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E. J. SCHRODER

RADIOCOIL

Filed April 20, 1925

Fig. 1.

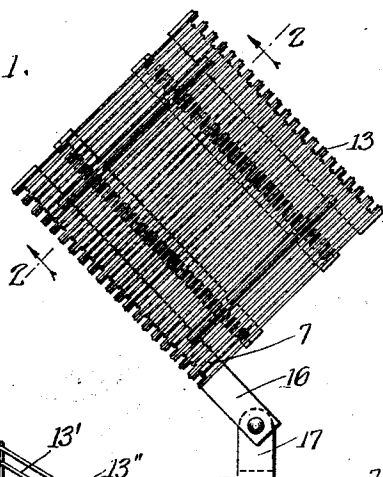


Fig. 4.

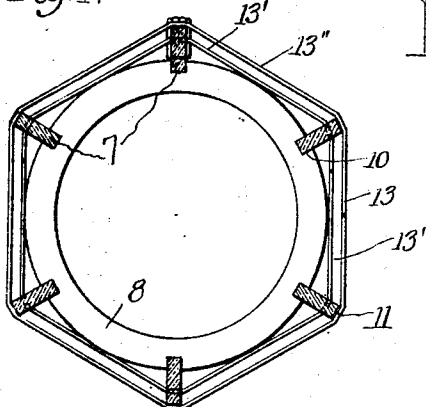


Fig. 2.

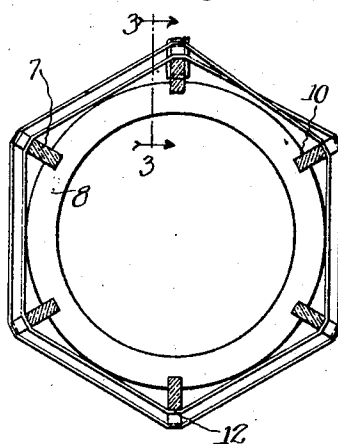


Fig. 5.

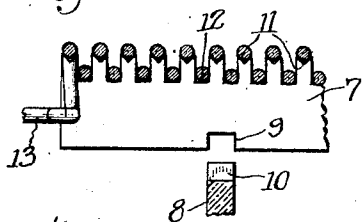


Fig. 3.

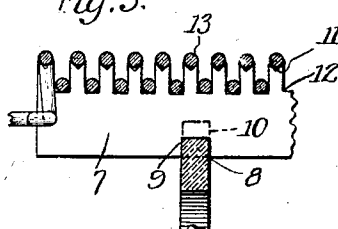


Fig. 6.

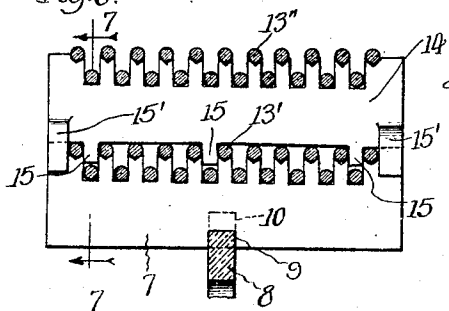
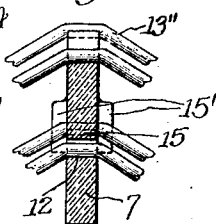


Fig. 7.



Inventor:
Edward J. Schroder
By *Shindahl, Parker & Buel*
Attys.

UNITED STATES PATENT OFFICE.

EDWARD J. SCHRODER, OF LOWELL, INDIANA.

RADIOCOIL.

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The invention relates to coils such as are used in radio communication apparatus, as, for example, inductance coils, transformers, variocouplers, variometers, etc.

5 The object of the invention generally stated is to produce a coil of advantageous construction, in which distributed capacity and absorption losses are reduced to a minimum.

10 With this object of the invention in view, the salient feature of my improved coil is a frame having a plurality of bars or ribs supported in longitudinal circumferentially spaced relation about the axis of a pair of
15 longitudinally spaced transverse supporting members or rings, the outer edges of the ribs being provided with closely spaced notches, alternately shallow and deep, adapted to receive the successive convolu-
20 tions of one or more wires wound on the frame. This construction is advantageous for straight space wound coils in that adjacent convolutions do not contact but are spaced apart to insure low capacity losses; approximately the same amount of wire
25 may be wound on the frame as upon a tube of equal dimensions but without permitting the convolutions to come in contact with each other; the parts of the frame are held
30 in assembled relation by the wire coiled thereon, thus avoiding the use of screws or other metallic fastening devices and reducing the dielectric material in the magnetic field to a minimum; the frame can be sup-
35 plied by the manufacturer at a low cost and in a knocked-down form; and it is capable of being quickly and easily assembled and wound without the exercise of especial skill.

40 In the accompanying drawings, wherein I have illustrated a preferred form of my invention, Figure 1 is a side elevational view of an inductance coil illustrating one manner in which it may be adjustably supported.

45 Fig. 2 is a transverse sectional view through the coil taken approximately in the plane of line 2—2 of Fig. 1 but on an enlarged scale.

50 Fig. 3 is a fragmentary longitudinal sectional view taken approximately in the plane of line 3—3 of Fig. 2.

Fig. 4 is a view similar to Fig. 2 but showing a different form of winding.

Fig. 5 is a fragmentary detail view show-

ing the interfitting character of the ribs and their supporting rings.

Fig. 6 is a fragmentary sectional view showing the employment of a double series of guide bars or ribs as, for example, in the construction of special coils.

Fig. 7 is a sectional detail view taken in the plane of line 7—7 of Fig. 6.

My improved coil comprises generally a frame of suitable dielectric material such for example as hard rubber, and about
65 which one or more wires are wound to form one or more coils. The construction is such that the wires may be wound in various ways as desired depending upon the type of coil which it is desired to construct. Here-
70 in I have shown, by way of example, the frame wound with a single wire (Figs. 1, 2 and 3) to produce an inductance coil, and with two wires (Fig. 4) to form the pri-
75 mary and secondary respectively of a radio frequency transformer. Obviously other methods of winding may be employed if desired, it being understood that the invention is not limited to any particular form of
80 winding.

The frame comprises a plurality of elongated guide bars or ribs 7, six being herein shown, and one or more (herein two) supporting members in the form of rings 8. The ribs 7 are provided near opposite ends
85 and at their inner edges with notches 9, (Fig. 5) and the rings are provided at equidistantly spaced points in their outer peripheries with transverse notches 10. The notches 9 are made of a width adapted to receive the rings 8 and the notches 10 are likewise of a width to receive the ribs 7. The ribs, therefore, may be readily assem-
90 bled onto the rings, the latter being inserted in the notches 9 at the opposite ends of the ribs and the ribs in turn being entered into the notches 10 in the rings with the notches 9 and 10 coinciding. When thus assembled the ribs extend longitudinally and are spaced apart substantially equidistantly
100 about the center of the rings 8 which is the axis of the coil to be formed. Initially the ribs are held in place on the rings by frictional engagement therewith, and if desired one end of the frame may be temporarily held together by a suitable wire while the coil is wound, beginning from the other
105 end of the frame. When the winding oper-

ation has been completed, the ribs are held by the coil or coils firmly in interlocking relation with their supporting rings, as above indicated, both the ribs and rings are made of insulation material such as hard rubber and being secured together by the coil or coils there is a minimum of dielectric material in the magnetic field.

In order that the frame, as thus constructed, may receive approximately the same amount of wire as a tube of similar dimensions, but without necessitating contact between the adjacent convolutions of the wire I provide transverse grooves in the outer edges of the ribs 7 which may be of a width substantially equal to the diameter of the wire employed, and preferably these grooves are arranged in closely spaced relation longitudinally of the ribs. Also they are made alternately shallow and deep so that adjacent convolutions may be wound in the shallow and deep grooves respectively. The shallow grooves are herein designated by the numeral 11 and the deep grooves by the numeral 12, the wire being indicated at 13. The result is that the adjacent convolutions are spaced apart radially as well as longitudinally of the frame, thus minimizing distributed capacity losses.

If desired, instead of winding a single coil upon the frame, separate wires may be wound respectively in the shallow and deep grooves to form the primary and secondary coils of a radio frequency transformer. In Fig. 4 I have shown this form of winding, the primary being indicated at 13' and the secondary at 13''. Also if desired the primary may consist of a few turns wound in both notches at one end of the frame, and the secondary can be similarly wound on the balance of the frame.

Or, if a greater number of turns is desired in each of the coils, a second series of ribs 14 may be employed in addition to the ribs 7. In this case, the ribs 14 have spaced depending portions or teeth 15 adapted to enter the deeper notches or grooves 12, together with saddle portions 15' at opposite ends adapted to straddle the ribs 7 at opposite ends thereof. With this construction, the primary coil 13' is wound first around the inner ribs 7 and then the outer ribs 14 are arranged upon the inner ribs 7 whereupon the secondary coil 13'' is wound.

The arrangement shown in Figs. 5 and 6 is not limited to use with a transformer but lends itself readily to use as an inductance coil or other types of coils, it being apparent that any number of additional sets of spacer ribs may be employed as desired, as shown in Fig. 6, only one supporting ring may be sufficient where the ribs employed are of short length. In all cases, however, the adjacent convolutions of the wire or wires may be spaced apart and because of the absence

of any fastenings and a minimum of dielectric materials in the magnetic field, the coil has a high efficiency, there being a substantial absence of absorption or capacity losses.

In Fig. 1 I have illustrated one manner of supporting an inductance coil. In this instance one of the ribs 7 is extended beyond the end of the frame proper as shown at 16 and it is pivotally secured at its free end upon a suitable bracket 18 for purposes of adjustment.

It will be observed that the construction which I have provided is exceedingly simple and hence inexpensive to manufacture. It may thus be supplied to the user at a low cost and it lends itself readily to the construction of a desired coil without the exercise of especial skill, it being possible readily to determine the size of the coil by the number of notches provided. Notwithstanding the fact that the adjacent convolutions are spaced apart, approximately the same amount of wire may be wound upon my improved coil as in the case of a tube of similar dimensions, and less wire is required than in the case of spider web, basket wound or similar coils.

Also it will be apparent that by virtue of the construction provided a minimum of dielectric material is employed in the coil, and there is an entire absence of conducting material.

While I have herein described my invention with considerable particularity, it is contemplated that various changes in the construction and arrangement employed may be made by those skilled in the art without departing from the spirit and scope of my invention. Further it should be understood that it is not intended to limit the invention to any particular form or manner of winding for many methods other than those herein set forth will doubtless occur to those skilled in this art.

I claim as my invention:

1. A coil frame having a plurality of wire sustaining ribs supported in circumferentially spaced substantially parallel relation, said ribs having alternate deep and shallow grooves for receiving the wire of the coil to be wound upon the frame whereby to maintain successive convolutions of said coil spaced apart but adjacent longitudinally of the frame.

2. A coil frame having a circular series of ribs arranged in substantially parallel relation and provided at their outer edges with alternately deep and shallow wire receiving grooves for guiding successive convolutions of a coil to be wound on the frame.

3. A coil frame having a circular series of ribs arranged in substantially parallel relation and provided at their outer edges with alternately deep and shallow wire re-

ceiving grooves for guiding successive convolutions of a coil to be wound on the frame, and a second series of ribs similarly arranged but providing wire guiding grooves spaced radially outwardly from the grooves of the first series of ribs.

4. A coil frame having a circular series of ribs arranged in substantially parallel relation and provided at their outer edges with alternately deep and shallow wire receiving grooves for guiding successive convolutions of a coil to be wound on the frame, a second series of ribs similarly arranged but providing wire guiding grooves spaced radially outwardly from the grooves of the

first series of ribs, said second series of ribs being mounted upon the first series of ribs and having portions interengaging with the ribs of said first series to prevent relative axial and circumferential movement.

5. A coil frame comprising a plurality of ribs supported in a circular series longitudinally of the axis of the coil to be formed, said ribs being constructed of insulating material and having alternately deep and shallow wire-retaining grooves.

In testimony whereof, I have hereunto affixed my signature.

EDWARD J. SCHRODER.