Sept. 20, 1960 J. B. CEJKA 2,953,630

ANTENNA MOUNTING

Filed June 24, 1958 3 Sheets-Sheet 1

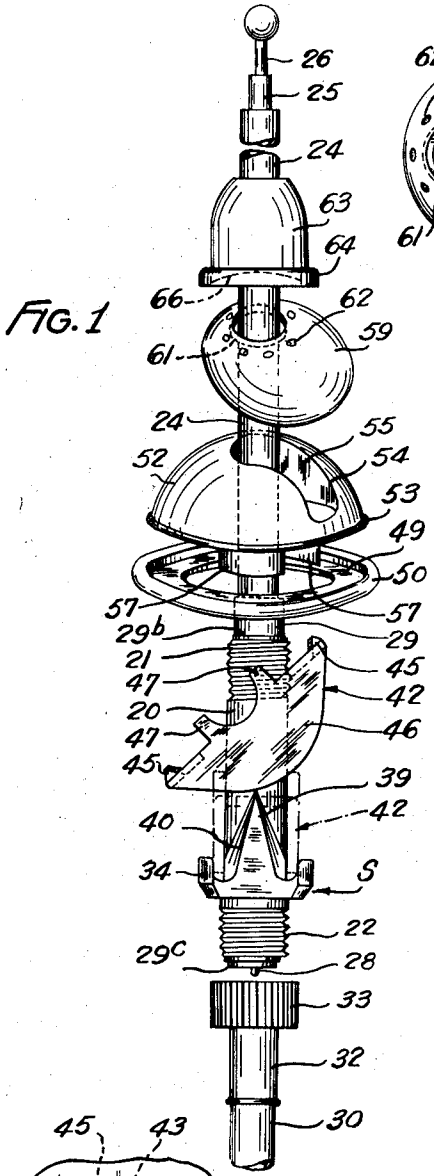

FIG. 1

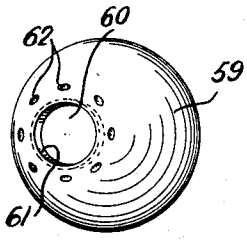

FIG. 6

FIG. 2

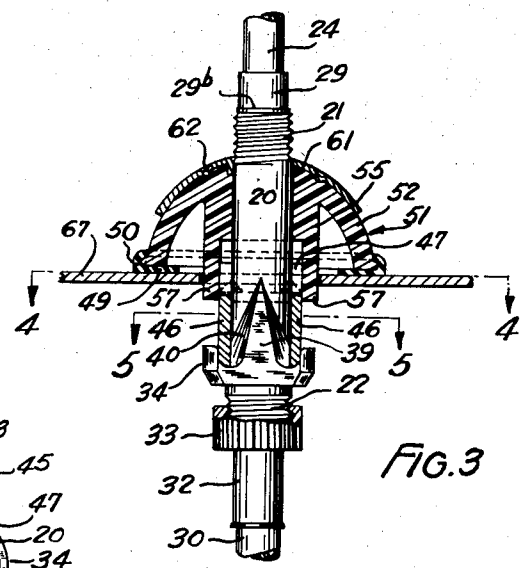

FIG. 3

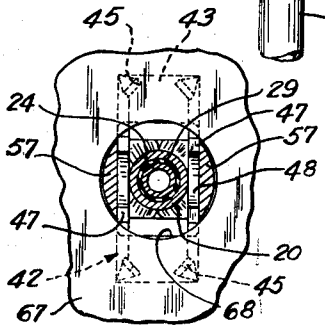

FIG. 4

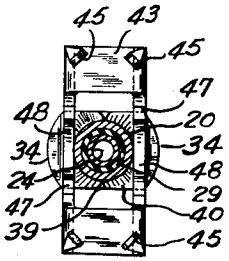

FIG. 5

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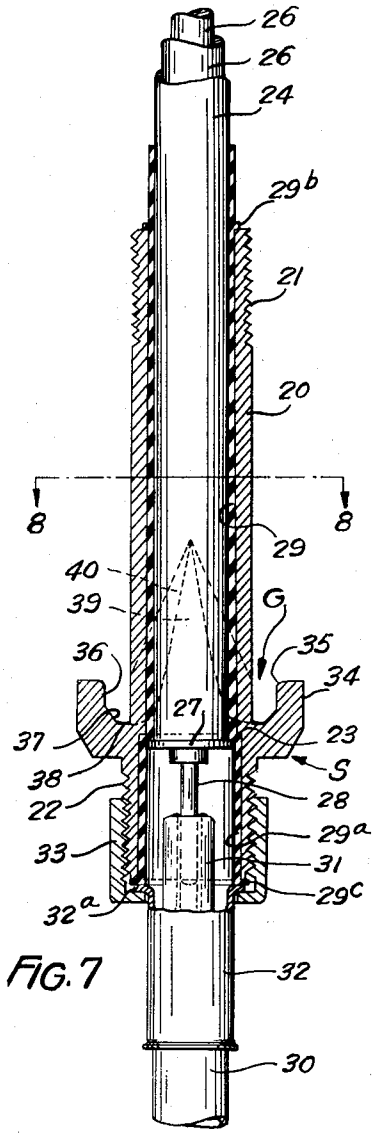

FIG. 7

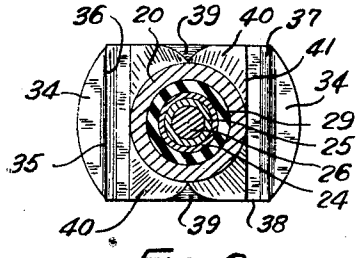

FIG. 8

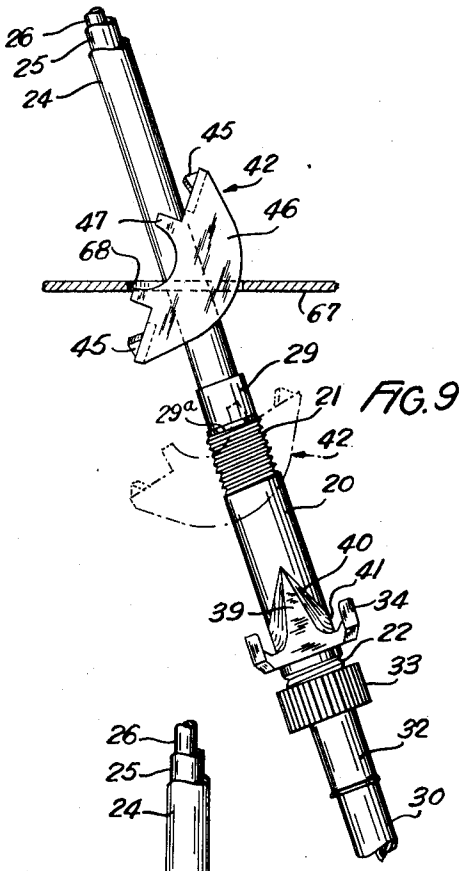

FIG. 9

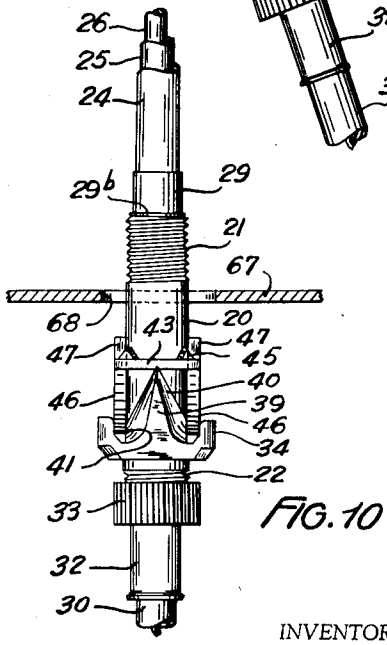

FIG. 10

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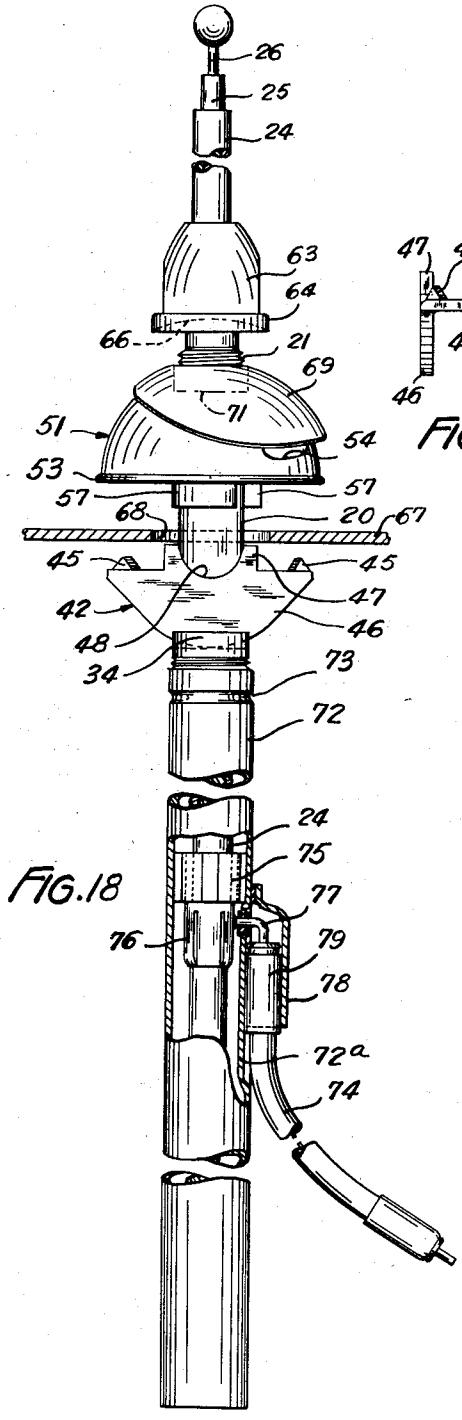

FIG. 18

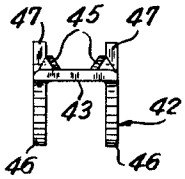

FIG. 13

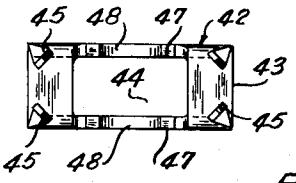

FIG. 11

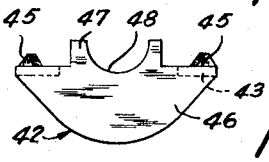

FIG. 12

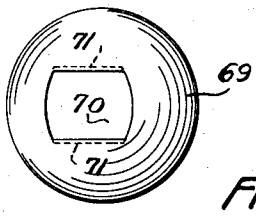

FIG. 16

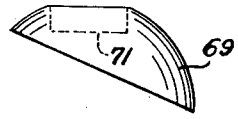

FIG. 17

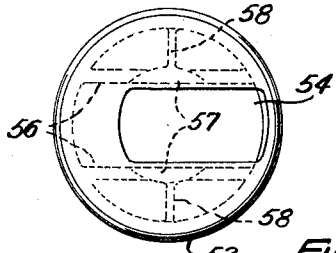

FIG. 14

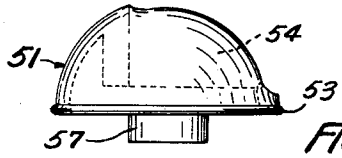

FIG. 15

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United States Patent Office 2,953,630
Patented Sept. 20, 1960

2,953,630

ANTENNA MOUNTING

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Filed June 24, 1958, Ser. No. 744,193

15 Claims. (Cl. 174—153)

This invention relates to an antenna mounting and more particularly to an antenna mounting for securing an antenna in position upon a motor vehicle.

An object of the invention is to provide an improved and novel antenna mounting which is so constructed that during its installation upon a motor vehicle there will automatically occur a plurality of interlocks between certain of the constituent elements of the mounting and which interlocks assure the correct positioning of the mounting on the vehicle and its retention in such correct position, since the elements of the mounting will not loosen during use from their proper assembled relationship.

Another object of the invention is to provide an antenna mounting which can be so positioned on the vehicle by the installer from the upper or outer side of the panel by passing downwardly through a panel opening those parts of the antenna and of the mounting which are ultimately located beneath the panel when the mounting is in secured position.

A further object is to provide an antenna mounting at referred to in the last named object and wherein the lower mounting or rocker member which will be located beneath the panel turns automatically from the position it has when passing through the panel opening to its proper position for securing the mounting to the panel, such automatic turning of the lower mounting or rocker member functioning to locate the rocker flanges of the member in supporting grooves arranged on diametrically opposite sides of the stud of the mounting and which engagement of the flanges in said grooves prevents distortion or spreading of the flanges under clamping forces when the mounting is secured to the panel of the vehicle.

A still further object is to provide an antenna mounting such as referred to in the last named object and wherein the clamping of the mounting to the vehicle automatically effects an interlock between the flanges of the lower mounting or rocker member and the walls of said grooves due to the configuration of the latter.

Another object of the invention is to provide an antenna mounting which includes an outer or upper mounting member and an inner or lower mounting member and which members are provided with portions that cooperate or interlock when the mounting is secured to a vehicle to prevent relative rotation between said members and to prevent undesired displacement of the mounting in any radial direction relative to the panel opening whereby the mounting will be attached to the panel in the proper location and the panel opening will be centralized with respect to the outer or upper mounting member and will be completely covered thereby.

Another and important object to the invention is to provide an antenna mounting that has a built-in water seal making it completely waterproof and insuring the finest signals in all weather or climatic conditions.

Another object is to provide an antenna mounting which includes a lower or inner mounting or rocker member having rocker flanges, the curvature of which

is so developed that the clamping nut forces are applied always at a fixed distance from the rocking surfaces of said flanges in all clamped positions of the mounting and regardless of the angularity of the mounting and antenna relative to a vertical position.

Another object of the invention is to provide an antenna mounting and antenna that can be furnished to the installer in preassembled condition requiring no extra work and can be installed by one man completely from the outside of the panel and in a minimum amount of time.

A further object is to provide an antenna mounting which includes an upper or outer mounting member, preferably an insulating ball-like member having an angle slot therein that is completely covered by the "dress" cap and which cap locks into the ball-like member.

A further object is to provide an antenna mounting that will interfit a substantial range of different size panel openings and is so constructed as to provide for maximum angular adjustment of the antenna.

A further important object of the invention is to provide an antenna mounting which is universal in its adaptability for use upon different locations of a motor vehicle and upon different types and makes of motor vehicles since only the "dress" parts of the mounting, i.e., those parts that are visible when the mounting is secured to a vehicle, need to be modified to adapt the mounting for the different installations.

Another object of the invention is to provide an antenna mounting which production-wise is economical, since regardless of make, type of styling of motor vehicle and contour of body panel upon which the antenna mounting is secured, the majority of the constituent parts of the mounting can be of the same construction for all installations, which fact also provides an inventory advantage.

Further and additional objects and advantages inherent in the invention and not specifically referred to above will become apparent during the detail description of preferred embodiments thereof which is to follow and which embodiments are illustrated in the accompanying drawings forming part of the specification and wherein,

Fig. 1 is an elevational exploded view of an antenna and its mounting embodying the invention and illustrates the lower mounting or rocker member, hereinafter referred to as the spinner rocker, in full lines with its rocker flanges extending transversely of the grooves in the support of the mounting stud or sleeve and in dash and dot lines automatically turned 90° with its rocker flanges located in said grooves.

Fig. 2 is an elevational view of the antenna and mounting of Fig. 1 when installed upon the panel of a motor vehicle, the panel being shown in section as is also a portion of the sealing pad of the mounting.

Fig. 3 is a sectional view through the mounting of Fig. 2.

Fig. 4 is a sectional view taken substantially on line 4—4 of Fig. 3 looking in the direction of the arrows and shows the interlocking and cooperating portions of the lower and upper mounting members which prevent relative rotation of said members and shifting of the mounting relative to the panel opening, one antenna tube and the antenna rod being omitted.

Fig. 5 is a sectional view taken substantially on line 5—5 of Fig. 3 looking in the direction of the arrows, one antenna tube and the antenna rod being omitted.

Fig. 6 is a detached detail plan of the "dress" cap of the antenna mounting shown in Figs. 1 to 3 inclusive.

Fig. 7 is a longitudinal sectional view on an enlarged scale through the mounting stud or sleeve of the antenna mounting and illustrates the base support and the dielectric sealing

sleeve which functions to render the mounting completely waterproof, the other parts of the mounting being omitted from this view.

Fig. 8 is a sectional view taken substantially on line 8—8 of Fig. 7 looking in the direction of the arrows.

Fig. 9 illustrates the manner in which the antenna and its mounting are passed from the outer or upper side of the panel through the panel opening and shows the inner or lower mounting or rocker member in full lines as it is passed through the opening and in dash and dot lines after it has passed through the opening and is dropping downwardly on the sleeve or stud to be automatically turned or spun to bring its flanges into the parallel locking grooves on the diametrically opposite sides of the sleeve or stud.

Fig. 10 shows the relationship of the parts shown in Fig. 9 after the rocker member has been correctly positioned on the support of the sleeve with its flanges in the locking grooves and prior to said member and the mounting and sleeve being clamped to the panel.

Figs. 11, 12 and 13 are, respectively, detail top plan, side elevational and end elevational views of the inner or lower mounting or rocker member.

Figs. 14 and 15 are, respectively, top plan and elevational views of the outer or upper mounting member.

Figs. 16 and 17 are, respectively, detached detail plan and elevational views of a modified form of "dress" cap differing from the "dress" cap shown in the previous views.

Fig. 18 illustrates the antenna mounting embodying the invention applied to a disappearing antenna having a shield tube or tank with the parts of the mounting in position to be secured to the panel and with the "dress" cap of Figs. 16 and 17 employed in the mounting.

The embodiment shown in Figs. 1 to 8 inclusive includes an antenna mounting having a mounting stud or sleeve **20**, in this instance, externally screw threaded at its upper and lower ends as indicated at **21** and **22**. The stud or sleeve **20** is provided with a bore that communicates adjacent the lower end of the stud or sleeve with a counterbore (Fig. 7). An internal shoulder **23** thus is provided in the sleeve or stud at the junction of the bore and counterbore. The sleeve or stud **20** is of a length to extend through the opening in the vehicle panel and project the necessary distance beyond the opposite sides of the panel. The sleeve or stud **20** may be formed of suitable material by various processes but preferably it will be a metal die casting and the screw threads **21** and **22** will be die cast rather than machined to provide greater thread strength. The stud or sleeve **20** adjacent the inner end of the lower threads **22** mounts a base support S, later to be referred to in detail. The base support S may be separate from but secured to the sleeve or stud **20** but preferably it is die cast integrally therewith.

The bore in the sleeve or stud **20** is formed with a slight inward taper from the counterbore to the upper end of the sleeve or stud for a purpose now to be explained. The antenna is secured in the stud or sleeve **20** and in Figs. 1 to 8 inclusive it is shown for purposes of illustration as of the extensible type and formed of two tubes **24** and **25** and a rod **26** having telescopic relationship as is well understood in the art.

The lower end of the antenna tube **24** has secured within it an electrical connecting plug which includes a disk portion **27** forming an annular exterior flange at the lower end of the tube. A jack pin **28** projects centrally from the disk portion **27** and extends in the assembled structure through the counterbore in the sleeve or stud **20** and slightly beyond the lower end of the sleeve or stud.

A dielectric water sealing tube **29** tightly surrounds the antenna tube **24** and has a lower end portion **29***a* of increased diameter such as to house the disk **27** and interfit the counterbore in the stud or sleeve **20**. The sealing tube **29** is positioned on the antenna tube **24** and then the entire antenna can be pushed upwardly through the stud or sleeve **20**. The sealing tube **29** may be formed of any suitable dielectric sealing material either natural or synthetic as will be understood, but preferably it is a polystyrene tube. The sealing tube **29** is of a length such as to extend a substantial distance beyond the upper end of the stud or sleeve **20** while its portion **29***a* extends slightly beyond the lower end of the sleeve or stud. The sealing tube **29** is formed at a predetermined distance inwardly of its upper end with an annular external bead **29***b*.

When the antenna with the sealing tube **29** thereon is passed upwardly through the stud **20** from the lower end of the latter, the sealing tube **29** will be forced through the stud until the bead **29***b* thereof engages tightly the upper end of the stud and at this time the disk **27** of the connecting plug will press the tube **29** firmly against the internal shoulder **23** in the stud **20** at the junction of the bore and counterbore therein. It will be recalled that the bore in the stud **20** is slightly inwardly tapered toward its upper end and hence the dielectric sealing tube **29** will be pressed tightly between the wall of the bore in the stud **20** and the exterior of the antenna tube **24** particularly adjacent to the upper end of the stud **20**. As a consequence the upper end of the stud **20** is sealed completely against the entrance of water therein and its passage downwardly to the counterbore at the lower end of the stud. This complete seal is effected by the bead **29***b*, the elongated seal provided by the tube **29** in the tapered bore of the stud and by the tight engagement of the internal shoulder **23** by the tube **29** due to the action of the disk **27** of the connecting plug.

Although the bore in the stud or sleeve **20** has been described as tapered it will be understood that the bore could be constant in diameter and the external diameter of the sealing tube **20** varied to provide a taper thereto to effect the same pressing action of the tube **29** between the wall of the bore and the exterior of the antenna tube **24**.

The lead in cable **30** is provided with a connector of known construction that includes a jack pin socket **31** to receive the jack pin **28**, a ferrule **32** having an outwardly extending flange **32***a* at its end that is adjacent to the socket **31**, and a connecting nut **33** swivelled on the ferrule.

As clearly illustrated in Fig. 7, when the lead in cable connector is attached to the lower end of the stud or sleeve **20** by screwing the connector nut **33** onto the threads **22** the flange **32***a* of the ferrule **32** engages the projecting end **29***c* of the portion **29***a* of the sealing tube **29** and deforms said end **29***c* tightly against the lower end of the stud or sleeve **20**. Thus a complete seal is provided at this location against the entrance of water into the counterbore of the sleeve or stud **20**. In addition to the complete water seals already referred to, there is a further seal between the upper end of the sealing tube **29** and the securing nut of the mounting as later will be pointed out.

The base support S on the stud or sleeve **20** will be described now in detail. The support S is die cast integrally with the stud **20** and is shown as of general rectangular configuration (Fig. 8). The support S on diametrical opposite sides of the stud **20** has parallel upstanding ribs **34**, the outer sides of which may be curved in the longitudinal direction as clearly indicated in Fig. 8. The inner sides of the ribs **34** are spaced from the circumference of the stud or sleeve **20** and, as clearly shown in Fig. 7, are slightly inwardly inclined from the vertical a short distance downwardly from the upper ends of the ribs, as indicated at **35**. The inclined portions **35** of the inner sides of the ribs **34** connect at their lower ends with straight vertical surface portions **36** of the inner sides of the ribs **34**. The surface portions **36** at their lower ends merge into inwardly and downwardly inclined surface portions **37**, the lower ends of which terminate at the

horizontal bottoms **38** of the linear parallel locking grooves or slots G provided in the base support S.

The base support S also includes on diametrical opposite sides of the stud **20** and displaced 90° to the ribs **34**, upwardly extending locating or spinning bosses **39**. The bosses **39** are generally triangular in shape with their apexes uppermost. The sides **40** of the triangular locating or spinning bosses **39** are divergently inclined relative to each other from a diametral plane through the stud **20** to provide camming or turning surfaces. Also the sides **40** of the bosses **39** increase in width toward their lower ends and merge into straight surface portions **41** parallel to the axis of and tangential to the stud **20** and forming the inner sides of the locking grooves or slots G. The functions of the construction of the base support S thus far described later will become apparent.

The lower mounting member of the antenna mounting is indicated generally at **42** and may be called a spinner rocker member. As clearly shown in Figs. 11, 12 and 13 this member includes a plate portion **43** generally rectangular in shape and provided with a rectangular opening **44** the long dimension of which extends in the direction of the long dimension of the plate portion **43**. The width of the opening **44** is such that the opposite sides of the opening will engage and be substantially tangential to the circumference of the stud or sleeve **20** which extends through the opening (Figs. 4 and 5). The corners of the plate portion **43** are provided with upwardly extending grounding prongs or teeth **45** which when the mounting is secured to a vehicle panel will bite into the underside of the metal panel (see Fig. 2).

The lower mounting or spinner rocker member **42** is provided at the opposite longitudinal sides of the plate portion **43** thereof with depending parallel rocker flanges **46**, the lower edges of which are provided with a developed curvature for a purpose later to be explained. As will later be pointed out the rocker flanges **46** when the parts of the antenna mounting are assembled and the mounting is secured to the vehicle panel extend into and are locked in the locking slots or grooves G in the base support S.

The lower mounting or spinner rocker member **42** also is provided on the longitudinal sides of the plate portion **43** thereof with upwardly extending locating and locking ears **47**. When the antenna mounting is assembled and clamped to the vehicle panel the ears **47** are located in the opening in the panel and, as will later be explained, they cooperate with portions of the outer or upper mounting member that extend into the opening to prevent undesired shifting of the antenna mounting in any direction relative to the opening and also to prevent relative rotation between the lower and upper mounting members.

The ears **47** on each side of the lower mounting member **42** are formed from an upwardly extending lug integral with the plate portion **43** by providing in said lug a concavity **48** which separates the ears **47** at each side and which also facilitates the passing of the lower mounting member **42** downwardly through the panel opening as will later be explained.

The antenna mounting also includes a sealing pad or gasket which engages the outer side of the vehicle panel and is shaped to cooperate with and interfit a portion of the upper mounting member later to be referred to. The sealing pad or gasket is formed preferably of stain-proof synthetic or natural rubber.

In Figs. 1, 2 and 3 the sealing pad is shown in the form of a ring **49** of substantial radial width so that it will underlie the outer mounting member and engage a substantial area of the outer side of the vehicle panel to provide an efficient seal. The ring **49** of the sealing pad on its outer circumference is provided with a flange **50** that extends upwardly and then has its upper end turned inwardly to thus provide a flange groove which receives and cooperates with a lip formed on the outer or upper

mounting member as will shortly be explained, thus providing a further sealing feature.

The antenna mounting further comprises an outer mounting member indicated generally at **51** and shown herein for illustrative purposes in the form of a half ball outer mounting member. The outer mounting member may be made from various materials but preferably it will be formed of a ductile moldable electrical insulating material, an example of which is the material commercially known as Tenite.

The dome-shaped semi-spherical portion **52** of the outer mounting member is substantially hollow and is provided with an outwardly extending annular lip **53** thus furnishing a substantial width planular surface for engagement with the ring **49** of the sealing pad while the lip **53** nests into the groove in the flange **50** of the sealing pad, as clearly shown in Figs. 2 and 3. The dome-shaped portion **52** of the outer mounting member **51** is provided with an angle slot **54** of a length to provide predetermined maximum angular adjustment of the antenna relative to the mounting. The slot **54** is of a width slightly more than the diameter of the stud or sleeve **20** to prevent undesired relative movement between the stud or sleeve and the outer mounting member **51** laterally or transversely of the angle slot **54**.

The dome-shaped portion **52** interiorly thereof is formed with interior wall portions **55** extending from the opposite sides and the inner end of the angle slot **54**, which strengthen the dome-shaped portion **52** and provide material into which a portion of the trim "dress" cap, later to be referred to, can dig or bite or engage. The interior of the dome-shaped portion **52** is provided with a pair of parallel chordal strengthening ribs **56** connected to the wall portions **55**. The lower ends of the chordal ribs **56** are provided with downwardly extending integral locating and locking bosses **57** which on their inner sides are planular while their outer sides are curved, preferably with a radius substantially equal to that of the opening in the panel of the vehicle.

When the parts of the antenna mounting are assembled and secured to the vehicle panel the locating and locking bosses **57** extend into the panel opening and engage the locating and locking ears **47** of the lower mounting or spinner member **42** to prevent relative rotation between the inner and outer mounting members and undesired displacement of the antenna mounting in any radial direction relative to the panel opening, see Fig. 4. The dome-shaped portion **52** of the outer mounting member **51** also is provided interiorly with diametrically extending ribs **58** located between the ribs **56** and the wall of the portion **52** and integral with said ribs **56** and said wall, see Fig. 14.

The antenna mounting also includes a "dress" cap **59** contoured to interfit the dome-shaped exterior surface of the outer mounting member **51** and of a size to completely cover the angle slot **54** in the member **51**.

In Figs. 1 to 6 inclusive the "dress" cap **59** is provided with an opening **60** through which the antenna extends and said opening is of a diameter to receive the sleeve or stud **20** of the mounting but to prevent excessive relative movement between the sleeve or stud **20** and the "dress" cap radially of the opening. In order to lock the "dress" cap automatically in place and against movement relative to the outer mounting member **51** when the mounting is secured to the vehicle panel the "dress" cap **59** is provided at the circumference of the opening **60** with a downwardly extending circular locking flange **61** and outwardly of the circumference of the opening **60** with a series of circularly spaced small depressions **62** providing locking points.

When the "dress" clamping or holding nut of the antenna mounting, later to be referred to, is in fully assembled position with the mounting secured to the panel, the locking flange **61** and the depressions **62** will be forced into the material of the outer mounting member

51 and the "dress" cap automatically is locked against movement relative to the outer mounting member 51, see Fig. 3.

The antenna mounting further includes a "dress" clamping and securing nut 63, the lower end of which is provided with an annular flange 64 that engages the "dress" cap 59. The nut 63 on diametrically opposite sides thereof and above the flange 64 preferably is provided with wrench flats 65. It will be understood that the nut 63 is provided with a threaded bore so that the nut can be screwed onto the threads 21 of the sleeve or stud 20. The inner end of the nut 63 that engages the "dress" cap 59 is of concave configuration, as indicated at 66, so as to interfit with the "dress" cap 59 and apply pressure thereto over a substantial area of the "dress" cap and thus prevent any tendency of the "dress" cap to be deformed as might be the case if the nut 63 engaged the "dress" cap with a planular surface.

Although the "dress" cap 59 and nut 63 could be formed of various suitable materials, preferably these parts will be chrome or chrome plated metal parts.

The antenna and antenna mounting may be loosely preassembled for shipping and distribution, that is, the lead in cable will be connected to the sleeve or stud 20 by the connector nut 33 while the lower mounting or spinner rocker member 42, the rubber sealing pad, the outer or upper mounting member 51, "dress" cap 59 and nut 63 will be loosely positioned on the sleeve or stud 20. The manner in which the antenna and the antenna mounting are secured to the vehicle panel 67 will now be described.

The panel 67 in the desired location will be provided with an opening 68 and said opening preferably will be of a diameter to snugly receive the upwardly extending locating and locking ears 47 of the lower mounting member and the downwardly extending locating and locking bosses 57 of the upper mounting member, as clearly shown in Fig. 4, to prevent displacement of the mounting relative to the opening and to lock the lower and upper mounting members against relative rotation.

Of course the size of the panel opening can be larger than the most desired size within practical limits as, for instance, if the mounting is designed for a ⅞ inch opening it will function satisfactorily in openings up to 1¼ inch and the ears 47 and bosses 57 will satisfactorily perform their functions.

The antenna and the mounting can be assembled and secured to the panel by a single installer. In installing the antenna and mounting the lead in cable is passed through the opening 68 from the upper side of the panel and then the antenna is tilted, as indicated in Fig. 9, and the lower mounting or spinner rocker member 42 passes through the opening, the concavities 48 between the ears 47 facilitating such passage of the member 42 through the opening. When the member 42 has passed through the opening 68 in the panel 67 the antenna is positioned more nearly vertical and the member 42 slides downwardly of the sleeve or stud 20.

When the rocker flanges 46 engage the pointed upper ends of the locating or spinning bosses 39 of the base support S the farther downward movement of the member 42 causes the camming or turning side surfaces 40 of the bosses 39 to impart a spinning or rotating movement to the member 42 and to automatically locate the lower ends of the rocker flanges 46 in the locking slots or grooves G in the base support S as indicated in Fig. 10. The inwardly inclined ends 35 at the top of the inner sides of the ribs 34 on the support S act to guide the rocking flanges into the grooves or slots.

Reference to Fig. 10 will show that at this time the lower ends of the rocker flanges 46 are between the straight vertical surfaces on the inner sides of the ribs 34 and the straight surface portions 41 forming the inner sides of the slots or grooves G. Also at this time the lower ends of the rocking flanges engage the upper ends of the inwardly and downwardly inclined surface portions 37 on the inner sides of the ribs 34 of the support S. The installer now raises the antenna until the locating and locking ears 47 of the lower mounting member 42 are within the panel opening 68 while the teeth or prongs 45 of the member 42 engage the underside of the panel 67. The sealing pad now has its ring 49 contacting the outer surface of the panel and concentrically surrounding the opening 68 and the outer mounting member 51 rests on said ring 49 and has its lip 53 nested in the annular groove formed in the flange 50 of the sealing pad. At this time the locating and locking bosses 57 of the outer mounting member 51 extend into the panel opening 68 and have their planular inner surfaces in engagement with the locating and locking ears 47 of the lower mounting member 42 as clearly shown in Fig. 4. The interengaged ears 47 and the bosses 57 automatically interlock the lower and outer mounting members 42 and 51 against relative rotation and against undesired shifting or displacement relative to the panel opening 68.

The installer now angularly adjusts the antenna and the sleeve or stud 20 within the angle slot 54. It will be noted that the bosses 57 at this time must be so positioned relative to the ears 47 that the rocker flanges 46 extend parallel to the longitudinal length of the angle slot 54, see Fig. 3. Hence the angular adjustment of the antenna just above referred to can be effected and the lower mounting member 42 can have rocking movement imparted thereto if necessary in effecting such adjustment.

The installer now positions the "dress" cap on the outer mounting member 51 to completely cover the angle slot 54 and holds the "dress" cap 59 in such position while screwing the nut 63 onto the threads 21 at the upper end of the sleeve or stud 20, until the locking flange 61 and the depression 62 of the "dress" cap bite or dig into the material of the upper mounting member 51 sufficiently to prevent relative turning between the "dress" cap 51 and the upper mounting member. Then the nut 63 is screwed tightly into position to draw and clamp all of the parts of the antenna mounting securely together. This tightening of the nut 63 causes the locking flange 61 and the depression 62 of the "dress" cap 59 to cut or dig into the material of the upper mounting member 51 until the "dress" cap 59 completely engages the dome-shaped exterior of the upper mounting member and is automatically locked against rotation relative thereto. Also the tightening of the nut 63 presses the upper mounting member 51 firmly against the ring 49 of the sealing pad and draws the sleeve or stud 20 upwardly. This upward drawing movement of the sleeve or stud 20 causes the lower ends of the rocker flanges 46 of the lower mounting member 42 to move downwardly of the inwardly and downwardly inclined surface portions 37 on the inner sides of the ribs 34 of the support S from the position shown in Fig. 10 to the position shown in Fig. 3, it being understood that the nut 43 is purposely omitted from Fig. 3.

The movement of the lower ends of the rocking flanges 46 downwardly of the inclined surfaces 37 tightly lock or wedge the locking flanges in the grooves or slots G and, in fact, deform the lower ends of the rocking flanges to tightly interfit and have the shape of the bottom portions of said slots or grooves G.

The antenna mounting is now securely attached to the panel 67 and it will be understood from the foregoing explanation that a plurality of automatic interlocks have occurred between the parts of the antenna mounting. The rocking flanges 46 of the lower mounting member 42 have been automatically located and locked in the grooves or slots G of the base support S and are held against spreading movement by being thus positioned in said grooves or slots. Also the straight vertical surface portions 36 on the inner sides of the ribs 34 of the support S prevent any tendency of the rocking flanges 46 to

work upwardly of the inwardly and downwardly inclined surface portions 37.

A second automatic interlock has occurred between the locking ears 47 of the lower mounting member 42 and the bosses 57 of the upper mounting member 51 to prevent relative rotation between said mounting members and any displacement of the latter relative to the opening 68 in the panel 67.

A third interlock has automatically been obtained by the installation of the mounting, namely, the interlock between the "dress" cap 59 and the outer mounting member 51 due to the digging into the material of the latter by the flange 61 and the depressions 62 of the "dress" cap.

It was previously stated that the curvature of the lower ends of the rocking flanges 46 was a developed curvature. This curvature is such that the distance from the application of the clamping force of the nut 63 to the rocking point of the rocking flanges 46 is always constant in any clamped position regardless of angularity.

Reference has previously been made to the fact that the interior of the sleeve or stud 20 is completely sealed against the entrance of water. When the connector nut 33 of the connector for the lead in cable 30 is screwed tightly in position the flange 32*a* of the ferrule 32 deforms the projecting end 29*c* of the enlarged portion 29*a* of the dielectric tube 29 into complete sealing engagement with the lower end of the sleeve or stud 20. Also the disk portion 27 of the connector plug that is attached to the antenna tube 24 forces the dielectric tube 29 into complete sealing engagement with the internal shoulder 23 in the sleeve or stud 20. In addition, due to the tapered relationship between the tube 29 and the bore in the sleeve or stud 20 the tube 29 provides an elongated efficient and completely effective seal against the passage of water between it and the wall of the bore in the sleeve or stud 20. Also the outer end of the sleeve or stud 20 is sealed by the bead 29*b* on the tube 29. Then when the nut 63 is completely tightened it engages that portion of the tube 29 that extends upwardly beyond the bead 29*b* to form a further seal between the tube 29 and the nut and between the tube 29 and the antenna tube 24.

The water seals referred to in detail cause the antenna mounting to function always at top efficiency to enable the reception of the finest signals regardless of weather or climatic conditions. The antenna and antenna mounting provide tighter installation, a more positive fit and give maximum fender coverage with a large diameter insulator for firmness and rigidity of mounting, yet the antenna mounting retains trimness of appearance.

A modified form of "dress" cap is indicated at 69 in Figs. 16, 17 and 18. The "dress" cap 69 is provided with a rectangular opening 70 in a place of the circular opening 60 of the previously described "dress" cap. The "dress" cap 69 on the opposite longitudinal sides of the opening 70 is provided with parallel downwardly extending flanges 71 which when the parts are assembled engagingly interfit the longitudinal side walls of the angle slot 54 in the outer mounting member 51 and prevent relative rotation between the "dress" cap 69 and the outer mounting member.

In Fig. 18 the antenna mounting embodying the invention is shown adapted for use with a disappearing antenna which has a shield tube or tank into which the antenna tubes extend. In adapting the antenna mounting of the invention for this use the threads 22 at the lower end of the stud or sleeve 20 are omitted and the upper end of the cylindrical shield or tank 72 is firmly and rigidly connected and sealed to the lower end of the sleeve or stud 20 as, for instance, by a spun connection as indicated at 73.

It will be understood that when the mounting is used for this type of antenna the antenna tubes and rod can have telescopic movement within the sleeve or stud 20 and dielectric sealing tube 29 so they can be moved through the same into or out of the shield or tank 72.

It will not be necessary to further describe the antenna mounting when used in connection with a disappearing type antenna since its parts will be of the same construction as those of the previously described mounting and in Fig. 18 bear the same reference numerals with the exception of the "dress" cap 69.

An electrical connection to the lead in cable 74 is carried by the shield or tank 72 and includes a circular supporting dielectric member 75 secured within the shield or tank 72 and having a spring jaw collet-like electrically conductive sleeve 76 through which the antenna tube 24 slidably extends. The jaws of the collet-like sleeve 76 have close frictional and electrical engagement with the antenna tube 24 in all positions of said tube. An angle-shaped electrical connecting pin or jack 77 is secured to the collet sleeve 76 and projects in an electrically insulated manner outwardly of the shield or tank 72 and then has a connecting portion extending parallel to said shield or tank 72.

Secured to the outer side of the shield of tank 72 is a housing 78 which with a depressed concave wall portion 72*a* of the shield or tank 72 provides a cylindrical receiving cavity for the reception of the connector 79 secured to the end of the lead in cable 74 and which, as will be well understood, is provided with an electrical connecting socket that receives the jack pin 77 when the connector 79 is pushed into the cylindrical cavity between the housing 78 and the portion 72*a* of the tank or shield 72.

It will be understood that the connector 79 is tightly received in the receiving cavity so as to maintain the connector in position with the jack pin 77 firmly and electrically interconnecting the lead in cable 74 with the collet sleeve 76 and the antenna.

In addition to the "dress" nut 63 and the "dress" cap 59 or 69, those parts of the antenna mounting which are located above the vehicle panel and are visible to an observer may be termed "dress" parts and in that category would be included the upper mounting member 51 and the rubber sealing pad.

The antenna mounting embodying the invention has the decided advantage that it can be readily adapted for mounting on different shaped panels or in different locations on the vehicle or on different types, makes and models of vehicles by the use of "dress" parts of different external configurations but having the functional characteristics of the "dress" parts described herein. In other words, the upper mounting member 51 may have differently shaped external configurations and the rubber sealing pad, "dress" cap and possibly the nut would be contoured to cooperate with the differently shaped upper mounting member in each instance. This means that the antenna mounting of the invention is universal in its adaptability for different installations.

Also the antenna mounting has the decided advantage productionwise that with the exception of the "dress" parts of the mounting, the other parts thereof, such as the sleeve or stud, the lower mounting member and the support on the sleeve or stud and the sealing dielectric tube can be standardized and used for a variety of different installations.

Although preferred embodiments of the invention have been illustrated and described herein it will be understood that such embodiments are for illustrative purposes only and that the antenna mounting in accordance with the invention may have various modifications and adaptations within the scope of the appended claims.

Having thus described my invention, I claim:

1. An antenna mounting for securing an antenna to a panel of a motor vehicle, comprising a tubular stud having a bore adapted to receive an antenna, said stud being adapted to extend through an opening in said panel and provided with screw threads at its upper end and intermediate its ends with a support having on diametrically opposite sides of the stud parallel linear locking

grooves, locating and turning means extending upwardly of said stud from said support and located on diametrically opposite sides of the stud and displaced 90° relative to said grooves, a lower mounting member rotatable on said stud and adapted to cooperate with the underside of said panel and having parallel depending rocker flanges, said rocker flanges engaging said locating and turning means during the installation of the antenna mounting to automatically rotate or turn the lower mounting member on said stud and locate said flanges in said grooves, an upper mounting member on said stud shaped and adapted to cooperate with the upper side of said panel and overlie and bridge the panel opening and provided with a slot through which the stud extends for angular relative adjustment, and threaded means screwing upon the threaded upper end of said stud and adapted to force said lower and upper mounting members into tight clamping engagement with the opposite sides of the panel and interlock said flanges and grooves.

2. An antenna mounting as defined in claim 1 wherein said locking grooves have surface portions which automatically deform the lower edges of said rocker flanges and lock said flanges in said grooves when said lower and upper mounting members are held by said threaded means in tight clamping engagement with the opposite sides of the panel.

3. An antenna mounting as defined in claim 1 wherein said locking grooves have their inner sides planular and parallel to the axis of said stud while their outer sides have surface portions parallel to their inner sides and have adjacent to the bottom of said grooves inwardly and downwardly inclined surface portions, said latter surface portions and the bottoms of said grooves engaging the lower ends of said rocker flanges when the mounting is secured to the panel and deforming said lower ends to lock said flanges in said grooves.

4. An antenna mounting as defined in claim 1 wherein said locating and turning means are triangularly shaped bosses extending upwardly of the stud from said support and having their downwardly divergent sides forming camming surfaces which act on said rocker flanges automatically during the installation of the mounting to turn the lower mounting member on said stud and locate said flanges in said grooves.

5. An antenna mounting as defined in claim 1 wherein said lower and upper mounting members have cooperating contacting locking and locating portions that extend into said panel opening to interlock said members against relative rotation and against radial displacement relative to said opening.

6. An antenna mounting as defined in claim 1 wherein said lower mounting member includes a substantially rectangular plate having in its corners adjacent its opposite ends upstanding prongs adapted to bite into the material on the underside of the panel and being provided intermediate its ends with a rectangular opening through which said stud extends and in which it can have angular adjustment, said plate being provided along its opposite longitudinal side edges with said depending parallel rocker flanges and with upwardly extending locating and locking ears adapted to extend into the panel opening and prevent radial displacement of said lower mounting member relative to said opening.

7. An antenna mounting as defined in claim 6 wherein said upper mounting member is provided with depending locking and locating bosses adapted to extend into said panel opening and contact said locating and locking ears on said lower mounting member to locate said members relative to each other and lock the same against relative rotation and radial displacement relative to said panel opening.

8. An antenna mounting for securing an antenna to a panel of a motor vehicle comprising a tubular stud having a bore adapted to receive an antenna, said stud being adapted to extend through an opening in said panel and provided with screw threads at its upper end and intermediate its ends with a support having on diametrically opposite sides of the stud parallel linear locking grooves, locating and turning means extending upwardly of said stud from said support and located on diametrically opposite side of the stud and displaced 90° relative to said grooves, a lower mounting member rotatable on said stud and adapted to cooperate with the underside of said panel and having parallel depending rocker flanges, said rocker flanges engaging said locating and turning means during the installation of the antenna mounting to automatically rotate or turn the lower mounting member on said stud and locate said flanges in said grooves, an upper mounting member on said stud and adapted to overlie and bridge the panel opening and provided with a slot through which the stud extends for angular adjustment, a sealing pad surrounding said panel opening and contacting the outer side of said panel and contoured to interfit and be engaged by a portion of said upper mounting member, a dress cap through which the stud extends and contoured to interfit the outer surface of the upper mounting member and cover said slot therein, and threaded means screwing upon the threaded upper end of said stud and adapted to force said lower and upper mounting members into tight clamping engagement with the opposite sides of the panel and said dress cap tightly against said upper mounting member, said dress cap being provided with means cooperating with said upper mounting member when the cap is pressed tightly thereagainst to interlock said cap against movement relative to said upper mounting member.

9. An antenna mounting as defined in claim 8 wherein said means on said cap includes a circular locking flange which cuts into the material of the upper mounting member when said cap is pressed by said threaded means tightly against said upper mounting member.

10. An antenna mounting as defined in claim 9 wherein said cap is provided with a series of circularly spaced depressions located outwardly of the locking flange and adapted to interlock with the material of the upper mounting member when said cap is pressed firmly thereagainst by said threaded means.

11. An antenna mounting as defined in claim 8 and wherein said locking means on said cap for preventing rotation between said cap and said upper mounting member includes locking flanges extending downwardly from a rectangular opening in said cap and into said slot of said upper mounting member and engaging the side walls of said slot.

12. An antenna mounting as defined in claim 8 wherein said locking grooves have surface portions which deform and lock the rocker flanges of said lower mounting member in said grooves when the antenna mounting is installed on the panel.

13. An antenna mounting as defined in claim 8 wherein said lower and upper mounting members are provided with portions extending into the panel opening and engaged when the antenna mounting is installed to lock said members against relative rotation and displacement radially relative to said panel.

14. An antenna and its mounting adapted to be secured to a panel of a motor vehicle and comprising a tubular stud provided with a bore and a counterbore with the latter located adjacent one end of the stud and providing an internal shoulder in the stud at the junction of the bore and counterbore, said one end of said stud and the opposite end thereof being externally threaded, said stud being provided intermediate its ends with a support, a dielectric sealing tube in said stud and of a length to project beyond both ends of said stud, said tube being provided with an external annular bead located inwardly of the end of the tube and engaging said opposite end of said stud, said tube and said bore in said stud having a relatively longitudinally tapered interfit adjacent said opposite end of said stud, said tube being provided with

an enlarged diameter portion interfitting said counterbore and engaging said internal shoulder in said stud, a cylindrical antenna element tightly intertfited in said tube and extending beyond said opposite end of said stud and provided with an annular flange located in said counterbore of said stud and pressing said tube against said internal shoulder in said stud, a lower mounting member on said stud and adapted to co-operate with the underside of said panel and having portions engaging said support, an upper mounting member on said stud shaped and adapted to co-operate with the upper side of said panel and overlie and bridge the panel opening, said upper member being provided with a slot through which the stud extends for angular relative adjustment, said opposite end of said stud passing through said upper mounting member, and threaded means screwing upon the threaded said opposite end of said stud and forcing said lower and upper mounting members in to tight clamping engagement with the opposite sides of the panel, whereby when the antenna and mounting are secured upon the panel, said tube is squeezed between said antenna

element and said stud, and said bead on said tube tightly engages said opposite end of said stud while said threaded means tightly surrounds the end portion of said tube beyond said bead.

15. An antenna and mounting as defined in claim 14 and wherein a connector for a lead-in cable is secured to said one end of said stud and includes a ferrule having an outwardly extending flange and a connecting nut swivelled on said ferrule and screwed onto the threads on said one end of said stud and causing the flange of the ferrule to engage and press the end of the tube in to tight sealing engagement with said one end of the stud.

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