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EXTENSIBLE AUTOMOBILE AERIALS

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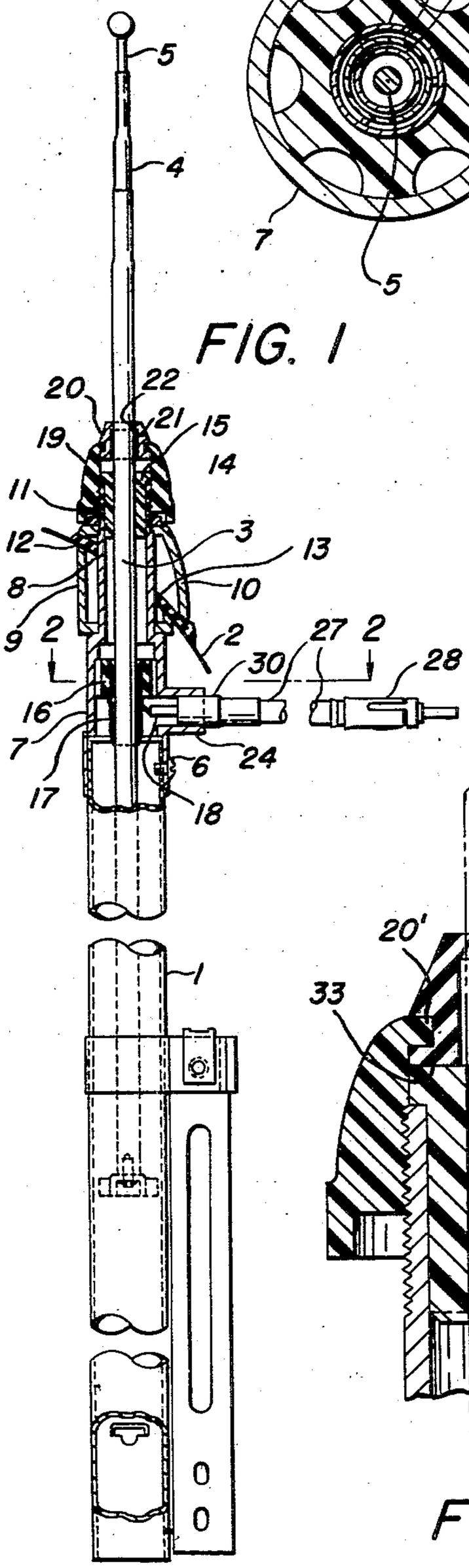

FIG. 1

FIG. 2

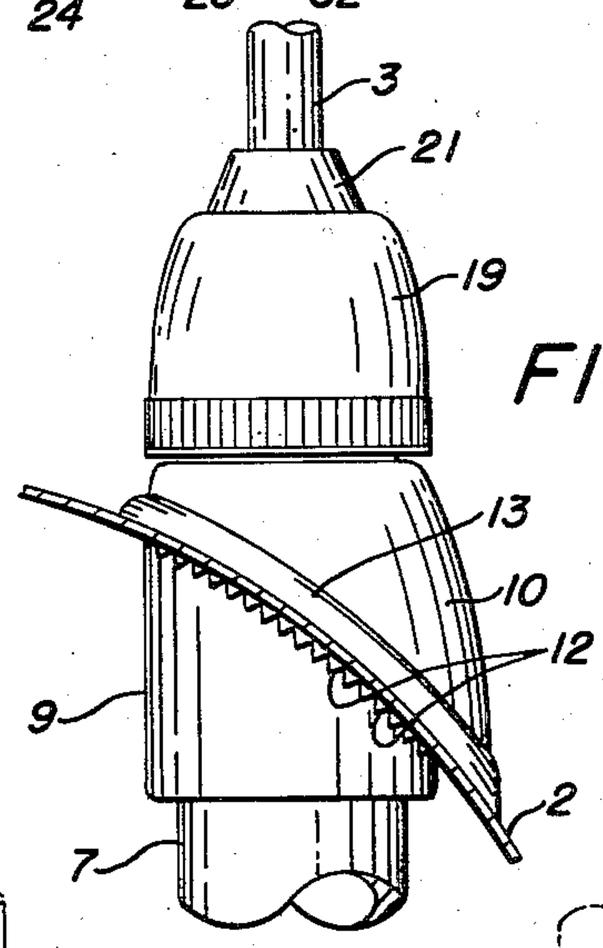

FIG. 3

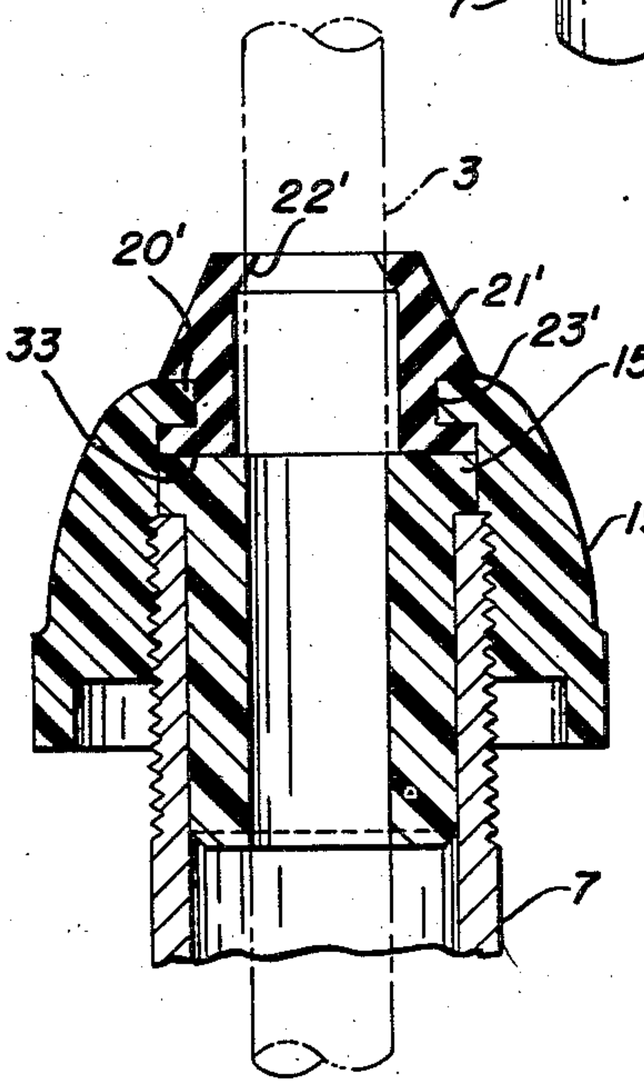

FIG. 5

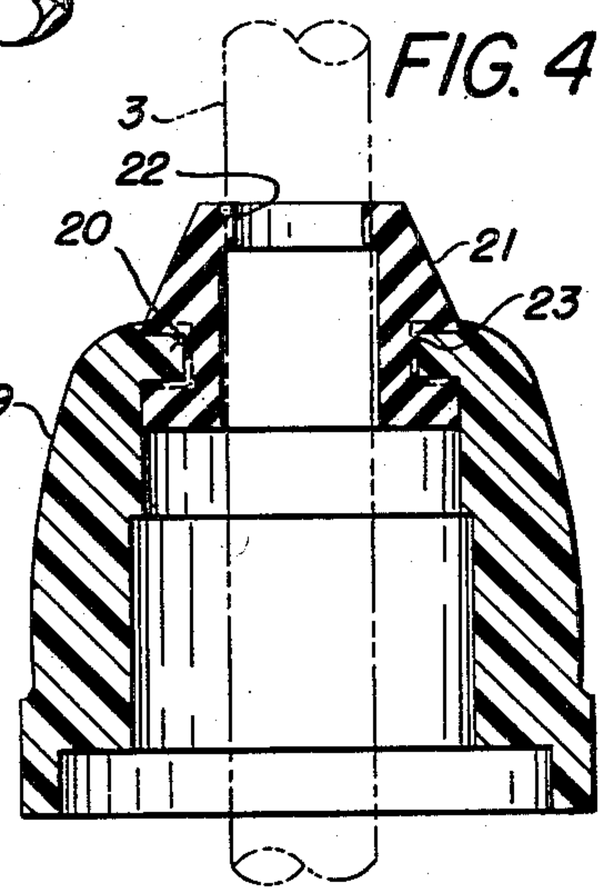

FIG. 4

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EXTENSIBLE AUTOMOBILE AERIALS

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1 Claim. (Cl. 286—37)

This invention relates generally to automobile aerials but has reference more particularly to the extensible or collapsible type of aerials.

A primary object of the invention is to provide an areial of the type described which is characterized by the use of a seal or sealing means which is effective not only to prevent entry of water into the joints between the antenna mast and mast housing, but is also effective to prevent accumulation of moisture on the mast, thereby enabling the antenna to retain good electrical characteristics in wet weather.

Another object of the invention is to provide an antenna of the character described which is inexpensive, comprises a minimum number of parts, has excellent electrical and mechanical properties, and is highly pleasing in appearance.

A further object of the invention is to provide an antenna of the character described, having an end fitting for the lead-in, the use of which eliminates the necessity for soldering and avoids flux corrosion and disturbance of the interlacing of the braid used in lead-ins, whereby a uniformly strong joint is obtained, as well as an effective water seal, without the use of extra parts.

Other objects and advantages of our invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a view, partly in elevation and partly in section, of an antenna embodying the novel features of the invention;

Fig. 2 is a fragmentary cross-sectional view, on an enlarged scale, taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary elevational view, on an enlarged scale, of a portion of Fig. 1;

Fig. 4 is a fragmentary cross-sectional view, on an enlarged scale, of a portion of Fig. 1, and

Fig. 5 is a view similar to Fig. 4, but showing a modified form of seal.

Referring more particularly to Figs. 1 to 4 of the drawings, the antenna will be seen to comprise a metallic shield or storage tube 1, which extends below the car body line and houses the antenna mast sections, when collapsed, shielding the mast against water, dirt and ignition noises. The car body line is indicated, in this instance, by the curved contour of the fender 2. The mast is of the conventional extensible type, consisting of two sections 3 and 4 of brass tubing, and one section 5, of stainless steel rod, each section collapsing within the next larger section, and the entire mast collapsing within the shield tube 1.

Surmounting the shield tube 1, and removably secured to the latter, as by means of a screw 6, is a body member 7, preferably made in the form of a zinc die casting, which extends through an opening 8 in the fender 2. The body member 7 is secured to the fender 2 by means of spacers 9 and 10, and a steel nut 11, which is threadedly secured to the upper end of the body member and

bears against the top of the spacer 10, so as to firmly clamp all of the parts together. The spacers 9 and 10 are also in the form of zinc die castings, the spacer 9 having serrations 12 at its upper end (Fig. 3) which penetrate paint and undercoating and aid in establishing a good electrical ground connection to the car body. An insulator pad 13, of rubber, is interposed between the fender 2 and the lower edge of the spacer 10, and is provided with an opening 14 through which the body member 7 extends.

Disposed within the upper end of the body member 7 is a plastic bushing 15, and firmly staked within the lower portion of the body member is a second plastic bushing 16, these bushings serving not only to hold the antenna mast centered within the body member, but also to insulate the mast from the body member. Secured within the bushing 16 is a contact tube or finger 7 by means of which the signal from the mast is picked up and carried to the lead-in by means of the wire 18.

Threadedly secured to the body member 7, above the nut 11, is a cap nut 19 made of electrically insulating material, and having an inturned annular flange 20. Secured to the flange 20 is a grommet 21, which is made from a soft rubber-like compound, and is provided with an inwardly-extending flange 22 at its upper end, and an annular groove 23 into which the flange 20 of the cap nut extends to lock the grommet to the cap nut.

As indicated in Fig. 4, the flange 22 is of slightly less internal diameter than the external diameter of the mast section 3, so that it snugly engages the latter, so as to provide a watertight seal therebetween, which permits easy movement of the mast section 3 with respect to the flange 22, yet prevents water from entering the joint between the flange and mast section and spoiling the good electrical characteristics of the antenna. Similarly, as shown in Fig. 4, the cross-sectional area of the flange 20 of the cap nut 19 is slightly greater than the cross-sectional area of the groove 23 of the grommet 21, so that pressure is exerted on all three sides of the groove, resulting in a watertight seal between the cap nut and grommet. In practice, we have found that if the axial length of the flange 22 is about ⅛ inch, and if the flange 22 is spaced at least ⅛ inch from the groove 23, best results are achieved.

A seal is thus provided between the mast and the ground (body 7), consisting of the plastic cap nut and the grommet, which seal is not only effective to prevent entry of water into the joints between the seal and mast, but is also effective to prevent accumulation of moisture on the mast section 3, since downward movement of the latter causes the grommet to wipe such moisture from the mast section, thereby enabling the antenna to retain its good electrical characteristics in wet weather.

It may be further noted, at this point, that the pressure of the grommet on the mast and of the cap nut on the grommet is entirely independent of the tightness of the cap nut. In other words, these pressures do not increase when the cap nut is tightened down on the body member 7, and hence, the cap nut cannot be tightened to such an extent that the mast becomes immovable with respect to the grommet.

The seal is inexpensive, and yet an effective one, comprising a minimum number of parts.

The invention also embodies an improved lead-in construction, which may be described with reference to Figs. 1 and 2 of the drawing.

The body member 7 is provided with a laterally-extending tubular extension 24.

The lead-in is attached to the body member in a watertight manner. It is of the conventional automotive type, consisting of an inner conductor of .010" wire 18 en-

cased in polyethylene tubing **25**, which, in turn, is covered with copper braid **26**. The braid, in turn, is covered with a vinyl or polyethylene jacket **27**. The end of the lead-in which is connected to the radio set is provided with a conventional end fitting **28**. To the other end of the lead-in is attached the novel water-tight fitting, which will now be described.

The fitting consists of two sleeves, an inner sleeve **29**, and an outer sleeve **30**, between which are compressed the braid **26** and jacket **27**, the braid and jacket being compressed between the outer portions of the sleeves, and the braid **26** being compressed between the inner portions of the sleeves. By providing conical steps **31** and **32**, on the inner and outer sleeves respectively, a joint is formed which becomes tighter, the more pull or tension is exerted between the braid and the outer sleeve.

In assembling the fitting, the inner sleeve **29** is inserted under the braid **26**, and after the inner sleeve has been properly positioned, the outer sleeve **30** is drawn up over the braid to the position shown in Fig. 2 after which the outer sleeve is secured, as by a press fit, in the tubular extension **24** of the body member.

Previously, end fittings have been applied to the lead-in either by soldering or by compressing the braid only between two sleeves. The braid, in the latter case, was turned back over one of the sleeves. A water seal was obtained by stretching a rubber sleeve over the joint. The soldered joint was unsatisfactory because of the occurrence of cold solder joints, flux corrosion and poor appearance. In the other case, folding back the braid disturbed the interlacing of the strands and gave rise to weak joints.

The present construction of end fitting eliminates cold solder joints and flux corrosion, and does not disturb the interlace of the braid, so that a uniformly strong joint is obtained, as well as an effective water seal, without the necessity of an extra element or part.

The end fitting, which has been described, may be used generally in connection with other types of antennas, such as the fixed mast type antenna.

In Fig. 5, a modification of the invention is shown, in which the flange **22′** of the grommet **21′** is of triangular cross-section, instead of rectangular, so as to provide a somewhat more pliant or flexible type of contact of the flange with the mast section **3** than is provided by the flange **22**. The diameter of the opening formed by the upper edge of the flange **22**, in unstressed condition is of slightly less diameter than the outer diameter of the mast section, so as to cause the grommet to snugly embrace the mast section.

In this case, however, the seal between the cap nut **19′** and the grommet is obtained primarily by screwing the cap nut down so as to compress the flange **33** of the grommet between the flange **20′** of the cap nut and the

plastic bushing **15**. The inside diameter of the grommet, below the flange **22′** is such that compression of the flange **33** will not cause this portion of the grommet to exert pressure on the mast section. Therefore, friction between the grommet and mast is not affected by the extent to which the cap nut is tightened. Since the flanges **20′** and **33** provide a seal between the cap nut and grommet, the use of the groove **23′** in the grommet is not essential, and the grommet need only be provided with a flange, such as the flange **33**.

It is thus seen that we have provided a disappearing type automobile antenna which, in addition to the features and advantages which have been described, has excellent electrical and mechanical properties, as well as a highly pleasing appearance.

It is to be understood that the forms of our invention, herewith shown and described, are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of our invention, or the scope of the subjoined claim.

Having thus described our invention, we claim:

In an antenna of the character described, a body member, a cylindrical mast section movable axially through said body member, a grommet of non-metallic compressible material surmounting said body member and having a bore of greater diameter than that of said mast section, said grommet having an internal unitary flange defining a diameter less than that of said mast section whereby to encircle and grip said mast section radially thereof, said grommet having an external circumferential recess, and means for removably securing said grommet to said body member, said means consisting of an element threadedly engaging said body member and having an internally-directed flange, of greater cross-sectional area than the cross-sectional area of said recess, engaged in said recess and adapted to compress said grommet axially thereof in response to said threaded engagement.

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