May 12, 1959 C. C. WILLIAMS 2,886,814

ROD TYPE ANTENNA

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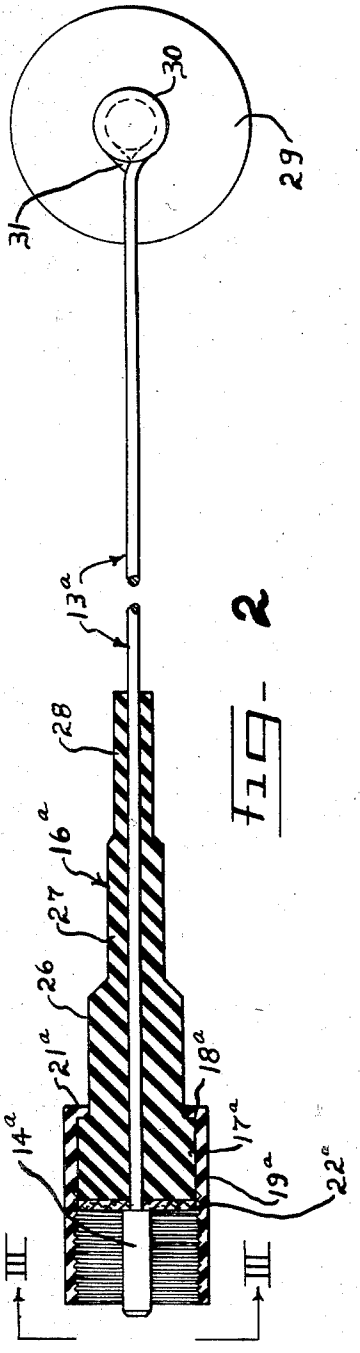


FIG. 2

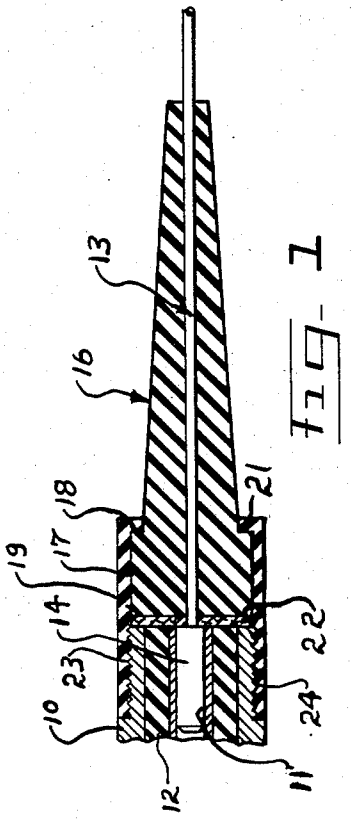


FIG. 1

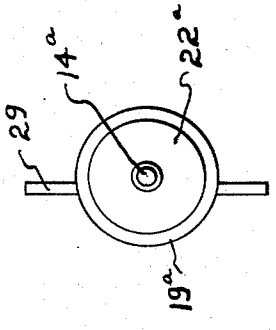


FIG. 3

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ROD TYPE ANTENNA

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2 Claims. (Cl. 343—900)

This invention relates to an antenna and more particularly to an antenna which shall be especially adapted for use with portable radio receivers and transmitters.

An object of my invention is to provide an antenna of the character designated which will not break easily from vibration and bending, thus assuring that the radio set is in operating condition at all times.

Another object of my invention is to provide an antenna of the character designated in which there is a better impedance match between the antenna and the radio set due to the fact that the transmission line effect is reduced to a minimum.

A further object of my invention is to provide an antenna of the character designated in which there is less reflected power lost.

A still further object of my invention is to provide an antenna of the character designated which shall be simple of construction, economical of manufacture and one which is adapted for use on conventional type portable and mobile radio sets.

Heretofore in the art to which my invention relates, various types of antennas have been proposed for portable radio sets, such as by providing a relatively rigid insulating material around the antenna which is reinforced by a metallic sleeve. The metallic sleeve telescopes within an outer connecting sleeve member. Also, coil spring members have been securd to the base of the antenna to prevent easy bending thereof. However, with such coil springs, the antenna still breaks at the same point that the antenna would break were the coil springs not placed around the same. Also, the coil springs and metallic sleeve members greatly increase the transmission line effect. As is well known, where a metallic member extends over an antenna wire that portion of the antenna wire serves as a transmission line rather than an antenna.

I overcome the above and other difficulties by providing an outwardly tapered resilient member which surrounds the antenna rod adjacent the base end thereof. The resilient member is formed of a suitable flexible, dielectric, material, such as flexible rubber and like materials which are substantially free of carbon.

By providing the outwardly tapered resilient member adjacent the base of the antenna rod, the inner sleeve heretofore employed is eliminated and the antenna rod may be connected to the usual coaxial connection on portable radio sets by a relatively short sleeve member, the portion of the sleeve member extending over the resilient member being approximately one-quarter inch. Furthermore, by providing the sleeve member of a suitable dielectric material, the transmission line effect is eliminated and a substantially perfect impedance match can be obtained. The tapered resilient member not only provides a better impedance match between the antenna and the set but also prevents the antenna rod from being bent sharply at a particular point. That is, when the free end of the antenna rod is moved relatively to the base end thereof, the rod bends in a uniform arc.

Antennas embodying features of my invention are illustrated in the accompanying drawing forming a part of this application, in which:

Fig. 1 is an enlarged vertical section view, partly broken away;

Fig. 2 is an enlarged vertical section view, partly broken away, showing a modified form of antenna; and

Fig. 3 is an end elevational view taken generally along the line III—III of Fig. 2.

Referring now to the drawing for a better understanding of my invention, I show the usual coaxial connection for portable radio sets, and the like, which comprises an outer cylindrical member **10** having a concentric tubular member which forms a centrally disposed socket **11**. A suitable insulating material **12** is provided between the cylindrical member **10** and the socket **11**, as shown in Fig. 1.

The antenna rod indicated generally at **13** is provided with the usual contact **14** at the base end thereof. Surrounding the antenna rod **13** adjacent the base end thereof is an outwardly tapered resilient member **16** which is formed of a suitable dielectric material, such as flexible carbon free natural rubber or the like. In actual practice, I have found that rubber compounds which meet A.S.T.M. standard R620 and military classification mil-R.6855 class 1 are satisfactory in every respect. The resilient member is preferably annular as viewed in transverse cross section. The inner end of the resilient member **16** is enlarged in diameter as at **17** and is provided with an annular shoulder **18** at the outer end of the enlarged diameter portion. Telescoping over the enlarged diameter portion **17** of the resilient member **16** is a sleeve connector **19** having an annular inturned flange **21** adjacent the outer end thereof adapted to engage the annular shoulder **18** whereby the resilient member **16** is held against outward movement relative to the sleeve connector **19**. The sleeve connector **19** may be formed of a metallic material. However, by forming it of a dielectric material the transmission line effect is eliminated.

To prevent lateral shifting of the inner or base end of the antenna rod **13** relative to the resilient member **16**, I provide a relative rigid disc member **22** between the contact **14** and the inner surface of the resilient member **16**. The disc member **22** is also formed of a suitable dielectric material. The diameter of the disc member **22** is equal substantially the internal diameter of the sleeve connector **19**. The sleeve connector **19** is provided with internal threads **23** adjacent the inner end thereof which are adapted to engage suitable threads **24** formed on the cylindrical member **10** of the radio set. As shown in Fig. 1, the contact **14** enters the socket **11** when the antenna is connected to the radio set.

Referring now to Figs. 2 and 3 of the drawing I show a slightly modified form of antenna comprising an antenna rod **13*a*** having a contact **14*a*** adjacent the inner or base end thereof. Surrounding the antenna rod **13*a*** adjacent the base end thereof is a resilient member **16*a*** which is also preferably annular as viewed in cross section and is formed of a suitable dielectric material, such as the flexible rubber described heretofore. The resilient member **16*a*** is provided with an enlarged diameter portion **17*a*** having an annular shoulder **18*a*** adjacent the outer end thereof which is adapted to receive an inturned annular flange **21*a*** formed at the outer end of a sleeve connector **19*a*** which is similar in all respects to the sleeve connector **19**. The resilient member **16*a*** is provided with a plurality of axially extending sections **26**, **27** and **28** which are progressively smaller in diameter toward the outer end of the resilient member **16*a***, thus providing a generally outwardly tapered surface for the resilient member. A relatively stiff disc member **22*a*** formed of a suitable dielectric material is positioned between the contact **14*a***

and the inner end of the resilient member **16***a* to limit lateral shifting of the base end of the antnna rod relative to the sleeve connector **19***a*.

Secured to the free end of the antenna rod **13***a* is a disc member **29** which serves as a safety member to prevent damage to the eyes of the operator when the antenna is used on portable and other type radio sets. The disc member **29** is attached to the antenna rod **13***a* by any suitable means, such as by providing an outturned annular flange **30** adjacent the central portion of the disc member for receiving the looped-shape end **31** of the antenna rod **13***a*, as shown in Fig. 2.

From the foregoing, it will be seen that I have devised an improved antenna which is particularly adapted for use with portable or mobile radio sets. By providing the outwardly tapered resilient member adjacent the base of the antenna rod, the rod is not easily bent, thereby assuring that the antenna remains in operating condition at all times. This is especially desirable in view of the fact that with certain uses, the loss of the of the use of the radio set even for a relatively short period of time causes great inconveniences and expense. For instance, when used by railroad men in the switching of trains, hand signals are wholly ineffective due to the length of present day trains. This is especially true when the train is positioned on a curve. It will thus be seen that with the portable radio set out of operation, not only would the train directly concerned be inconvenienced and delayed, but the schedule of other trains would also be inconvenienced.

Also, by providing a dielectric resilient member around the base of the antenna rod, the length of a metallic sleeve connector may be reduced to a minimum, thereby reducing the transmission effect of the connection between the antenna and the radio set. Furthermore, by providing a dielectric sleeve connector which surrounds the enlarged diameter base end of the resilient member, the transmission effect in the antenna is eliminated whereby a substantially perfect impedance match is obtained between the antenna and the radio set. Furthermore, by providing the outwardly tapered resilient member, a better impedance match is obtained. Not only is the inner metallic sleeve heretofore employed eliminated entirely, but in actual practice I have found that the tapered shape

actually provides a better impedance match than a resilient member having an abrupt end.

While I have shown my invention in but two forms it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. The combination with a radio having a coaxial connection embodying a cylindrical member with a contact receiving socket disposed inwardly thereof, of an antenna rod having a contact at its base and disposed to engage the socket of a coaxial connection, an elongated, outwardly tapered, dielectric, resilient member surrounding said antenna rod adjacent the base end thereof with said contact at the base end of the antenna rod projecting outwardly thereof, a sleeve-like member telescoping over the inner end of said resilient member with the entire inner surface of said sleeve-like member which is opposite said resilient member being in direct contact with said resilient member, a relatively stiff, dielectric disc member surrounding the antenna rod and in direct contact with the inner end of the resilient member, the outer diameter of said disc member being equal substantially to the internal diameter of said sleeve-like member whereby said disc member is disposed to contact the outer end of the contact receiving socket, and means for attaching said sleeve-like member to the cylindrical member of a coaxial connection.

2. An antenna as defined in claim 1 in which the sleeve-like member is also of a dielectric material.

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