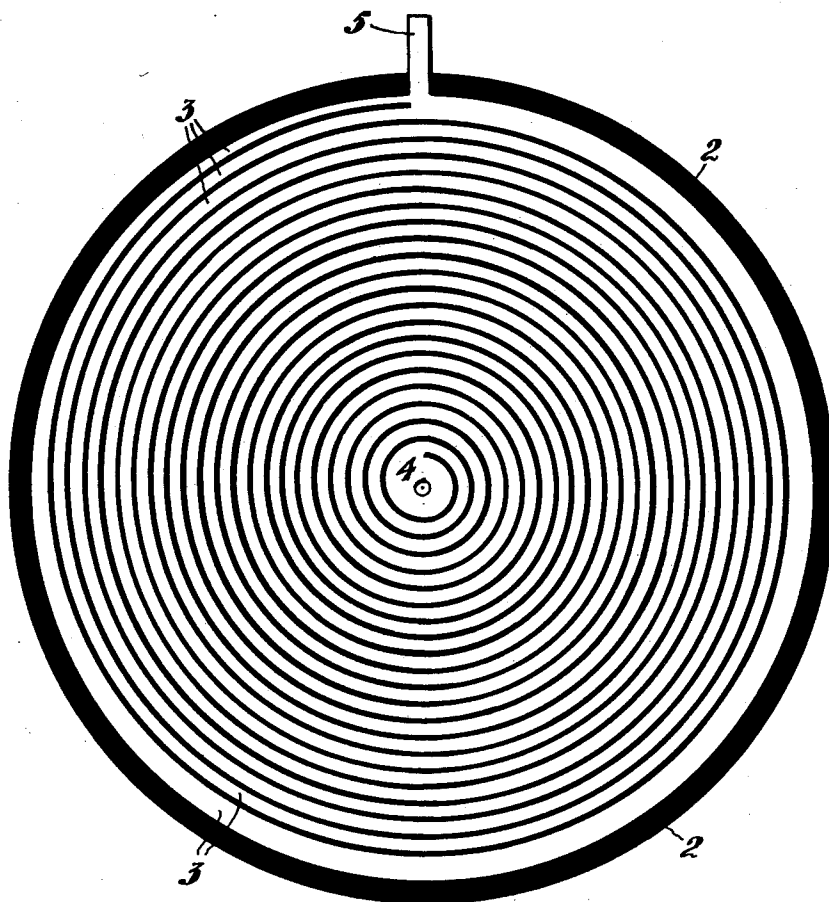


Dec. 22, 1931.

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INDUCTANCE COIL PARTICULARLY ADAPTED FOR  
USE WITH RADIO TUNING DEVICES  
Filed Feb. 14, 1929

1,837,678



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## UNITED STATES PATENT OFFICE

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INDUCTANCE COIL PARTICULARLY ADAPTED FOR USE WITH RADIO TUNING DEVICES

Application filed February 14, 1929, Serial No. 339,939, and in Australia September 12, 1928.

This invention relates to an improved construction of inductance coil for use with radio receivers and other electrical apparatus.

The chief object of the invention is to provide an inductance coil of simple and cheap manufacture and designed to have a minimum self-capacity between its adjacent turns or coils.

A further object is to provide an inductance coil of low self-capacity but having an extensive surface area to thus provide a lower resistance to radio-frequency or high-frequency currents than is obtainable in inductance coils of present types wound from single wire of circular cross-section.

A further object of the invention is to provide an inductance coil of low self-capacity and high inductance whose magnetic field is, by virtue of the particular form and design of the coil, restricted to a comparatively small space, this feature being particularly desirable where two or more tuned circuits are incorporated in a radio-receiving set.

The improved coil construction is characterized in that it is not wound, but has its coils formed by a thin conducting layer of spiral configuration applied by printing, gold blocking, painting, metal spraying or electro-deposition or equivalent means to the surface of a dielectric base, such as bakelite, celluloid, mica, etc.

Alternatively, the coils may be self-supporting and produced by any of the known methods of mould or die casting, mechanical cutting, stamping from sheet metal or the like.

The accompanying drawing illustrates a plan or face view of one preferred form of the improved inductance coil. This coil comprises a base member 2 of di-electric material, such as ebonite or treated paper, having a thin conducting layer applied on its upper surface in such a manner as to form a coil 3 of spiral configuration. This coil may be produced in various ways.

According to one method, a printing block is first made to print a spiral having the desired dimensions, and an impression from this block is made upon the di-electric base 2 in gold size or similar adhesive substance.

A sheet of metallic leaf, such as gold leaf or silver leaf, is now placed over the impression thus formed and is caused to adhere to the portions of the base 2 treated with the gold size or adhesive. The metallic leaf covering those portions of the base not coated with gold size or adhesive is now removed by rubbing lightly or similar procedure, thus leaving the spiral coil 3 reproduced on the base in metallic leaf.

Alternatively, an approved gold blocking or metal blocking process may be utilized for the purpose of forming a coil according to the invention.

In the preferred method, however, the spiral coil 3 is reproduced on the di-electric base 2 by direct printing, using a suitable metallic conducting ink. Other methods may be employed for applying the conducting layer such as, for example, metal spraying through a stencil, or electro-depositing processes.

The coil has a central portion 4 and an extended end portion 5 both adapted to receive terminals of any approved type or to make contact as with another circuit. If desired, suitable taps may be provided in the length of the spiral coil 3 to enable the same to be used as a tapped inductance.

The spiral coil 3 of the improved inductance coil is characterized by having very thin edges of metal presented towards each other between the adjacent turns or coils. Consequently, the inherent or self-capacity of the coil is very low. By reason of the extensive surface area of the turns of the spiral coil 3, a very low resistance is offered to high-frequency currents and a much more confined magnetic field exists as compared with existing types of coils wound with wire of circular cross-section. These advantages are of considerable importance when the improved inductance coil is used in radio apparatus.

The extensive surface area of the improved coil enables two or more of said coils to be used very effectively for close coupling radio circuits similarly to honeycomb, duo-lateral and like types of coils. In this form, the coils are fitted together flatwise, and, if desired, means may be provided for varying

their proximity to thus vary the degree of capacitive and inductive coupling.

Similarly, two or more of the improved coils may be connected in series, and means may be provided for varying their proximity to thus obtain a variometer effect, or alternatively may be inductively coupled as in a vario-coupler or radio-frequency transformer, the degree of capacitive and inductive coupling being readily variable.

In the manufacture of the improved inductance coil, the number of turns in the spiral 3 and the surface area of the turns are variable as found desirable to provide any required inductance-capacity value according to the particular circuit in which the coil is to be used.

The improved coil is of such character that it is eminently adaptable to mass production whereby it can be manufactured much more economically to a predetermined definite electrical standard than can coils of ordinary types produced by wire winding operations, thus ensuring a standard of interchangeability or duplication of circuits not hitherto possible.

It will be seen that the invention provides a form of coil which—particularly when two or more of the same are together used—by virtue of its special design and the thin edge-to-edge disposition of its turns, isolates its inherent or self-capacity from its natural inductance, and its said self-capacity and inductance may be said to have been thus separately “lumped” in a manner which renders them nevertheless arranged so to be each active and capable of being readily adapted for use with a tuned radio circuit whose tuning is effected by the sum product of, and ratio between, its capacity and inductance.

A few adaptations for the use of an improved coil or coils according to the invention, it is thought, may with advantage be mentioned herein and by virtue of the particular construction of a coil according to the invention and its particular characteristics as before-mentioned, many other special applications other than hereinafter dealt with will suggest themselves to those persons who are familiar with the art of designing radio and electrical components or circuits.

For example, a coil according to the invention may function as a wavemeter coil where the essentials are an interchangeable coil of low self-capacity and non-variable inductance to facilitate standard calibration.

Again, a coil according to the invention may function as a radio frequency choke where low self-distributed capacity, a confined magnetic field and a low volt turns ratio are absolutely necessary. To effect this it is usual to wind a solenoid coil of small diameter in several sections or “pies”. It will be seen that the design of the improved coil lends itself readily to the construction of a

unit where these conditions obtain. A number of coils are connected in series and spaced to form the sections or “pies”. The connections from segment to segment or “pie” to “pie” may be made by a simple snap-in method, and thus the inductance of the choke is governed by the number of “pies”. This flexibility is a desirable feature when changing from upper to lower wave bands.

Again, a coil according to the invention may function as a wavetrapp where a coil and condenser are imposed in the aerial circuit and tuned to the frequency of the unwanted signal by the variable capacity.

In utilizing the improved coil, two or more are connected in series, the capacity across them varying as their proximity to each other varies. A suitable aerial tapping is taken from the intersection between coils.

Again, a number of coils according to the invention may together function as a radio frequency transformer where a primary winding is inductively and capacitively coupled to a secondary winding. These windings may be fixedly tuned by virtue of the degree of coupling and turn ratio, or alternatively the primary or secondary, or both, may be capacitively tuned to vary the frequency response. In applying the improved coils a very flexible transformer results, the tuning being effected by the degree of coupling between primary and secondary and the amount of capacity introduced across the secondary; these factors being controlled by a variable position of the coils in respect to each other.

It is of course essential that the secondary be composed of at least two sections to obtain variable capacity across same.

Again, astatic and non-inductive coils may be made by superimposing one spiral upon another—such as for example by using a double-cut spiral—the inner ends being connected together and the outer ends being the beginning and end respectively of the circuit. Alternatively, two coils may be connected together so that their individual fields are opposed to each other.

Still again, where, as in fixedly tuned circuits, the best capacity and inductance ratio for a given wavelength are predetermined by the number of turns and effective surface area of two or more of the improved coils in respect to each other, the wavelength response of such a unit may be accurately checked and adjusted with a wavemeter and then sealed in wax, resin or similar insulator.

A number of popular wavelengths may be made up and incorporated in a receiving set where the selection of the wanted station is effected by the simple expedient of switching the suitable unit into circuit.

Again, where, as in balanced circuits, it is necessary to repeat a value of inductance and capacity, the method of manufacture and

construction of the improved coil automatically repeats the physical and electrical properties of each coil. Further it is possible to readily find the exact electrical centre of an inductance by joining two coils in series and tapping at the intersection.

What I do claim is:—

1. An inductance coil designed primarily for use with radio tuning devices, consisting of a dielectric base having a conducting layer of spiral configuration printed thereon in metallic ink.

2. An inductance coil according to claim 1, in which the printed coil has a central portion and an extended end portion to make contact with another circuit or to receive terminals.

In testimony whereof I affix my signature.

SAMUEL CHARLES RYDER.