March 17, 1959 N. E. ZACHER 2,878,303

ANTENNA MOUNTING STRUCTURE

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Fig. 1.

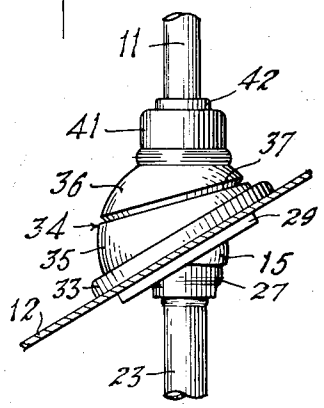


Fig. 3.

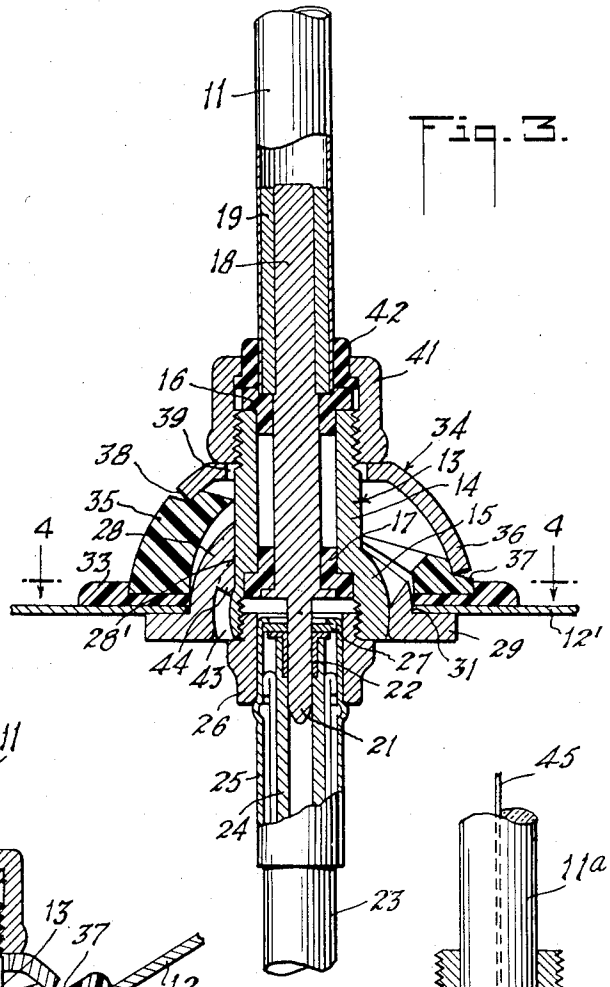


Fig. 2.

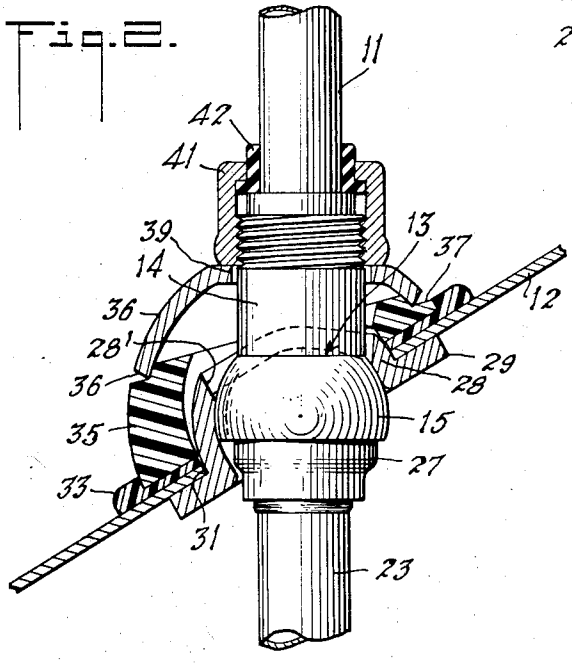
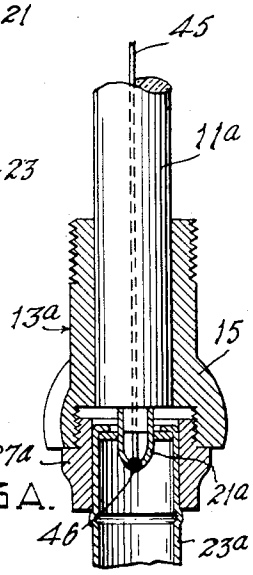


Fig. 3A.



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Fig. 4.

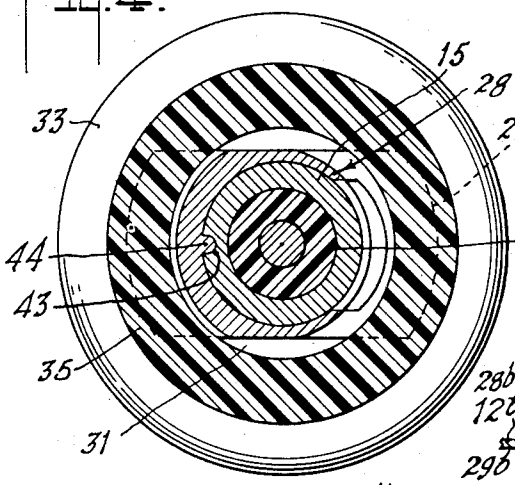


Fig. 5.

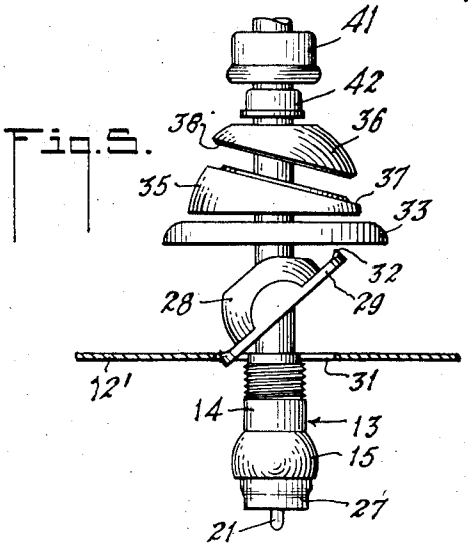


Fig. 6.

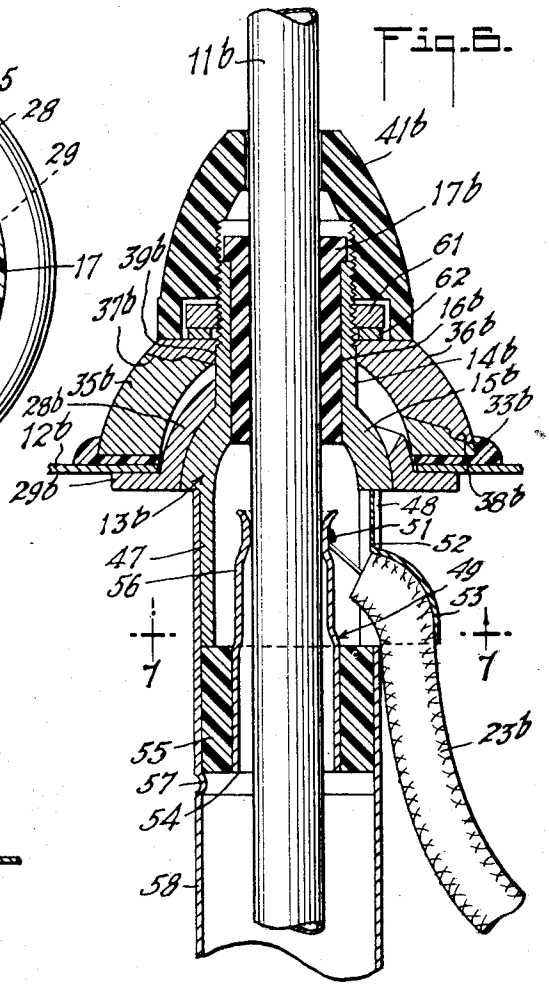
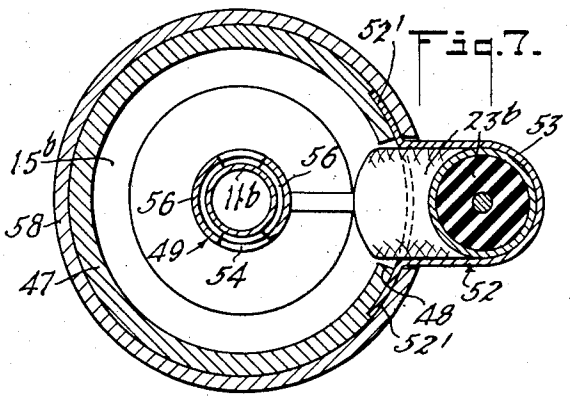
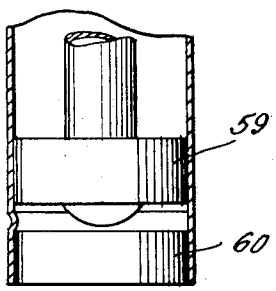


Fig. 7.





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ANTENNA MOUNTING STRUCTURE

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Application April 4, 1956, Serial No. 576,172

3 Claims. (Cl. 174—153)

This invention relates to antenna mountings and, more particularly, to a mounting structure for supporting an antenna on the wall of a vehicle or the like at a selected angle to said wall. In mounting an antenna on the wall of an automobile or other vehicle, the slope and/or contour of the wall at the point of mounting is frequently such that the antenna must lie at an acute angle to the wall in order to extend in the desired vertical direction. In mountings heretofore proposed for this purpose, it has generally been necessary to obtain access to both sides of the wall, such as a portion of the cowl or fender, in order to assemble the antenna thereon. This is frequently very difficult and awkward, making the mounting of the antenna an expensive and troublesome operation.

In accordance with my invention, I provide an antenna mounting which can, while operating from one side only, be assembled and mounted on a supporting wall, and can be securely held at any desired angle relative to said wall.

An object of my invention is to provide an antenna mounting which may be held on one side of a wall by a member so shaped that it can be tilted and slipped through a wall opening and will then tilt back to a position to engage the wall.

Another object of my invention is to provide an improved antenna mounting structure which can be installed on a support panel or wall of a vehicle, and which mounting is capable of supporting the antenna at desired angles relative to the panel, so that the antenna may extend vertically even though the panel may be inclined.

A further object of the invention is to provide such an antenna mounting structure which shall include cooperative ball and socket members and means mounting them on a support wall with the axis of rotation of said members approximately in the plane of said wall.

A still further object of my invention is the provision of an automobile antenna support which is simple and sturdy in construction and which when in position positively centers in a receiving hole of the support wall and firmly anchors to said wall.

These and other objects and advantages will become apparent from the following detailed description, when taken with the accompanying drawings. It will be understood that the drawings are for purposes of illustration and do not define the scope or limits of the invention, reference being had for the latter purpose to the appended claims.

In the drawings, wherein like reference characters denote like parts in the several views:

Figure 1 is a vertical sectional view through an inclined supporting wall, showing an antenna mounting assembled with respect to said wall.

Figure 2 is a view corresponding to Figure 1, but showing certain of the parts of the mounting in vertical section and to a larger scale.

Figure 3 is a view corresponding to Figure 2, but showing all of the parts of the mounting in axial section and the supporting wall as horizontal.

Figure 3A is a view corresponding to Figure 3, but showing only certain inner parts of a modified form of mounting.

Figure 4 is a horizontal sectional view on the line 4—4 of Figure 3, in the direction of the arrows.

Figure 5 is a view corresponding generally to Figure 3, but to a smaller scale and showing the mounting parts in elevation and separated from one another, as during the operation of assembling.

Figure 6 is a view corresponding to Figure 3, but showing a second modification.

Figure 7 is a transverse sectional view on the line 7—7 of Figure 6, in the direction of the arrows.

Specifically describing the embodiment of my invention illustrated in Figures 1 to 5, inclusive, there is shown the lower portion of an antenna or antenna means **11** mounted alternatively on an inclined supporting wall **12**, and on a horizontal supporting wall **12'**, which may be any desired portion of an automobile or other vehicle body. In the installation shown in Figures 1 and 2, the antenna **11** is considered as mounted on the cowl at one side of the vehicle body and it will be seen that this portion slopes, rather than being horizontal as is the wall **12'** in Figures 3 and 5. The purpose of illustrating supporting walls both inclined and horizontal is to show how one may adapt the mounting for being supported on walls at different inclinations. When supported so that the antenna projects in a vertical direction on a wall such as **12**, it is necessary that the mounting support said antenna at an acute angle thereto.

In the embodiment of my invention under consideration, the mounting structure comprises an elongated member or structure **13**, desirably cast, having a tubular shank **14** extending integral with and from a convex spherical segment portion **15**. Insulating washers or thimbles **16** and **17**, desirably formed of linen "Bakelite" are set inside of said shank **14** and in these is firmly supported a rod **18**, desirably serving as a steel end plug for the antenna. One end of the rod **18** fits tightly in a desirably steel bushing **19** in the lower end portion of the antenna **11**, which is tubular as shown most clearly in Figure 3. This antenna may be of conventional form, for example, it may comprise segments which telescope with one another.

The lower end of the rod **18** is headed to engage the lower end of the washer **17**, and therebelow descreased in section to form a projecting pin portion **21**. The portion **21** may fit a desirably brass eyelet **22** in the adjacent end of a cable **23**, which latter may be of conventional construction for connection with a radio set (not shown). Thus, the eyelet **22** may fit the end of a conductor **24** insulated from a protective thimble or casing **25**. To the casing **25** is attached a cable nut **26**, threadably engaging in the lower end of the spherical segment portion **15**. The upper end of the casing **25** may be flanged over a closure disc **27** which is abutted by the eyelet **22**.

The spherical segment portion **15** cooperates with a hollow spherical socket member **28** formed with outstanding flanges **29** which engage the under of inner side of the supporting wall, **12** or **12'**, of the vehicle or automobile body. This socket member **18** is desirably formed nearly rectangular in plan (see Figure 4) and narrow enough so that it may be tilted to the position of Figure 5 and inserted through the receiving aperture **31** in the supporting wall **12** or **12'**. After insertion through said aperture, it may be drawn up into engagement with the under surface of said wall as viewed in Figures 1, 2 and 3. In order to minimize slippage of the flanges **29** on said under surface, said flanges are desirably bent up at their corners, as indicated at **32**, so as to provide teeth adapted to bite into said lower surface.

At the outer side of the supporting wall is a gasket **33**,

desirably formed of resilient water-excluding material, on which is supported a two-part spacer device 34, comprising a lower insulating section 35, and an upper section 36, here shown as made of a suitable metal such as chromium-plated brass. The lower edge of the upper section 36 desirably nests over an annular boss at the top edge of the lower section 35, to avoid undesired displacement between said sections. Both of these sections have openings therethrough to receive the shank 14 of the elongated device 13, and abutting inclined surfaces. That is, the lower member 35 has an upper surface 37 inclined, in the embodiment illustrated at an angle of about 15°, and engaged by a correspondingly inclined lower surface 38 of the upper member 34 so that, upon relative rotation of the two segments, the inclination of the aperture 39 which receives said shank and the received shank may be correspondingly disposed at a desired angle with respect to the supporting wall 12 or 12'.

The mounting is clamped firmly in an adjusted position by a desirably chromium-plated brass nut or cap 41, threadably engaging the upper end of the shank 14 and abutting the upper end of the upper section 36 of the spacer device 34. A resilient packing ring 42, desirably of neoprene, is disposed between said nut and the antenna tube and rod assembly to cooperate with the gasket 33 in preventing the entrance of foreign material, particularly water. The spherical segment portion 15 has a circumferential groove 43 extending in an axial plane and receiving socket member 28 has a tongue 44 fitting said groove to allow for relative movement therebetween only in the axial plane of the member 13, while preventing relative axial rotation with respect thereto. In this way, after assembly of the parts as viewed in Figure 3, for example, relative rotation of the antenna 11 is prevented.

It will be seen that one wall of the socket member 28, that is, the one to the right as viewed in Figures 2 and 3, is lower than the left wall, so that the ball portion of the ball and socket arrangement may be tilted to the right (in the present embodiment about 35°) from the position of Figure 3 to that of Figure 2, to the limited extent provided by the lowering of the socketed wall, while it cannot be tilted to the left from the position of Figure 3, that is, from the right-angle relationship. This allows for the tongue 44 and groove 43 arrangement at the left side of the parts, as viewed in these figures which prevents axial turning therebetween.

The parts are assembled by bringing the cable nut 26 up through the aperture 31 and fastening it onto the lower end of the elongated member 13 after it is assembled with the antenna 11 while disposed above the wall 12 or 12'. The socket member 28 is then threaded over the antenna 11, followed by the gasket 33, lower spacer section 35, upper spacer section 36, and the packing ring 42. Finally, after the spacer sections 35 and 36 have been adjusted with respect to one another for the desired angular relationship, the nut or cap 41 is applied and draws all the members together, from the position of Figure 5 to that of Figure 2 or 3, depending on the angle desired.

In the embodiment of Figure 3A, there is provided a fiberglass antenna 11*a* in which a conductor 45 is embedded. There is a suitable connection between the lower end of said antenna and the elongated member 13*a* as by having a drive fit or a threaded connection. The cable and nut assembly 23*a*, 27*a*, may be identical with that of the preceding embodiment. However, in this case, the pin portion 21*a* is formed hollow, pointed at its lower end, and extends from the lower end of the glass antenna rod 11*a*, being united with the lower end of the conductor 45 as by a drop of solder or other securing means 46. Otherwise the construction may be in accordance with Figures 1 to 5, inclusive.

Where the antenna is of the disappearing type, a modified construction may be used, as shown in Figures 6 and 7. Here we have an elongated member 13*b* provided with a depending tubular extension or cylindrical flange 47, notched as indicated at 48. The connection with the radio set is here made by a cable 23*b* which passes through the notch 48 and the lead or conductor of which is soldered to the antenna contact 49, as indicated at 51. A sheet metal hood 52 is pushed upwardly into the notch 48 in the flange 47 and has an outwardly and downwardly extending portion 53 projecting laterally from the flange, so that the cable 23*b* is disposed beneath it and the notch thereby protected against the entrance of foreign matter, particularly water. The hood 52 has flanges 52' secured between the flange 47 and an antenna guide tube 58.

This antenna contact 49 desirably has a body portion 54 mounted in an insulator 55, and provided with upstanding spring fingers 56, which confine and are slidably engaged by the disappearing antenna 11*b*. To one of these fingers 56, the lead of the cable 23*b* is soldered.

The insulator 55 is secured against the lower end of the flange 47 as by means of an internal collar or inwardly crimped or upset portion 57 in the tube 58 in which the antenna travels. The lower end of said antenna may carry a guide 59 slidable in said tube and be closed by a plug 60. Otherwise, the construction may be generally like that of the first embodiment.

However, the following description will show that I prefer to in the present embodiment change the details slightly because of the change in the aerial construction. So here the elongated member 13*b* desirably receives only one insulating washer 16*b* in its tubular shank 14*b*, rather than two as in the preceding embodiment. This washer has a shoulder provided by a flange 17*b* at its upper end for holding it in place by engagement with the upper end of the threaded portion of said shank 14*b*. This washer 16*b* is what carries the slidable antenna 11*b*, the upper end portion of which may be conventional.

The spherical segment portion 15*b*, as in the preceding embodiment, cooperates with a hollow spherical socket member 28*b* formed with outstanding flanges 29*b* which engage the under side of the supporting wall 12*b* of the vehicle or automobile body. This socket member is desirably formed generally rectangular in plan, as in the preceding embodiment, so it may be applied as described in connection with said first embodiment. After insertion through a wall aperture, it may be drawn up into engagement with the under surface of said wall, as viewed in Figure 6. In order to minimize slippage the flanges 29*b* may be formed like the flanges 29 of the preceding embodiment.

At the outer side of the supporting wall 12*b* is a gasket 33*b*, desirably formed of resilient water-excluding material, on which is supported a two-part spacer device 34*b* comprising lower and upper sections, as in the preceding embodiment. In this embodiment, however, both of said sections, 35*b* and 36*b*, are shown made of suitable metal, such as chromium-plated brass. Both of these sections have openings therethrough to receive the shank 14*b* of the elongated device 13*b*, and abutting inclined surfaces. Such surfaces, as in the preceding embodiment, are desirably inclined at an angle of about 15° to the horizontal or lower surface of the gasket 33*b*.

That is, the lower member 35*b* has an upper surface 37*b*, inclined in the embodiment illustrated an angle of about 15°, and engaged by a correspondingly inclined lower surface 38*b* of the upper member 36*b*, so that upon relative rotation of the two segments, the inclination of the aperture 39*b* which receives said shank, and the received shank, may be correspondingly disposed at the desired angle with respect to the supporting wall 12*b*. These inclined surfaces are desirably shouldered, as illustrated, to prevent slipping from engagement with one another.

The mounting is clamped firmly in an adjusted position by a cap 41*b*, threadably engaging the upper end

of the shank 14*b*, and abutting the upper end of the upper section 36*b*. However, inasmuch as this is here shown as an insulating cap, it is desirably used only as a finishing member and overlies a nut 61 threadably engaging said shank 14*b* and pressing on the upper member 36*b* through a washer 62 therebeneath. Although in the present embodiment there is no illustration of an interfitting tongue and groove, corresponding with the tongue 44 and groove 43 of the preceding embodiment, yet this may be employed if desired, although there is not as much need for it because of the type of antenna.

Also, as in the preceding embodiment, a wall portion of the socket member 28*b*, that is, the part to the right as viewed in Figure 6, is lower than the left part, so that the ball portion of the ball and socket arrangement may be tilted to the right from the position illustrated. In the present embodiment this tilting may also be about 35° from the position of Figure 6 to a position corresponding with that of Figure 2, while it cannot be tilted to the left from the position of Figure 6, that is, from the right-angle relationship.

From the foregoing disclosure, it will be seen that I have devised an improved antenna mounting structure, including a member 13, 13*a*, or 13*b*, forming in effect the ball of a ball and socket joint, the socket portion, 28 or 28*b*, having flanges held against the inner surface of the supporting wall. These socket members are so narrow that each conveniently fits through a relatively small aperture in the wall, especially because the axis of rotation between the ball and socket portions lies approximately in the plane of the inner surface of said wall. This permits the tilting of the socket member for insertion through the aperture 31, prior to the final assembly as viewed in Figures 2 and 3.

While I have shown and described my invention as embodied in certain specific details of construction and relations of parts, it is to be understood that the present disclosure is primarily illustrative of the principles of the invention, and that modifications in details of construction may be made without departing from the spirit or scope thereof.

I claim:

1. A mounting for supporting a radio set antenna on a wall having an opening therein including in combination, an elongated structure adapted to extend through said opening and having a longitudinal hole therethrough, said structure having a part fixedly associated therewith and formed as an exterior convex spherical segment and a part as a tubular shank integral therewith for extending outwardly from said opening, insulating washer means fitting in said shank for receiving antenna means, a hollow spherical socket member in which the convex spherical segment fits to form in effect a ball and socket joint, said socket member having an opening therethrough through which said tubular shank loosely passes and being narrow enough to pass through said opening on tilting, said socket member having outstanding flanges so positioned that they engage the inner surface of said wall at diametrically opposite sides of said opening upon return of said socket member from a tilted position and the ball and socket joint is centered in approximately the plane of the wall, a two-part spacer device through which said tubular shank portion extends, the spacer parts having inclined abutting surfaces so that the inclination of the received shank can be varied upon relative rotation of said parts, and a nut receiving said antenna means, engageable with the outer end of said spacer device, said nut being threaded on the end portion of said shank to draw the flanges into clamping engagement about the edge portions of said wall defining the aperture.

2. A mounting for supporting a radio set antenna on a wall having an opening therein including in combination, an elongated structure adapted to extend through said opening and having a longitudinal hole therethrough, said structure having a part fixedly associated therewith and formed as an exterior convex spherical segment and a tubular shank integral therewith for extending outwardly from said opening, insulating washer means fitting in said shank for receiving antenna means, said spherical segment having a tubular portion extending therefrom in a direction opposite to that of said shank, said extension being notched, a conductor in said notch for connection with said set, an antenna housing tube fitting said tubular portion, an insulator carried inside said tube and through which said antenna passes, a device carried by said insulator and comprising spring finger contact means engaging said antenna means and connected to said conductor, a hood fitting said notch and covering that portion of said conductor adjacent said connection, a hollow spherical socket member in which the convex spherical segment fits to form in effect a ball and socket joint, said socket member having an opening therethrough through which said tubular shank loosely passes and being separate from said structure and narrow enough to pass through said opening on tilting, said socket member having outstanding flanges so positioned that they engage the inner surface of said wall at diametrically opposite sides of said opening upon return of said socket member from a tilted position and the ball and socket joint is centered in approximately the plane of the wall, a resilient annular gasket encircling said joint, a two-part spacer device supported on said gasket and through which said tubular shank portion extends, the spacer parts being formed so that the inclination of the received shank can be varied upon relative rotation of said parts, a nut through which said antenna means passes, engageable with the outer end of said spacer device, said nut being threaded on the end portion of said shank to draw the gasket and flanges into clamping engagement about the edge portions of said wall defining the aperture.

3. A mounting for supporting a radio set antenna on a wall having an opening therein including in combination, an elongated structure adapted to extend through said opening and having a longitudinal hole therethrough, said structure having a part fixedly associated therewith and formed as an exterior convex spherical segment and a tubular shank integral therewith for extending outwardly from said opening, insulating washer means fitting in said shank for receiving antenna means, said spherical segment having a tubular portion extending therefrom in a direction opposite to that of said shank, said extension being notched, a conductor in said notch for connection with said set, spring finger contact means in said extension, engaging said antenna means and connected to said conductor, a hood fitting said notch and covering that portion of said conductor adjacent said connection, a hollow spherical socket member in which the convex spherical segment fits to form in effect a ball and socket joint, said socket member having an opening therethrough through which said tubular shank loosely passes and being narrow enough to pass through said opening on tilting and having outstanding flanges to engage the inner surface of said wall at diametrically opposite sides of said opening upon return of said socket member from a tilted position, a spacer device through which said tubular shank portion extends, a nut through which said antenna means passes, engageable with the outer end of said spacer device, said nut being threaded on the end portion of said shank to draw the gasket and flanges into clamping engagement about the edge portions of said wall defining the aperture.

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