Nov. 18, 1924. 1,515,635

L. E. WACKERLE

INDUCTANCE COIL FOR RADIOCOMMUNICATION

Filed April 2, 1923 2 Sheets-Sheet 1

Fig. 1.

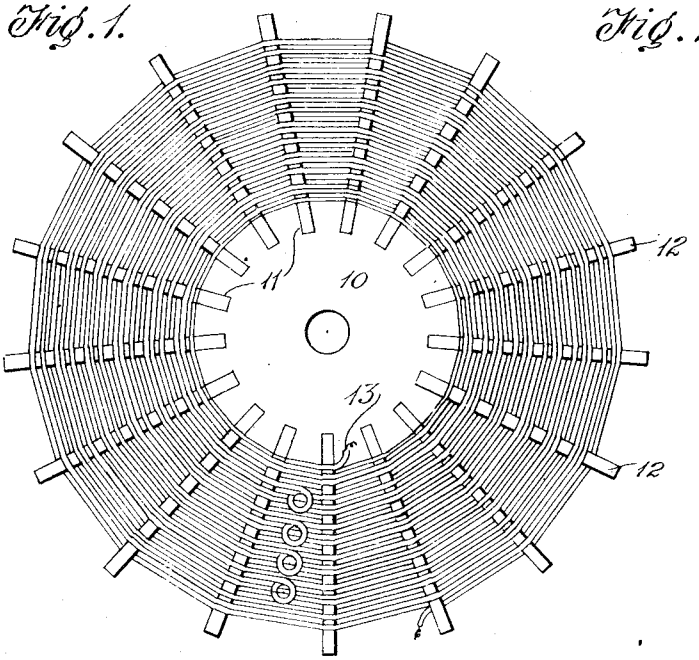


Fig. 2.

Fig. 3.

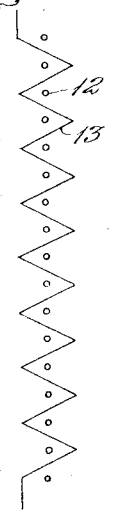


Fig. 4.

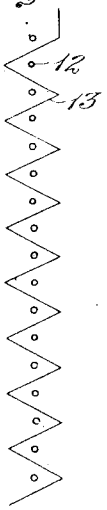


Fig. 5.

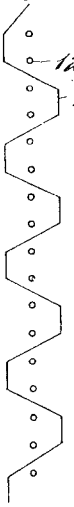


Fig. 6

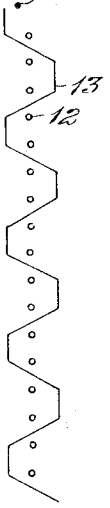


Fig. 7.

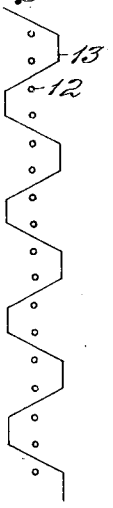
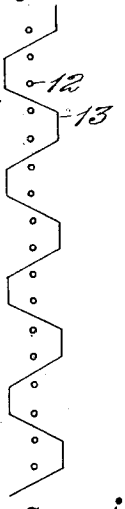


Fig. 8.



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INDUCTANCE COIL FOR RADIOCOMMUNICATION

Filed April 2, 1923 2 Sheets-Sheet 2

Fig. 9.

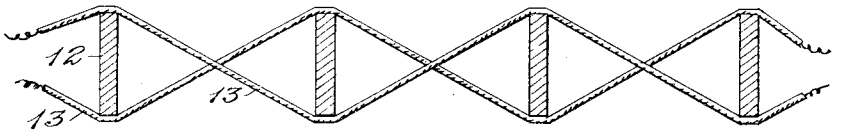


Fig. 10.

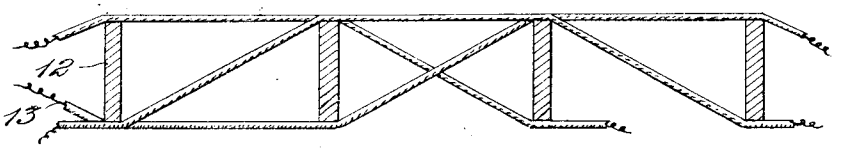


Fig. 11.

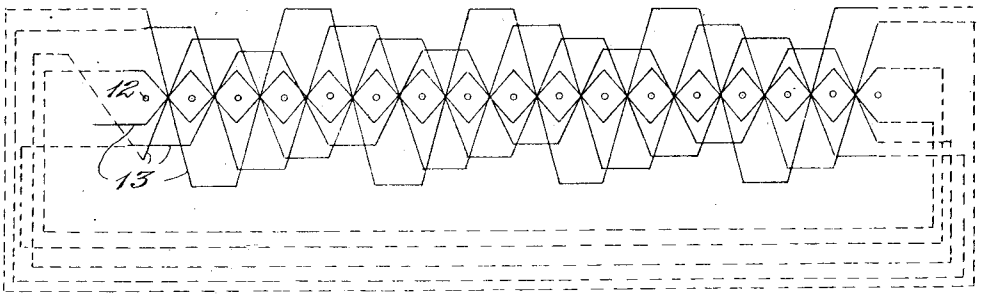


Fig. 12.

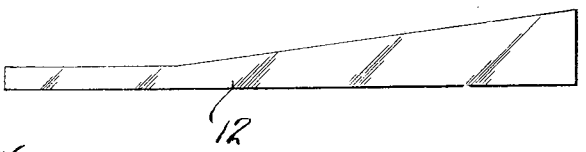
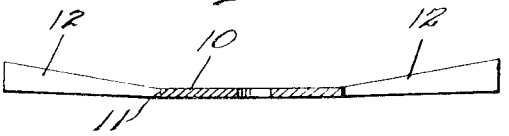


Fig. 13.



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Patented Nov. 18, 1924. 1,515,635

UNITED STATES PATENT OFFICE.

LEWIS E. WACKERLE, OF JACKSONVILLE, ILLINOIS.

INDUCTANCE COIL FOR RADIOCOMMUNICATION.

Application filed April 2, 1923. Serial No. 629,521.

To all whom it may concern:

Be it known that I, LEWIS E. WACKERLE, a citizen of the United States, residing at Jacksonville, in the county of Morgan and State of Illinois, have invented new and useful Improvements in Inductance Coils for Radiocommunication, of which the following is a specification.

This invention relates to the art of transmitting electrical impulses without the use of wires between the stations, the art being commonly known as radio communication.

More particularly the invention relates to an inductance coil for use in connection with radio signalling and other like arts, the coils being adapted for service either alone or in combination with like coils in the construction of inductances, variometers, variocouplers, and other similar devices.

One of the chief objections to many of the existing forms of coil wherein the coil is at all of a compact arrangement is that the varnish or other medium used to retain the wires in their position acts as a dielectric, and in consequence the coil not only acts as an inductance, but as an inherent capacity so that it acts in a measure as a condenser. This is very objectionable in many cases, and one important object of the present invention is to provide an improved construction of coil which is so wound that the use of a dielectric to hold the windings in position will be rendered unnecessary. To the same end, another important object of the invention is to provide an improved construction of coil wherein the successive windings of the coil will be nearly free from all parallelism between successive windings.

A third important object of the invention is the provision of an improved construction of coil so arranged that the coil is wound in a dish shape, one side of which is concave, thereby producing what may be termed a field focus.

A fourth important object of the invention is to provide an improved form of coil wound in dish shape wherein a series of successive windings are so arranged that no two of the windings have parallel paths.

With the above and other objects in view as will be hereinafter apparent, the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings and specifically claimed.

In the accompanying drawings like characters of reference indicate like parts in the several views, and:

Fig. 1 is a side elevation of the coil constructed in accordance with this invention.

Fig. 2 is a transverse section taken diametrically through such a coil.

Fig. 3 is a schematic view of the first winding.

Fig. 4 is a schematic view of the second winding.

Fig. 5 is a schematic view of the third winding.

Fig. 6 is a schematic view of the fourth winding.

Fig. 7 is a schematic view of the fifth winding.

Fig. 8 is a schematic view of the sixth winding.

Fig. 9 is an enlarged detailed view showing certain of the radiating arms and the first and second convolutions of the wiring.

Fig. 10 is a view similar to Fig. 9, showing the third, fourth and fifth convolutions of the wiring.

Fig. 11 is a general wiring diagram showing six complete convolutions in their relation to each other.

Fig 12 is a detail view of one of the radiating arms.

Fig. 13 is a detail cross sectional view of a modified form of the internal disk showing one side thereof concave and the other side convex.

In the construction of this coil there is provided an internal disk or hub 10 having peripheral slots 11 formed therein which receive the smaller and inner ends of spokes 12 which are formed from flat strips of material tapered from end to end, and set radially into the hub. These strips are set so that their flat sides are substantially parallel with the axis of the hub, and thus present their edges laterally with respect to the hub. Preferably these strips are inclined only on one side or are dished so as to present a concave arrangement for the edges of the strip at one side of the hub, and either flat or generally convex arrangement on the other side of the hub.

In the windings of the coil a wire 13 is taken and secured to one of these strips, or, as they may be called, spokes, at the point of its junction with the disk or hub. The wire is then led around the hub being laid at one edge of one spoke and the

opposite edge of the next succeeding spoke throughout so that the first convolution, thus formed, is woven back and forth from one side of the disk to the other at single spoke intervals. It is preferred that the number of spokes being uneven, and with an uneven number of spokes, the second convolution is carried on around the spokes in the same manner as the first convolution, but owing to the fact that the number of spokes is uneven, the second convolution of the wire will cross the first convolution of the wire between each pair of adjacent spokes. These two steps in the winding are clearly illustrated in Figures 3 and 4. The third convolution of the series is formed by weaving the wire back and forth in such a manner as to leave two spokes on one side of the wire and the next two spokes on the other side thereof. In other words, in the first two convolutions, the wire lies on opposite sides of successive spokes while in the third convolution the wires lie on opposite sides of pairs of successive spokes. The fourth convolution is formed like the third convolution, but owing to the fact that the spokes are uneven in number, this fourth convolution will be staggered one spoke around the coil.

The fifth convolution is formed like the third and fourth, but is staggered one more spoke around the coil so that the wires of the fifth convolution cross the wires of the third convolution at the point where the respective convolution shifts from one side to the other of the spokes. The sixth convolution is similar to the fifth convolution, but staggered one spoke farther around, and by reason of this arrangement, the wires of the sixth convolution cross the wires of the fourth convolution where they shift from one side to the other of the spokes.

If more than six convolutions are made, as is commonly the case, the seventh convolution is wound like the first, the eighth like the second, and so on. In other words, the series of six convolutions just described are repeated indefinitely as many times as may be necessary to form the complete coil. With this arrangement it will be seen that no two successive convolutions are wound in the same manner, and that in each convolution the wire also contacts with the supporting spokes at the thin edges of these spokes so that even if a dielectric, such as varnish, shellac, or the like is employed to hold these wires in position on these edges, the adjacent wires are only parallel for such an extremely short distance as to be negligible and consequently there is practically no production of a capacity in the winding of this coil.

It is to be noted that in some instances it is found desirable to omit the first two of the series of convolutions. As for instance, in winding smaller coils only the third, fourth, fifth and sixth convolutions are used in the series, and this series is repeated as many times as may be necessary to wind the small coil.

In any event, it will be noticed that each convolution consists of a wire woven back and forth across a set of spokes, and that each successive convolution is staggered with respect to the next antecedent convolution.

By reason of the dish arrangement of the spokes, it will also be obvious that the field surrounding the coil will have its greatest intensity at a point, which may be termed the focus of the coil, substantially on the axis of the coil and at the side thereof which is concave.

It will also be obvious to those skilled in the art that these coils may be combined in various ways for the construction of such devices as variometers, variocouplers and the like.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, therefore desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

Having thus described the invention, what is claimed as new is:

1. A coil of the class described comprising a central disk constituting a hub, spokes radiating from the edge of said hub, and a winding on said spokes consisting of a wire woven around said spokes in a series of convolutions, the first convolution of the series having the wire wound to lie on opposite sides of successive single spokes, the second convolution of the series being woven to have the wire lie on opposite sides of successive spokes but being staggered one spoke with relation to the first convolution, the third convolution being arranged with the wire on opposite sides of successive sets of spokes, the fourth convolution being similar to the third convolution but staggered one spoke with respect thereto, the fifth convolution being similar to the fourth convolution but staggered one spoke with respect thereto, and the sixth convolution being similar to the fifth convolution but staggered one spoke with respect thereto, said series of convolutions being repeated in arrangement to complete the coil.

2. A coil of the class described comprising a hub, a series of spokes radiated from said hub, and a winding consisting of wire arranged in convolutions supported on said spokes, each convolution being woven back and forth across the spokes, each successive

convolution being arranged in staggered relation to the next antecedent convolution, said spokes having one edge inclined with respect to a plane passing perpendicularly through the axis of the hub, said inclined edges being arranged to form a shallow dish in one side of the coil.

3. In a coil of the class described, a hub, a series of spokes radiating from the hub, there being an odd number of spokes in the series, and a coil wound on said spokes and consisting of a wire woven back and forth between the spokes, said wire being arranged to lie on one side of a pair of spokes and on the opposite side of the next succeeding pair, each convolution being staggered with respect to the next antecedent convolution, said spokes having one edge inclined with respect to a plane passing perpendicularly through the axis of the hub, said inclined edges being arranged to form a shallow dish in one side of the coil.

4. In a coil of the class described, a hub, a series of spokes radiating from the hub, there being an odd number of spokes in the series, and a coil wound on said spokes and consisting of a wire woven back and forth between the spokes, said wire being arranged to lie on the one side of a pair of spokes and on the opposite side of the next succeeding pair, each convolution being staggered one spoke around the hub with respect to the next antecedent convolution, said spokes having one edge inclined with respect to a plane passing perpendicularly through the axis of the hub, said inclined edges being arranged to form a shallow dish in one side of the coil.

5. A coil of the class described comprising a central disk constituting a hub, spokes radiating from the edge of said hub, and a winding on said spokes consisting of a wire woven around said spokes in a series of convolutions, the first convolution of the series having the wire wound to lie on opposite sides of successive single spokes, the second convolution of the series being woven to have the wire lie on opposite sides of successive spokes but being staggered one spoke with relation to the first convolution, the third convolution being arranged with the wire on opposite sides of successive sets of spokes, the fourth convolution being similar to the third convolution but staggered one spoke with respect thereto, the fifth convolution being similar to the fourth convolution but staggered one spoke with respect thereto, the sixth convolution being similar to the fifth convolution but staggered one spoke with respect thereto, said series of convolutions being repeated in arrangement to complete the coil, said spokes having one edge inclined with respect to a plane passing perpendicularly through the axis of the hub, said inclined edges being arranged to form a shallow dish in one side of the coil.

In testimony whereof I affix my signature.

LEWIS E. WACKERLE.