

June 12, 1928.

H. H. IDE

1,672,889

COIL

Filed Dec. 4, 1924

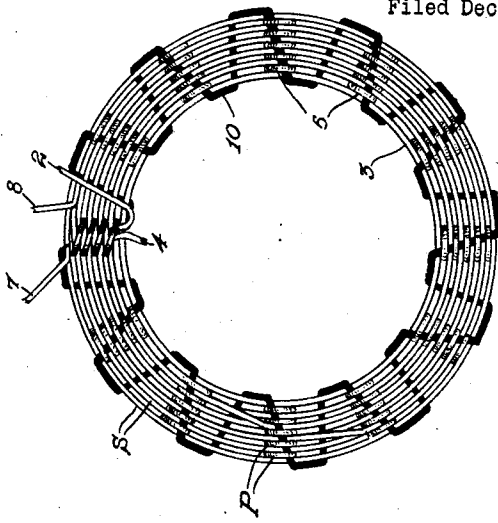


Fig. 3.

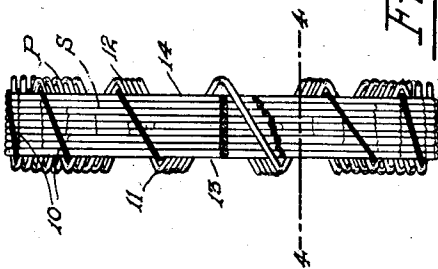


Fig. 2.

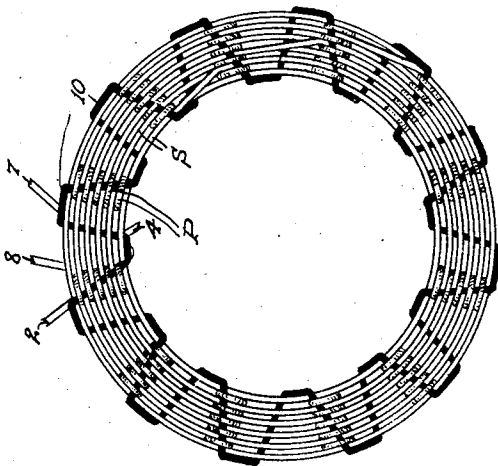


Fig. 1.

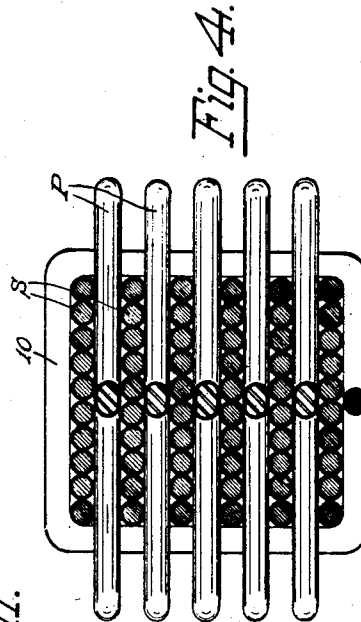


Fig. 4.

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UNITED STATES PATENT OFFICE.

HARRY H. IDE, OF LA GRANGE, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

COIL.

Application filed December 4, 1924. Serial No. 753,926.

My invention relates to coils or transformers, and has to do more particularly with transformers of the air core type, which in the wireless or radio art, are known as radio frequency transformers and which are used in circuits of radio receiving sets, although the coils are adapted to be used for many other purposes.

In radio frequency transformers of the above type, the primary and secondary windings each comprise a plurality of turns or convolutions of wire wound upon a suitable supporting tube of insulation material. It has been found that large losses occur, due to leakage of the coils and material capacity owing to the fact that the convolutions of wire are in contact with the supporting tube, and an object of my invention is to construct a transformer of the above type, which will obviate a large percentage of the loss found in coils of the prior art.

A feature of my invention is the provision of an improved coil of the above type, in which each layer of the primary winding of the coil engages the convolutions of adjacent layers of the secondary winding to obtain close coupling between the primary and secondary windings of the coil.

Another feature of my invention is the novel means employed in winding the coil of my invention in which each convolution of the primary winding of the coil lies between two adjacent layers of convolutions of the secondary winding and in which the completed coil is self-supporting without the use of any substance, such as shellac or the like, for holding the turns of wire in position.

The features just pointed out, as well as others, relating to details of construction and combinations of parts, will be hereinafter more particularly pointed out in the ensuing specification and appended claims.

For a more complete understanding of my invention, reference may be had to the accompanying drawings in which like reference characters in the several views denote like parts, and in which:

Fig. 1 is a face view of the transformer coil of my invention;

Fig. 2 is a right side view of Fig. 1;

Fig. 3 is a reverse face view of the transformer coil, and

Fig. 4 is a sectional view along the line 4-4 of Fig. 2.

Referring now more in detail to my invention as illustrated in the accompanying drawing, the transformer coil of my invention is ring shaped and comprises a primary winding P and a secondary winding S and for the purpose of winding the transformer of my invention, I provide a suitable winding mandrel with two parallel rows of removable pins equally spaced apart around the periphery of the winding mandrel but staggered in relation to each other in the two rows for purposes as will presently be described. In placing the first layer 3 of convolutions on the mandrel the inside terminal 2 of the secondary winding S is anchored to suitable means on the mandrel and upon rotation of the mandrel the first layer 3 of convolutions of wire of the secondary winding S is placed upon the mandrel between the two parallel rows of pins in the mandrel, and which as illustrated in the accompanying drawing is ten in number. After the first layer 3 has been placed upon the mandrel, the first turn 5 of the primary winding P is now placed over the first layer 3 of the secondary winding S. The inside terminal 4 of the primary winding P is anchored and the first turn 5 of the primary is woven in and out around the two rows of pins permitting the turn 5 of the primary winding P to be placed thereon in a "zig-zag" form due to the staggered relation of the pins in the two parallel rows. After the first turn 5 of the primary winding has been placed on the first layer 3 of convolutions of the secondary winding S, the next layer of convolutions of the secondary winding S is placed on top of the first turn 5 of the primary winding P, and successive layers and turns of the secondary and primary windings S and P are placed on the mandrel until the requisite number of turns or layers of the secondary winding S have been placed thereon and the requisite number of turns of the primary winding P have been placed thereon. After this building up of the primary and secondary windings P and S

has been accomplished, the terminal ends 7 and 8 of the respective windings P and S are temporarily secured until the coil can be fastened together to form a unit structure. To
5 secure the turns of the coil in position and to form a unitary self-supporting structure, a binder twine or cord 10 is woven through the aligned loops 11 and 12 of the turns of the primary windings P, protruding from
10 the respective sides 13 and 14 of the completed coil, which secures the layers 3 of the secondary winding S against displacement, and also secures the turns 5 of the primary winding P against displacement. It is, of
15 course understood, that the wire which forms the primary and secondary windings is wire which is provided with suitable insulation to prevent adjacent turns of the secondary winding from becoming short circuited and
20 for preventing the primary winding from making electrical contact with the secondary winding.

By this method of construction, it is readily apparent that I have produced a coil in
25 which each turn of the primary winding P contacts with the convolutions of adjacent layers of the secondary winding S to produce a coil or transformer in which is obtained close coupling effect between the pri-
30 mary and secondary windings P and S and in which the successive layers of the secondary winding S are equally spaced by the turns on the primary winding P and the turns of the primary winding P are in turn
35 spaced apart by the layers of the secondary winding S.

While I have described a particular form of coil and a specific number of turns for the primary and secondary windings P and
40 S, it is readily understood that different size coils may be constructed with different ratios of turns between the primary and secondary windings P and S, and that struc-
45 tural changes will readily suggest themselves to those skilled in the art, without departing from the spirit of the invention, and I, therefore, aim to cover all such changes

and modifications as come within the spirit and scope of the appended claims.

What I claim as new and desire to secure 50 by United States Letters Patent, is:

1. A transformer of the character described including a primary and a secondary winding, said secondary winding comprising
55 a strand of wire wound in concentric layers of convolutions and forming the innermost and outermost layers and the alternate layers throughout the said transformer, said primary winding comprising a strand of
60 wire wound back and forth across the faces of the layers of said secondary winding and lying between adjacent layers and engaging the convolutions of the layers of said secondary winding to maintain the said layers
65 in spaced relation, and means wound around the layers of the said primary and said secondary to hold the layers in position relative to each other.

2. A transformer of the character described including a primary winding and a
70 secondary winding, said secondary winding comprising a strand of wire wound in concentric layers of convolutions, said winding forming the innermost layer upon which the
75 remainder of the transformer is wound and the outermost layer which assists in securing the other layers in position, said primary winding comprising a strand of wire wound
80 back and forth across the faces of the layers of said secondary winding and lying between adjacent layers and engaging the convolutions of the layers of said secondary winding and serving to separate the layers of
85 said secondary winding, said primary winding extending outside the layers of the said secondary winding, and a binding cord wound around the layers of the said primary
90 and secondary and extending through the extended portions of said primary to hold the said layers in position relative to each other.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 2d day of December, 1924.

HARRY H. IDE.