Feb. 2, 1960 J. B. CEJKA 2,923,908

CONTACT MEMBER FOR COLLAPSIBLE ANTENNA

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Fig. 1.

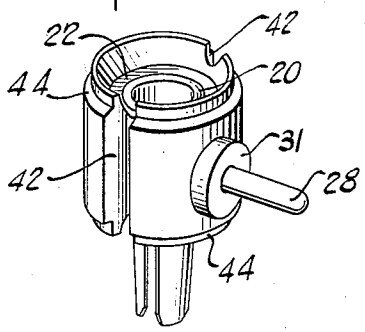


Fig. 3.

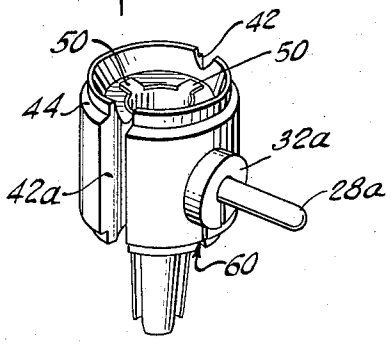


Fig. 2.

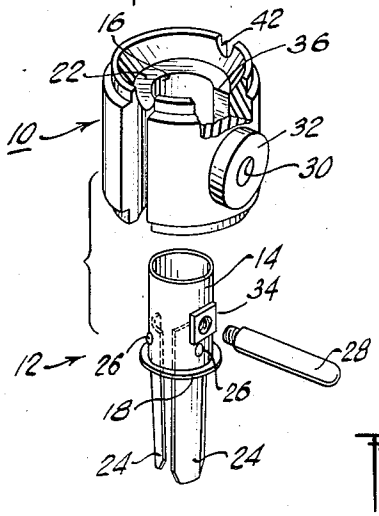


Fig. 4.

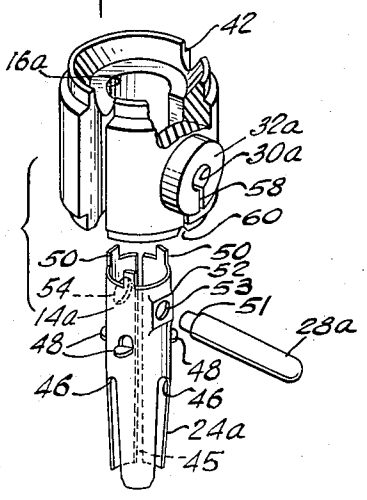
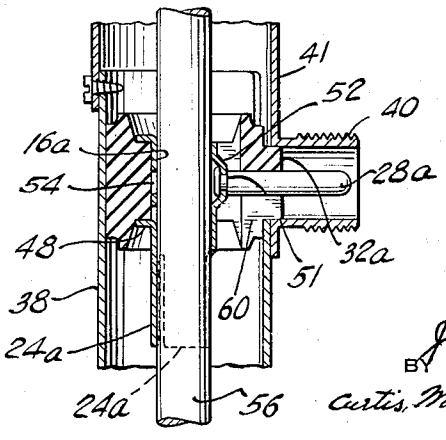


Fig. 5.



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CONTACT MEMBER FOR COLLAPSIBLE ANTENNA

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3 Claims. (Cl. 339—9)

The present invention relates to contact members for collapsible antennas and more particularly to such members which are well suited for use in collapsible automobile antennas.

It is becoming customary to arrange such antennas so that when collapsed only a few inches of the antenna protrude above the hood or fender cowl mounting, as described in my co-pending application Serial No. 447,992, filed August 5, 1954, now Patent No. 2,840,816, dated June 24, 1958, of which the present application is a continuation-in-part. To make possible this full retraction of the antenna, the antenna element itself is arranged in a number of telescoping sections. The upper sections all slide down into the lowest section which also slides down through the mounting when the antenna is retracted. The electrical connection between these antenna sections and the radio in the automobile is generally made by a fixed contact in the mounting which touches the outside of the lowest antenna section and slides along it when the antenna is collapsed or extended.

With prior contact members difficulties have been experienced in maintaining good electrical contact between the fixed contact and the slidable antenna section. A film of dirt and oil formed on the section, and the prior contacts would fail to wipe it off so that in time the connection was interrupted. This was also likely to occur when the antenna section became twisted to a new position as it was extended.

The contact members described herein as embodying the invention substantially surround the lowest slidable section of the antenna and each includes a conductive sleeve with a plurality of resilient fingers extending axially along the antenna section and adapted to engage the section at a number of places around its circumference.

Among the advantages of this arrangement is that the resilient fingers provide a good wiping action over substantially the entire circumference of the slidable section, insuring good electrical contact regardless of any turning of the antenna.

Another advantage of the contact members described is the fact that each of the resilient fingers is in contact with the antenna section along a substantial portion of its length, providing a plurality of adjacent areas of contact extending axially a significant distance along the antenna section. Advantageously, the fingers extend upwardly along the antenna section and thus, as it is pulled up, the lower portions of the fingers wipe the section and the tips of the fingers can engage freshly wiped areas.

The contact members described are easily and inexpensively fabricated by mass production and are easy to assemble into the completed antenna. In a preferred commercial form the conductive sleeve and resilient fingers are integrally formed from sheet metal.

The various aspects and advantages of the present invention will be more fully understood from a consideration of the following description in conjunction with the accompanying drawing, in which:

Figure 1 is a perspective view of a contact member embodying the invention;

Figure 2 is an exploded perspective view of the contact member of Figure 1;

Figure 3 is a perspective view of a preferred modified form of the contact member;

Figure 4 is an exploded perspective view of the contact member of Figure 3; and

Figure 5 is an axial sectional view showing the contact member and portions of a slidable antenna section and mounting with which it is assembled.

The contact member shown in Figures 1 and 2 includes, generally, an annular insulator **10** and a contact assembly **12** with a sleeve **14** which fits within the axial opening **16** of the insulator. To hold the contact assembly in the insulator, the sleeve **14** has a flange **18** at one end which abuts against a shoulder in the insulator **10** adjacent one end of the opening **16** when the contact assembly is slid into the opening **16** during assembly. The other end of the sleeve **14** is rolled over after assembly to form a lip **20** against a similar shoulder **22** adjacent the other end of the opening **16**.

Projecting from the inside of the flanged end of the sleeve **14** are three resilient contact fingers **24**. These fingers are arcuate in cross section with their inner ends spot welded to the inside of the sleeve **14** at three equally spaced points **26** before the sleeve **14** is slid into the insulator. The free ends of the contact fingers converge slightly so as to exert pressure on the antenna section when it is slid through the sleeve portion **14**.

The external connection from the contact assembly **12** to the automobile radio is made through a pin **28** which projects radially through a hole **30** in a circular boss **32** on the outside wall of the insulator **10**. The inner end of the pin **28** is threaded into a small square nut **34** which is fastened to the outside of the sleeve **14** at a mid-point aligned with the inner end of one of the fingers **24**. An axial recess **36** in the wall of the opening **16** behind the boss **32** provides clearance for the nut **26** when the contact assembly is slid into the hole **16**.

The outer wall of the insulator **10** is cylindrical and is arranged to fit snugly within a tubular portion **38** (as shown in Figure 5) of the antenna mounting with the boss **32** fitting into a threaded nipple **40** on the base **41** of the mounting. This nipple is adapted to hold the sleeve of a coaxial cable coupling (not shown) when the inner conductor of the coaxial cable is connected with the pin **28**. A pair of semi-circular axial recesses **42** at each side in the outer wall of the insulator provide clearance for a rolled seam in one side of the tube **38** and enable the contact member to be assembled in the antenna mounting with the fingers **24** either up or down. These recesses **42** also increase the resilience of the insulator **10** when the sleeve **14** is slid into place.

From the inner shoulders **22** at each end of the hole **16**, the insulator **10** flares out at about a 30° angle to its axis toward each end. The insulator has an overall length about twice the length of the opening **16** so as to seat firmly in the tubular portion **38** of the antenna mounting and has a groove **44** around its outside at each end to facilitate assembly.

The commercial form of the contact member shown in Figures 3, 4 and 5 is generally similar to the contact member described above, and parts performing corresponding functions have corresponding reference numbers followed by the suffix "*a*."

In this contact member, the contact assembly **12*a*** is punched and rolled from a sheet of brass to form a sleeve portion **14*a*** with three resilient fingers **24*a*** projecting from one end. These fingers **24*a*** are defined by the spaced seam **45** and by two axial slots **46** stamped in the blank before it is rolled up.

To engage one of the shoulders **22***a* in the insulator **10***a*, three semi-circular ears **48** are knocked out perpendicular to the sleeve portion **14***a*, each axially aligned with one of the fingers **24***a*. At the other end of the sleeve portion **14***a* are three square tabs **50** which are bent over onto the other shoulder **22***a* after the sleeve portion **14***a* is slid into the insulator **10***a*. Thus the contact assembly **12***a* is held against movement axially of the insulator **10***a*.

Among the advantages of this contact member is the fact the pin **28***a* can be fastened to the sleeve **14***a* before the contact assembly **12***a* is slid into the insulator **10***a*. To hold the inner end of the pin **28***a* which is reduced in diameter to form a shoulder **51** a bump **52** with a hole **53** therein is formed in the sleeve portion **14***a* in line with one of the slots **46**. The reduced end of the pin **28***a* fits through this hole **53** and is held in place by being peened over with a punch inserted through a hole **54** in the sleeve portion **14***a* opposite to the hole **53**. The bump **52** provides clearance between the inner peened end of the pin **28***a* and the slidable antenna section **56** (Figure 5) which slides through the contact member.

To enable the contact assembly **12***a* and pin **28***a* to be slid into the insulator **10***a*, a radial slot **58** is cut between a V-notch **60** at one end of the insulator and the hole **30***a*. The insulator **10***a* is of black polystyrene and is sufficiently flexible so that the pin **28***a* can be pushed along the slot **58** into the hole **30***a*.

In a particular commercial form, the insulator **10***a* is about ¾ inch long and about ⅞ inch in diameter. The opening **16***a* is about 7/16 inch long and about 11/32 inch in diameter. The boss **32***a* is about ⅛ inch long and 7/16 inch in diameter. The blank forming the sleeve portion **14***a* and fingers **24***a* has an axial length of 1⅛ inches with the fingers **24***a* about ½ inch long and about ¼ inch wide. The two slots **46** are about ⅛ inch wide, with the fingers **24***a* being bent in slightly so as to grip resiliently the outside of the slidable antenna section **56**.

From the foregoing description it will be seen that I have provided contact members well suited to attain the ends and objects hereinbefore set forth, and it will be understood that the scope of my invention includes various alternatives and modifications which may be made in adapting the contact members for use in each particular application.

I claim:

1. In a collapsible antenna of the type having a tubular base and an antenna section slidable therein, a contact member for slidably supporting said slidable section in insulated relation to said base and for electrically connecting said slidable section to an external circuit, said contact member comprising a generally annular insulator fixed in said base and having an axial opening therethrough, a cylindrical boss on one side of said insulator with a radial opening extending out from said axial opening through said boss, a conductive sleeve portion fitting within said axial opening, resilient fingers projecting axially from said sleeve portion with their free ends converging slightly toward one another, and a contact pin projecting from said conductive sleeve through said radial opening, and a nipple projecting radially from said base, said nipple having a circular opening therethrough into which said boss is received to lock said insulator against movement longitudinally of said base.

2. In a collapsible antenna of the type having a tubular base and an antenna section slidable therein, a contact member for slidably supporting said slidable section in insulated relation to said base and for electrically connecting said slidable section to an external circuit, said contact member comprising a generally annular insulator fixed in said base and having an axial opening therethrough, abutments in said insulator adjacent each end of said opening, said insulator having a cylindrical boss extending radially from one side and a radial opening extending concentrically through said boss from said axial opening to the outside of said insulator, a slot extending through said insulator from the axial opening to the outside and from one end of said insulator to said radial opening, said insulator having a recess in the wall of said axial opening aligned with said slot, a conductive sleeve portion fitting within said axial opening, projecting flange portions on said sleeve portion resting against said abutments, a plurality of resilient contact fingers projecting axially from one end of said sleeve portion with the free ends of said fingers converging slightly toward one another, and a contact pin projecting radially from said sleeve portion through the radial opening in said insulator, and a nipple projecting radially from said base, said nipple having a circular opening therethrough into which said boss is received to lock said insulator against movement longitudinally of said base.

3. In a collapsible antenna of the type having a tubular base and an antenna section slidable therein, a contact member for slidably supporting said slidable section in insulated relation to said base and for electrically connecting said slidable section to an external circuit, said contact member comprising a generally annular insulator fixed in said base and having an axial opening extending from one end to the other and a cylindrical boss extending radially from one side with a radial opening extending coaxially through said boss and intersecting said axial opening, and a sleeve portion rolled from sheet material with an open seam along one side, a plurality of resilient fingers integral with said sleeve portion and projecting axially from one of the ends of said sleeve portion, said fingers being defined by said seam and at least one slot in said sheet material extending axially from said end, a flange element cut from said sheet material and turned outwardly from the axis of said sleeve portion to engage said insulator, and a bump in said sleeve portion having a hole therein, a contact pin projecting radially out from the hole in said sleeve portion, the inner end of said pin being peened over inside of said hole, said sleeve portion having a second hole in the side opposite from and aligned with said first hole, and a nipple projecting radially from said base, said nipple having a circular opening therethrough into which said boss is received to lock said insulator against movement longitudinally of said base.

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