June 6, 1939. W. R. PETERSON 2,161,192

ANTENNA COUPLING SYSTEM

Filed Dec. 31, 1937

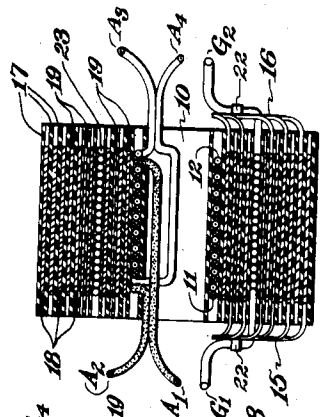


Fig. 1.

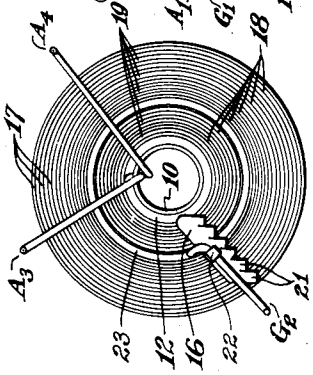


Fig. 2.

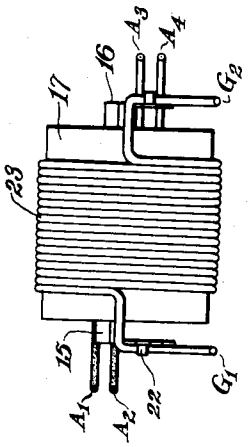


Fig. 6.

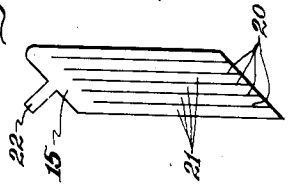


Fig. 8.



Fig. 7.

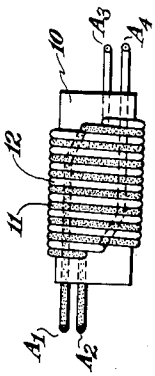


Fig. 3.

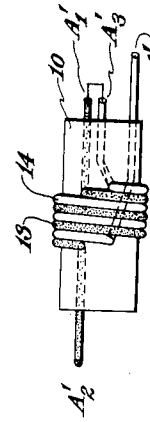


Fig. 4.

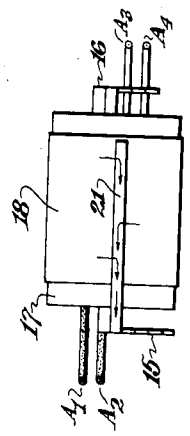


Fig. 5.

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ANTENNA COUPLING SYSTEM

Wynford R. Peterson, Nashville, Tenn.

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4 Claims. (Cl. 250—16)

This invention relates to an improved means for coupling the antenna or aerial of a radio receiving system to the radio set itself.

One of the objects of this invention is to provide a device of this type which will couple the antenna to the radio set in such way that a large proportion of the signal energy received by the antenna will be transmitted to the radio set.

A further object of my invention is to provide a device of this type which is suitable for use either with the Marconi or the doublet type of antenna.

Another object of my invention is to provide a device of the type described, which may be used with existing radio sets as an accessory or may be built into future radio sets as they are manufactured.

Another object of my invention is to provide a device of this type which is simple and cheap to manufacture, and which contains no parts likely to burn out or to get out of order.

These and other objects are attained by means of the device described in this specification and illustrated in the accompanying drawing in which

Figure 1 is a cross-section of a preferred form of my device.

Figure 2 is an end view of the same,

Figures 3 and 4 show two alternative methods of connection of a portion of my device,

Figures 5 and 6 show portions of my invention in certain stages of manufacture, and

Figures 7 and 8 are an end view and a plan view respectively of a novel form of connecting means used in my invention.

Referring now in greater detail to the drawing and to Figures 1, 2, 3, and 4 specifically, the numeral 10 indicates a tubular, non-magnetic core which may be constructed of cardboard, wood, fiber, synthetic resin or the like. Upon this core are wound the antenna coils of my device. Figures 1 and 3 show the method of winding for a device of my invention intended for use with a doublet antenna. It will be seen that there are two separate coils 11 and 12 interwound with each other upon the core 10, coil 11 being shaded so as to be more easily distinguishable from coil 12. For the same reason cross-sections of coil 11 are shown with an X inscribed in the circle while cross-sections of coil 12 are shown having a small dot at the center of the circle.

The end A2 of coil 11 is intended to be electrically connected to one of the two lead-in conductors of the doublet antenna, and the end A1 is intended to be connected to one of the antenna binding posts of the radio, it being understood that the radio used with this particular embodiment of my invention is of the type commonly used with doublet antennas, and therefore has provided thereon two antenna binding posts and a ground connection.

The end A3 of coil 12 is connected to the other of the two antenna lead-in conductors from the doublet antenna and the end A4 is connected to the other antenna binding post or connection of the radio set.

For use with radio sets designed for use with antenna lead-in, I prefer to construct the antenna lead-in. I prefer to construct the antenna coils as shown in Figure 4. The two coils 13 and 14 are interwound upon the non-magnetic core 10. These coils are interwound as were the antenna coils above described in connection with the device for use with the doublet type antennae, but in general have fewer turns.

It is to be understood that while I have, for purposes of illustration, shown coils with a certain number of turns, I do not wish to be limited to any fixed number, but may use whatever number of turns best serves the purpose under the conditions encountered in using my device with any particular radio set or antenna.

In the construction shown in Figure 4 the end A'2 is connected to the lead-in from the antenna and the end A'4 is connected to the antenna binding post of the radio set. Ends A'1 and A'3 are electrically connected together as shown.

Surrounding the coils 11 and 12 or 13 and 14, as the case may be, is a plurality of layers of insulating dielectric material such as waxed paper, friction tape, mica, fiber or the like, alternating with layers of conductive material such as tin foil, lead foil, aluminum foil, brass or copper foil, or the like. The insulating layers form complete circles or bands around the core 10 and the coils wound thereupon. The width of the insulating bands is preferably equal to the length of the core 10. The conductive layers may be made in the form of complete circles, or, may be formed with a short gap in their periphery so as not to constitute complete turns. The bands of conductive material are preferably made slightly narrower than the insulating bands and so placed with reference thereto, that the insulating bands project slightly further in each direction along the axes of the bands, than do the conductive bands, thus fully insulating each conductive

band from all the rest. Counting outward from the innermost conductive band, all of the even numbered conductive bands are electrically connected together by connecting member **15**, while all of the odd numbered conductive bands are connected together by connecting member **16**. On Figure 1 the insulating layers, or bands, are denoted by numeral **17**; the even numbered conductive bands by numeral **18** and the odd numbered conductive bands by the numeral **19**.

Connecting members **15** and **16** are constructed of a thin sheet of electrically conductive material such as tin, copper or brass, etc., and is of the general shape of parallelogram with oblique sides as shown in Figures 7 and 8. A number of equally spaced slits or cuts, **20**, are made therein parallel to the longest side forming long narrow strips or fingers, **21**, which are all attached together at one end but remain free at the other end. A connecting tab **22** is formed projecting outward at right angles to the oblique side of the parallelogram nearest the ends of fingers or strips **21** which are joined together.

Figure 5 shows in greater detail how the connectors **15** and **16** are placed in the device. After each conductive band is put in place, one of the fingers **21** is bent over so that it lies flat upon the surface of the conductive band, parallel to the axis thereof. The next succeeding layer of insulating material, when placed thereon, binds the finger **21** tightly against the surface of the conductive band forming a good electrical connection between the two, which, combined with the comparatively large cross section of finger **21** provides an exceedingly low resistance path for electrical currents flowing from the conductive band such as, for example, are indicated by the arrows in Figure 5. The arrangement of the connecting members may also be seen in Figure 2 to good advantage.

At a point between the innermost and outermost conductive bands, (which point is best determined for each individual set of conditions) instead of one of said conductive bands, is placed a coil of magnet wire **23**, the arrangement of which is best seen in Figure 6. This coil is wound directly upon one of the insulating or dielectric bands and replaces one of the conductive bands.

The end G1 of coil **23** is bent so as to lie flat against connector **15** and the tab **22** is clamped therearound and soldered thereto. The other end G2 of coil **23** is connected in a similar manner to connecting member **16**. The end G1, in use, is also connected to the outside ground, while end G2 is connected to the ground binding post of the radio set.

While I have shown and described certain preferred embodiments of my invention, it will be understood that modification and changes may be made without departing from the spirit and scope of my invention, as will be understood by those skilled in the art, within the scope of the appended claims.

I claim:

1. As an article of manufacture, an antenna coupling system comprising a non-magnetic core, two antenna coils interwound upon the core, a plurality of conductive bands surrounding said coils and coaxial therewith, a plurality of bands of insulating material interposed, one between each pair of conductive bands, a connecting member formed of conductive material in the general shape of a parallelogram with oblique sides, having a plurality of partial slits formed therein to form a plurality of relatively narrow strips joined together at one end and free at the other end, said strips being bent at substantially a right angle and one strip making electrical contact with the surface of each alternate band of conductive foil; a second connecting member similarly formed making contact with, and, electrically joining together, the remaining bands of conductive material, and a coil of wire interposed between two of the bands of insulating material, taking the place of one of the conductive bands, the ends of said coil being connected, one to each of the two connecting members, substantially described.

2. As an article of manufacture, an antenna coupling system consisting of a plurality of antenna coils for connection in series with the antenna lead-in conductors of a radio receiver, a condenser structure comprising a plurality of conductive bands separated from each other by a plurality of insulating bands, all of said bands being co-axial with said coils, a ground coil interposed within said condenser structure and co-axial therewith, in such position as to be inductively coupled to the antenna coils but staticly shielded therefrom by a portion of said condenser structure.

3. An article of manufacture comprising a coil, a fixed condenser structure of tubular form surrounding and co-axial with said coil, and a second coil interposed within said condenser structure and having its ends connected to said structure, said second coil being inductively coupled to the first mentioned coil, but being staticly shielded therefrom by a portion of said condenser structure.

4. As an article of manufacture, an antenna coupling system comprising an antenna coil, a plurality of conductive bands surrounding and co-axial with said coil, said bands being divided into two groups of alternate bands, each group being joined together, a ground coil surrounding and co-axial with said antenna coil and positioned within said groups of conductive bands, and having one end connected to one of said groups and the other end connected to the other of said groups, said ground coil being inductively coupled to the antenna coil but shielded from static charges thereon by one of said groups of conductive bands.

WYNFORD R. PETERSON.