

Nov. 4, 1958

J. B. CEJKA
RADIO ANTENNA

2,859,274

Filed Nov. 20, 1953

2 Sheets-Sheet 1

FIG. 1.

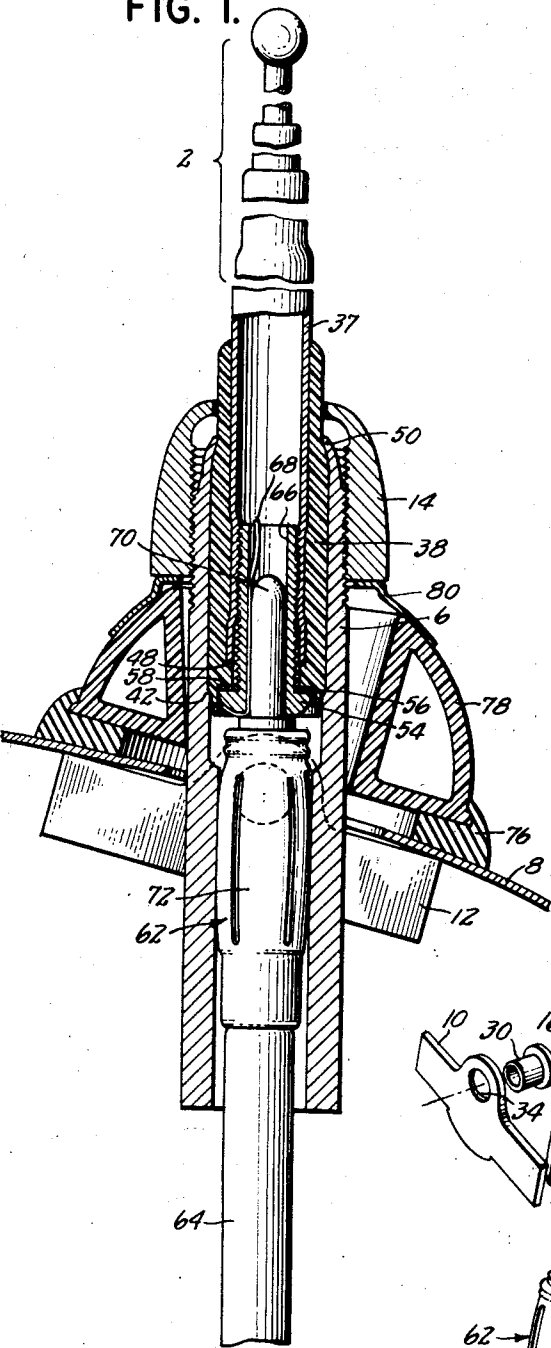
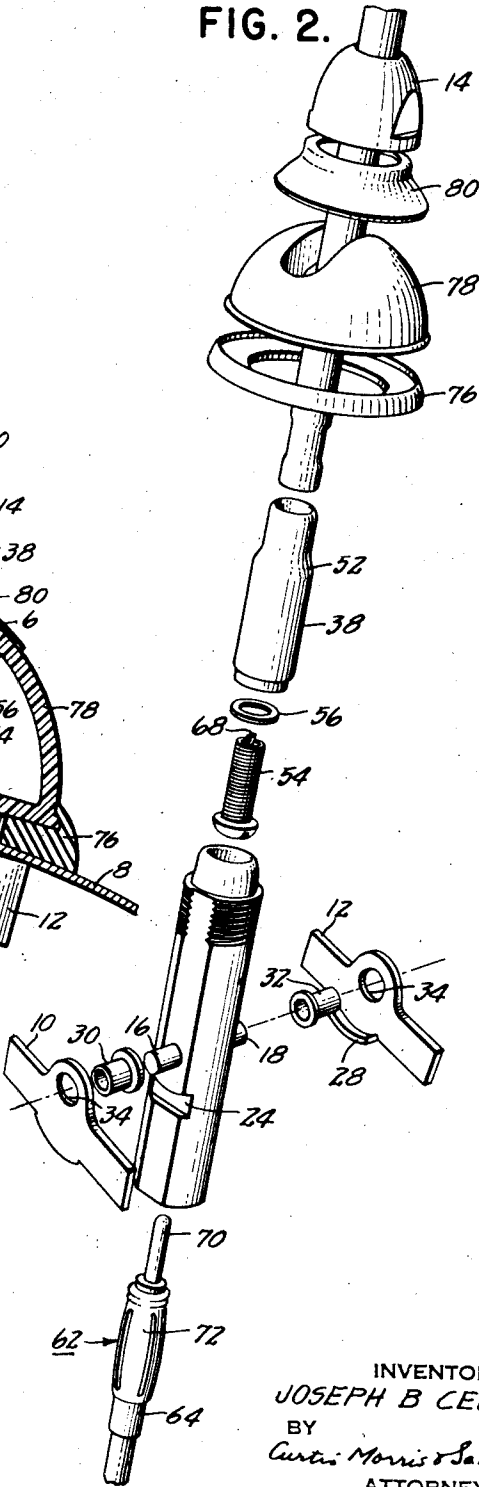


FIG. 2.



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FIG. 3.

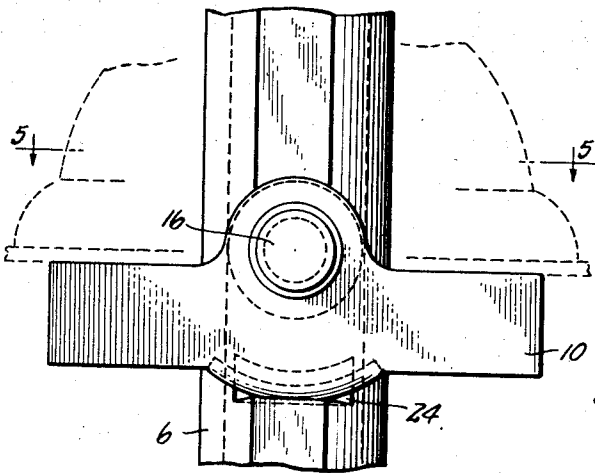


FIG. 4.

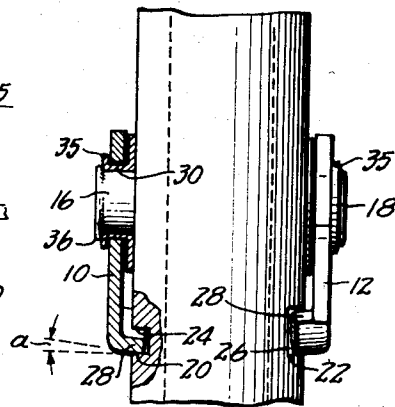


FIG. 5.

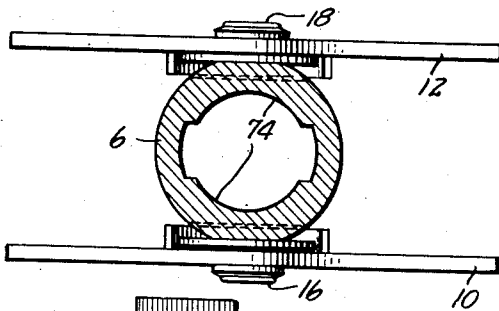


FIG. 7.

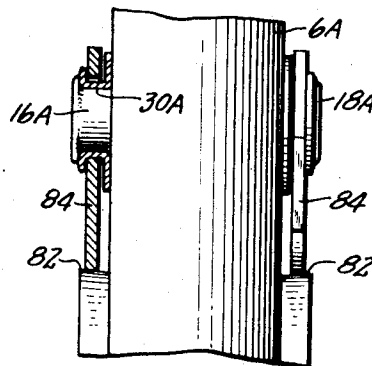


FIG. 6.

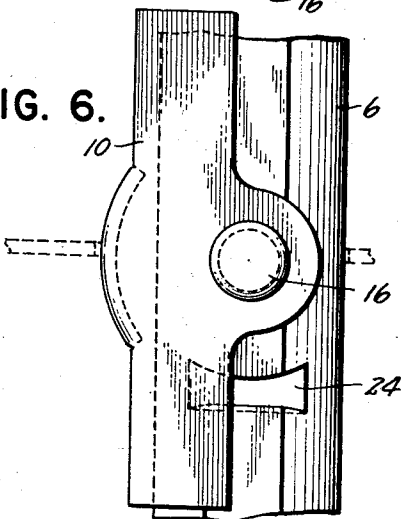
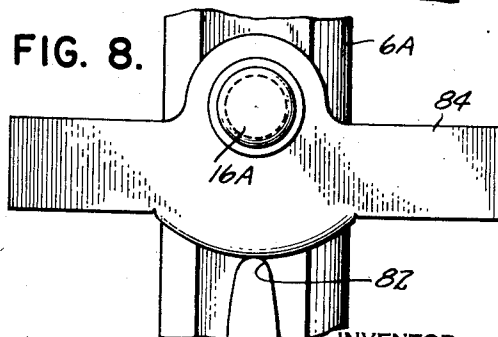


FIG. 8.



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RADIO ANTENNA

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Application November 20, 1953, Serial No. 393,331

7 Claims. (Cl. 174—153)

This invention relates to an improved mounting device particularly useful as an integral part of whip-type radio antennas for automobiles.

There are a number of features that determine the suitability of an antenna for use on automobiles. Among these are: ease of mechanical mounting, suitability for original installation at the automobile factory or by an ordinary mechanic without special tools, suitability as a replacement unit in automobiles having antennas of other types, sturdiness of the mechanical mounting, the electrical characteristics such as are dependent upon capacity to the body of the automobile, corrosion resistance of the electrical connections and the like, and low cost.

Unless an antenna is satisfactory in each of these respects, it will be of only limited utility. Many of the antennas proposed heretofore have solved certain of these problems but in failing to meet one or more of the other requirements, have failed to provide the most satisfactory answer to the over-all problem.

In a preferred embodiment of the present invention, a pair of swingably mounted arms are mounted on the antenna base and are arranged when parallel with the antenna to permit the base of the antenna to be inserted from the outside through an opening in the car body after which the arms are turned or swing naturally to a crosswise position permitting the antenna to be clamped in place by tightening a retaining nut against the outside of the body.

A pair of cam shoulders, preferably formed integrally with the antenna base, are positioned adjacent the arms to support the arms when the antenna is tightened in position.

The novel construction and arrangement of the electrical components within the base of the antenna provide improved mechanical and electrical characteristics and utilize fewer and lower cost parts than other antenna arrangements. The construction of the antenna components is described more fully and is claimed in my copending application, Serial No. 393,333, filed on even date herewith, it being apparent that the mounting system described and claimed herein is not dependent upon the use of any particular arrangement within the sleeve base of the antenna.

The various aspects, advantages, and features of this invention will be in part pointed out in and in part apparent from the following description of a preferred embodiment of the invention considered together with the accompanying drawings, in which:

Figure 1 is a cross-sectional view of an antenna embodying the invention showing the antenna mounted on a portion of an automobile body;

Figure 2 is an expanded view showing the principal parts of the antenna mounting structure;

Figure 3 is an enlarged partial elevational view of the antenna mounting structure;

Figure 4 is a side view of the portion of the antenna shown in Figure 3;

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Figure 5 is a sectional view taken along line 5—5 of Figure 3;

Figure 6 is a partial view similar to Figure 3 but with the anchor arms rotated so that the base can be inserted in the hole in the automobile body;

Figure 7 is an enlarged partial side view showing a modification of the clamping structure; and

Figure 8 is an elevational view of the portion of the antenna mounting structure shown in Figure 7.

In the embodiment of the invention shown in Figure 1, the signal-receiving portion 2 of the antenna, usually a telescoping tube and rod assembly, is supported by a metal sleeve base 6 that extends through and is secured to the sheet-metal body 8 of an automobile. In order to permit the antenna to be mounted conveniently from the outside of the automobile, a pair of arms 10 and 12 (see also Figure 2) are mounted swingably on this sleeve so that the antenna can be inserted into the opening in the body 8 and the arms turned crosswise to act as an anchor when the sleeve is secured in position by tightening a nut 14 which is in threaded engagement with the sleeve 6.

In order to relieve the supports for the arms 10 and 12, in this example shown as projections 16 and 18 on opposite sides of the sleeve 6, from the strain imposed when the nut 14 is tightened, the lower edges of the arms 10 and 12 are arranged, when the arms are turned crosswise, to abut, respectively, shoulders 20 and 22 (Figure 4) on the sleeve 6. Thus, as the nut 14 is tightened the downward deflection of the arms 10 and 12 is limited by the engagement with the shoulders 20 and 22 which bear the mechanical load and prevent any possibility of shearing the projecting pivots 16 and 18.

In order to prevent the lower edges of the arms 10 and 12 from being deflected outwardly and sliding off their respective shoulders 20 and 22, the surfaces of these shoulders form a slight angle, for example five degrees, with respect to a plane perpendicular to the longitudinal axis of the antenna is indicated at "a" in Figure 4. That is, the surfaces of these shoulders extend downwardly and inwardly so that as the lower edges of the arms tend to move downwardly relatively to the sleeve 6 they are cammed inwardly.

In this particular example, the shoulder surfaces 20 and 22 are formed by grooves 24 and 26 in opposite sides of the sleeve 6, and each of the arms is provided with an arcuate inwardly-projecting flange, as at 28, which passes through the respective groove 24 or 26 when the arm is rotated. The lower surface of this flange, where it engages the surface of the cam shoulder, also forms a slight angle with the plane perpendicular to the longitudinal axis of the sleeve 6 in the same direction as the shoulder. The flange thus seats or nests with the shoulder providing a somewhat increased bearing surface and further insuring that the arms 10 and 12 will be held securely on the shoulders.

The sleeve 6 may be formed by die casting the pivots 16 and 18 and the grooves 24 and 26 being formed by the die casting operation. The grooves 24 and 26 are formed with curved upper walls, the bottom surfaces 20 and 22 are nearly planar.

The arms 10 and 12 are formed of sheet steel or other suitably strong material and may be of any desired shape so long as they are sufficiently narrow to permit the antenna to be inserted through a mounting hole of reasonable size when they are positioned along the longitudinal axis of the sleeve and long enough to provide a good anchor against the inner surface of the automobile body when they are turned crosswise. The arcuate lower surface permits the necessary rotation of the arms and also provides a mechanically rigid structure when the antenna is tightened in position.

In order to mount the arms 10 and 12 on the projecting pivots 16 and 18, a metal eyelet, as at 30 and 32, is positioned loosely in a hole 34 in each of the arms. A flange 35 rolled on the outer end of each eyelet (Figure 4) locks the arm and the eyelet together, but does not interfere with the free rotation of the arm relatively to the eyelet. The eyelet-arm assemblies each are then placed on one of the pivots 16 or 18 and the outer end of the pivot is then peened, as shown at 36 in Figure 4, to secure the eyelet and arm in position. This construction permits the arms to be mounted rapidly and economically and insures that the arms will rotate freely so that after the antenna is inserted in the mounting hole they will turn crosswise by the action of gravity alone, thus eliminating the need for manual manipulation of the arms after the antenna is positioned in the mounting hole.

The holes 34 in the arms 10 and 12 are formed slightly larger than the outer diameters of the eyelets 30 and 32 so that, as stated above, the arms fit loosely on the eyelets. This tolerance permits the flanges 28, or lower edges of the arms 10 and 12, to pass freely along the grooves 24 and 26, but when the antenna is clamped in position by the tightening of the nut 14, the flange 28 abuts the shoulder on the sleeve 6 and takes up the load without placing significant strain on the arm-supporting pivots 16 and 18.

The die cast sleeve 6 is formed ordinarily of metal softer than that of the arms 10 and 12. The curved lower surface or flange 28 of the arms therefore tends to deform the shoulder somewhat as the nut 14 is tightened to form a shallow indentation corresponding to the shape of the lower surface of the arm; the lost motion at the pivot being sufficient to permit such indentation without placing excessive strain on the pivots.

The lower length of tubing 37 of the telescoping assembly 2 is supported by and insulated from the sleeve base 6. This is accomplished by a bushing 38 of insulating material that fits within the upper portion of the sleeve 6. In this example, the sleeve or bushing 38 is formed of polystyrene, but other insulating materials can be used. The bushing is molded in the shape best shown in Figures 1 and 2, with an external annular shoulder near its lower end which, when the bushing is inserted in the metal supporting sleeve 6, abuts an internal annular shoulder, as at 42 in Figure 1, on the sleeve 6. The tubing 37 fits snugly within the insulation bushing 38 and extends into the bushing with its lower end abutting an internal shoulder 48 on the bushing 38.

In order to secure the insulating bushing 38 after it is inserted in the sleeve 6, the upper end of the sleeve 6 is rolled or swaged inwardly, as at 50, against a sloping annular shoulder 52 (Figure 2) on the outside of the bushing 38 so that the bushing is firmly anchored between the lower shoulder 42 and the internal collar thus formed at the upper end of the sleeve 6.

The tubing 37 is secured in the insulation bushing 38 by a screw 54 which is in threaded engagement with the inside wall of the tube 37, the head of the screw being drawn up against a washer 56 that presses against an internal shoulder 58 on the bushing 38.

The portion of the insulation bushing 38 below the washer 56 is provided to increase the length of the surface leakage path between the screw 54 and the metal sleeve 6.

In order to permit electrical connection to be made to a plug 62 that is connected by a shielded wire 64 to the radio receiver, the screw 54 is provided with a longitudinal bore 66 in which is positioned a strip-like Phosphor-bronze contact spring 68. This spring is spot welded at the lower end to the outside of the head of the screw 54 and extends upwardly within the bore 66. The spring 68 is not secured inside the bore 66 but is pre-set with a number of undulations along its length so as to insure good contact with the central conductor prong 70 of the

plug 62 which is adapted to be inserted through the bottom of the sleeve 6 into the bore 66.

The ground connection between a spring metal sleeve 72 on the plug 62 and the antenna sleeve 6 is completed by direct contact between the sleeve 72 and internal longitudinal projections 74 (Figure 5) on the sleeve 6.

Any suitable bushing arrangement may be used between the nut 14 and the outer surface of the automobile. For example, a conventional soft rubber protecting and sealing washer 76 (Figures 1 and 2) may be placed around the antenna adjacent the auto body. A slotted generally semi-spherical insulator 78, of aceto-butylate plastic such as is sold under the trademark "Tenite II," or other suitable material, is placed on top of the washer 76 and is capped by a saucer-shaped washer 80 against which the nut 14 is tightened. The washer 76, insulator 78, washer 80, and nut 14 can all be constructed in accordance with prior art devices such as are already in wide use.

From the foregoing, it will be observed that the antenna described above and embodying the present invention is well adapted to meet the ends and objects set forth above and to be manufactured economically, the structure being formed of relatively few parts and these being such that they can be produced by well-known low-cost production techniques.

It will be apparent that various modifications of the individual features can be made without departing from the scope of the invention in order to best adapt the invention to a particular use or constructional technique. For example, an external shoulder 82, corresponding to the shoulders 20 and 22, can be formed, as shown in Figure 7, by abruptly increasing the outer diameter of the sleeve 6. The inwardly projecting flange 28 can be eliminated from the arms 10 and 12 to form arms 84. As shown in Figure 8 the extent of rotation of the arms 84 is more limited than in the earlier embodiment so that a larger opening is required for mounting the antenna. The remaining parts of the antenna are similar to those described in connection with the antenna of Figures 1 to 6, corresponding parts being indicated by the same numerals followed by the suffix "A."

What is claimed is:

1. An automobile antenna structure including an elongated electrically-conductive signal-receiving member, a mounting sleeve mechanically supporting said signal-receiving member and having at opposite sides flattened faces with a pair of studs formed integrally with said sleeve and projecting perpendicularly from said flat faces, a pair of swingably-mounted arms loosely supported by said studs on said sleeve, arcuate grooves formed in said flat faces concentrically with said studs, and arcuate flanges on said arms slidably received in said grooves, said flanges engaging the walls of said grooves when said arms are turned substantially crosswise of said sleeve so as to provide support for said arms when the antenna is clamped in position on an automobile.

2. An automobile antenna structure including an elongated electrically-conductive signal-receiving member, a mounting sleeve mechanically supporting said signal-receiving member, a pair of swingably-mounted arms supported by said sleeve, and shoulder means supported by said sleeve and having a shoulder surface sloping inwardly and downwardly and positioned respectively to abut said swingable arm when the arm is turned substantially crosswise of said sleeve, the lower surface of said arm adjacent said shoulder surface sloping inwardly and downwardly in the same direction as said shoulder surface when in its crosswise position.

3. An automobile antenna structure including an elongated electrically-conductive signal-receiving member, a mounting sleeve, means secured to the outer end of said sleeve and mechanically supporting said signal-receiving member in electrically insulated relation to said sleeve, an electrical conductor extending axially through said

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sleeve in insulated relation thereto for making electrical connection to said signal receiving member, a pair of swingably-mounted arms supported by pivots extending outwardly from opposite sides of said sleeve and having flanges extending inwardly thereof, and shoulder means formed at the outer surface of said sleeve by oppositely-disposed grooves on said sleeve and having two surfaces positioned respectively to abut one of said flanges of the swingable arms when the arm is turned substantially crosswise of said sleeve, whereby to provide support for the arms when the antenna is clamped in position on an automobile.

4. An automobile antenna structure including an elongated electrically-conductive signal-receiving member, a mounting sleeve mechanically supporting said signal-receiving member, a pair of swingably mounted arms supported by pivots extending outwardly from opposite sides of said sleeve and having arcuate flanges extending inwardly along an edge thereof, and shoulder means formed at the outer surface of said sleeve by oppositely-disposed grooves on said sleeve, said grooves having abutment surfaces positioned to abut said flanges when the arms are turned crosswise of the sleeve, said surfaces extending, in the area of contact with said flanges, at an angle to a plane perpendicular to the longitudinal axis of said sleeve.

5. An automobile antenna structure as claimed in claim 4 wherein said angle between said abutment surfaces and said plane perpendicular to the longitudinal axis of said sleeve is about five degrees.

6. In an automobile antenna, a signal-receiving portion, an antenna-supporting sleeve for supporting said signal-receiving portion adapted to extend through a hole in the body of an automobile and having a pair of oppositely-disposed externally-projecting pivots, said sleeve having a pair of grooves formed in the external surface thereof respectively beneath said pivots, and a pair of

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antenna-anchoring arms each swingably mounted on one of said pivots and each having an arcuate inwardly-extending flange arranged to traverse one of said grooves and upon installation of the antenna to be placed in pressure contact with the lower wall thereof, each of said arms having sufficient lost motion with respect to the pivot upon which it is mounted to permit said flange thereof to freely traverse its respective grooves and to make pressure contact with one wall thereof without placing substantial strain on the projecting pivot supporting the arm.

7. An automobile antenna including a telescoping rod and tube assembly for receiving radio signals, a tubular base for supporting said rod and tube assembly, said base being a malleable die casting and having a pair of integrally cast pivot means projecting from opposite sides of said base, and a pair of opposed shoulder surfaces adjacent said pivots and aligned generally perpendicularly to the direction of said pivot, a pair of elongated anchoring arms each having a hole therein and each having an arcuate projecting surface concentric with the adjacent pivot arranged to abut one of said shoulders, and a pair of eyelets each positioned loosely in one of the holes in the anchoring arms, each of the eyelets being positioned on one of said pivot means, said pivot means being swaged and thereby locking said eyelet in position, said holes being sufficiently larger than said eyelets to permit said arcuate surfaces to bear against said shoulders without substantial strain on said pivots.

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