennas.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

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

1. A radio antenna assembly for a vehicle having an apertured plate-like horizontal support for mounting the assembly, comprising a fixture including a housing having a cylindrical, hollow bottom portion and a head extending radially outward of said cylindrical portion at the upper end thereof, said head having an annular surface at its underside extending radially outward of said cylindrical portion and surrounding the same, a receptacle in said housing, said head having an opening axially aligned with said receptacle to receive a tubular antenna section, and a resilient insulating jacket surrounding said cylindrical portion of the housing, said jacket having a first annular flange abutting the annular surface at the underside of the head, a second annular flange spaced axially from the first flange by a cylindrical neck equal in axial length to the thickness of said plate-like support, a cylindrical section surrounding a low part of the cylindrical portion of the housing, and a conical section connecting the outer periphery of said second flange with said cylindrical section of the jacket to define a springy support for the fixture and to facilitate mounting of the fixture in the aperture of said plate-like support, said receptacle having detent means for detachably engaging one end of a tubular antenna section insertable through the opening in the head of the housing, said housing having an axial bore, said receptacle being slidably disposed in said bore, said opening in the head being defined by a shoulder constricting one end of the bore and retaining the receptacle in said bore, and a coil spring in said bore normally supporting said receptacle at said shoulder in the absence of said tubular antenna section.

2. A radio antenna assembly for a vehicle having an apertured plate-like horizontal support for mounting the assembly, comprising a fixture including a housing having a cylindrical, hollow bottom portion and a head extending radially outward of said cylindrical portion at the upper end thereof, said head having an annular surface at its underside extending radially outward of said cylindrical portion and surrounding the same, a receptacle in said housing, said head having an opening axially aligned with said receptacle to receive a tubular antenna section, and a resilient insulating jacket surrounding said cylindrical portion of the housing, said jacket having a first annular flange abutting the annular surface at the underside of the head, a second annular flange spaced axially from the first flange by a cylindrical neck equal in axial length to the thickness of said plate-like support, a cylindrical section surrounding a lower part of the cylindrical portion of the housing, and a conical section connecting the outer periphery of said second flange with said cylindrical section of the jacket to define a springy support for the fixture and to facilitate mounting of the fixture in the aperture of said plate-like support, said receptacle having detent means for detachably engaging one end of a tubular antenna section insertable through the opening in the head of the housing, said housing having an axial bore, said receptacle being slidably disposed in said bore, said opening in the head being defined by a shoulder constricting one end of the bore and retaining the receptacle in said bore, and a coil spring in said bore normally supporting said receptacle at said shoulder in the absence of said tubular antenna section, said detent means including a recess in said receptacle aligned axially with the opening in the head, and an expansible ring in a groove surrounding the recess and projecting radially into the recess for engaging a circumferential groove in said end of the tubular antenna section.

3. A radio antenna assembly for a vehicle having an apertured plate-like horizontal support for mounting the assembly, comprising a fixture including a housing having a cylindrical, hollow bottom portion and a head extending radially outward of said cylindrical portion at the upper end thereof, said head having an annular surface at its underside extending radially outward of said cylindrical portion and surrounding the same, a receptacle in said housing, said head having an opening axially aligned with said receptacle to receive a tubular antenna section, and a resilient insulating jacket surrounding said cylindrical portion of the housing, said jacket having a first annular flange abutting the annular surface at the underside of the head, a second annular flange spaced

axially from the first flange by a cylindrical neck equal in axial length to the thickness of said plate-like support, a cylindrical section surrounding a lower part of the cylindrical portion of the housing, and a conical section connecting the outer periphery of said second flange with said cylindrical section of the jacket to define a springy support for the fixture and to facilitate mounting of the fixture in the aperture of said plate-like support, said receptacle having detent means for detachably engaging one end of a tubular antenna section insertable through the opening in the head of the housing, said housing having an axial bore, said receptacle being slidably disposed in said bore, said opening in the head being defined by a shoulder constricting one end of the bore and retaining the receptacle in said bore, and a coil spring in said bore normally supporting said receptacle at said shoulder in the absence of said tubular antenna section, said detent means including a recess in said receptacle aligned axially with the opening in the head, and an expansible ring in a groove surrounding the recess and projecting radially into the recess for engaging a circumferential groove in said end of the tubular antenna section, said detent means including a recess in said recepetacle aligned axially with the opening in the head, and an expansible ring in a groove surrounding the recess and projecting radially into the recess; and a telescopic whip antenna including a plurality of tubular sections disposed in axial alignment concentrically within one another and mutually slidable between fully extended and fully retracted positions, the outermost one of said tubular sections having a circumferential groove detachably receiving said ring when said one end of the outermost tubular section is inserted through the opening in the head and engaged in the recess.

4. A radio antenna assembly for a vehicle having an apertured plate-like horizontal support for mounting the assembly, comprising a fixture including a housing having a cylindrical, hollow bottom portion and a head extending radially outward of said cylindrical portion at the upper end thereof, said head having an annular surface at its underside extending radially outward of said cylindrical portion and surrounding the same, a receptacle in said housing, said head having an opening axially aligned with said receptacle to receive a tubular antenna section, and a resilient insulating jacket surrounding said cylindrical portion of the housing, said jacket having a first annular flange abutting the annular surface at the underside of the head, a second annular flange spaced axially from the first flange by a cylindrical neck equal in axial length to the thickness of said plate-like support, a cylindrical section surrounding a lower part of the cylindrical portion of the housing, and a conical section connecting the outer periphery of said second flange with said cylindrical section of the jacket to define a springy support for the fixture and to facilitate mounting of the fixture in the aperture of said plate-like support, said receptacle having detent means for detachably engaging one end of a tubular antenna section insertable through the opening in the head of the housing, said housing having an axial bore, said receptacle being slidably disposed in said bore, said opening in the head being defined by a shoulder constricting one end of the bore and retaining the receptacle in said bore, and a coil spring in said bore normally supporting said receptacle at said shoulder in the absence of said tubular antenna section; and a telescopic whip antenna including a plurality of tubular sections disposed in axial alignment concentrically within one another and mutually slidable between fully extended and fully retracted positions, the outermost one of said tubular sections having means at one end for detachable engagement by said detent means in the receptacle when said one tubular section is inserted through the opening in the head and engaged in the receptacle.

5. A radio antenna assembly for a vehicle having an

apertured plate-like horizontal support for mounting the assembly, comprising a fixture including a housing having a cylindrical, hollow bottom portion and a head extending radially outward of said cylindrical portion at the upper end thereof, said head having an annular surface at its underside extending radially outward of said cylindrical portion and surrounding the same, a receptacle in said housing, said head having an opening axially aligned with said receptacle to receive a tubular antenna section, and a resilient insulating jacket surrounding said cylindrical portion of the housing, said jacket having a first annular flange abutting the annular surface at the underside of the head, a second annular flange spaced axially from the first flange by a cylindrical neck equal in axial length to the thickness of said plate-like support, a cylindrical section surrounding a lower part of the cylindrical portion of the housing, and a conical section connecting the outer periphery of said second flange with said cylindrical section of the jacket to define a springy support for the fixture and to facilitate mounting of the fixture in the aperture of said plate-like support, said receptacle having detent means for detachably engaging one end of a tubular antenna section insertable through the opening in the head of the housing, said housing having an axial bore, said receptacle being slidably disposed in said bore, said opening in the head being defined by a shoulder constricting one end of the bore and retaining the receptacle in said bore, and a coil spring in said bore normally supporting said receptacle at said shoulder in the absence of said tubular antenna section; and a telescopic whip antenna including a plurality of tubular sections disposed in axial alignment concentrically within one another and mutually slidable between fully extended and fully retracted positions, the outermost one of said tubular sections having means at one end for detachable engagement by said detent means in the receptacle when said one tubular section is inserted through the opening in the head and engaged in the receptacle, and means at the bottom end of said housing for engaging an electrical connector to connect the housing and antenna electrically to remotely located radio apparatus.

6. A radio antenna assembly for a vehicle having an apertured plate-like horizontal support for mounting the assembly, comprising a fixture including a housing having a cylindrical, hollow bottom portion and a head extending radially outward of said cylindrical portion at the upper end thereof, said head having an annular surface at its underside extending radially outward of said cylindrical portion and surrounding the same, a receptacle in said housing, said head having an opening axially aligned with said receptacle to receive a tubular antenna section, and a resilient insulating jacket surrounding said cylindrical portion of the housing, said jacket having a first annular flange abutting the annular surface at the underside of the head, a second annular flange spaced axially from the first flange by a cylindrical neck equal in axial length to the thickness of said plate-like support, a cylindrical section surrounding a lower part of the cylindrical portion of the housing, and a conical section connecting the outer periphery of said second flange with said cylindrical section of the jacket to define a spring support for the fixture and to facilitate mounting of the fixture in the aperture of said plate-like support, said receptacle having detent means for detachably engaging one end of a tubular antenna section insertable through the opening in the head of the housing, said housing having an axial bore, said receptacle being slidably disposed in said bore, said opening in the head being defined by a shoulder constricting one end of the bore and retaining the receptacle in said bore, and a coil spring in said bore normally supporting said receptacle at said shoulder in the absence of said tubular antenna section, said detent means including a recess in said receptacle aligned axially with the opening

in the head, and an expansible ring in a groove surrounding the recess and projecting radially into the recess for engaging a circumferential groove in said end of the tubular antenna section, said detent means including a recess in said receptacle aligned axially with the opening in the head, and an expansible ring in a groove surrounding the recess and projecting radially into the recess; and a telescopic whip antenna including a plurality of tubular sections disposed in axial alignment concentrically within one another and mutually slidable between fully extended and fully retracted positions, the outermost one of said tubular sections having a circumferential groove detachably receiving said ring when said one end of the outermost tubular section is inserted through the opening in the head and engaged in the recess, and means at the bottom end of said housing for engaging an electrical

connector to connect the housing and antenna electrically to remotely located radio apparatus.

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