Dec. 4, 1928. 1,694,091

W. H. ADAMS

SECTIONAL INDUCTION COIL

Filed Oct. 13, 1925 2 Sheets-Sheet 1

Fig. 1.

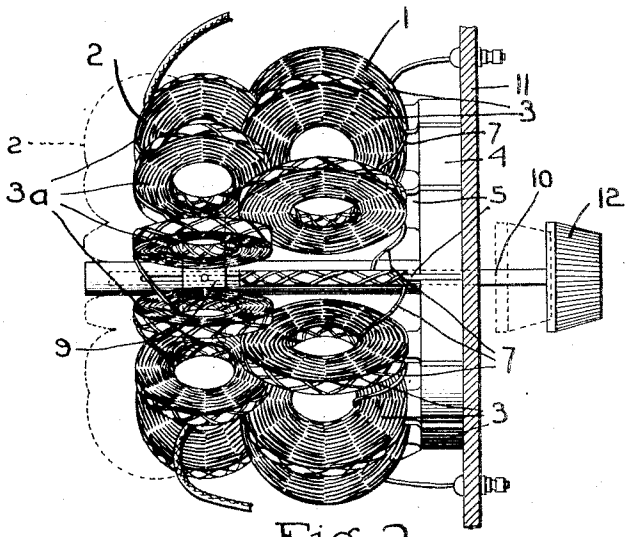

Fig. 2.

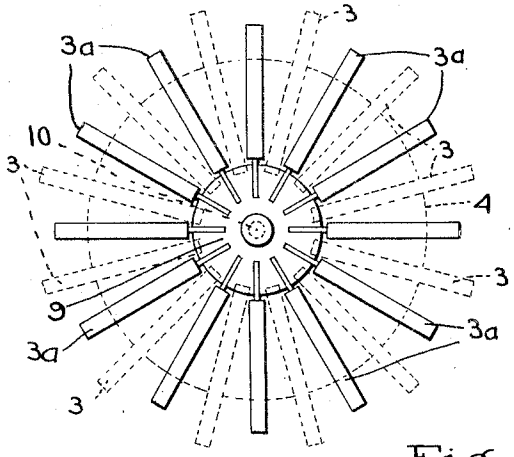

Fig. 3.

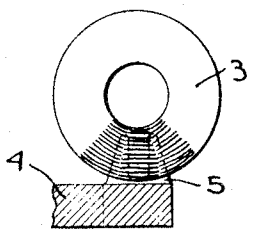

Fig. 4.

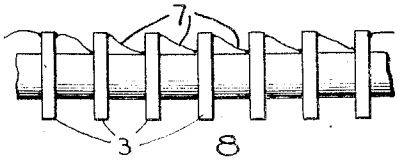

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Fig. 5.

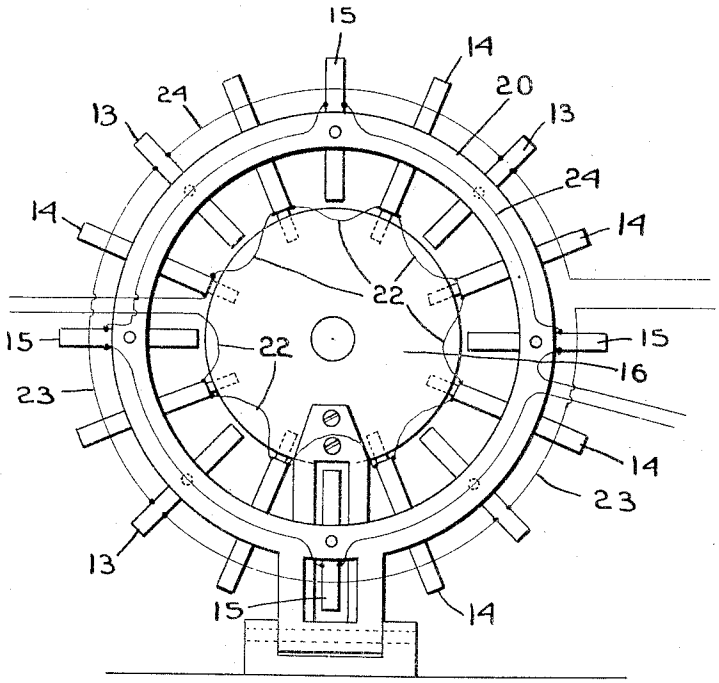


Fig. 6.

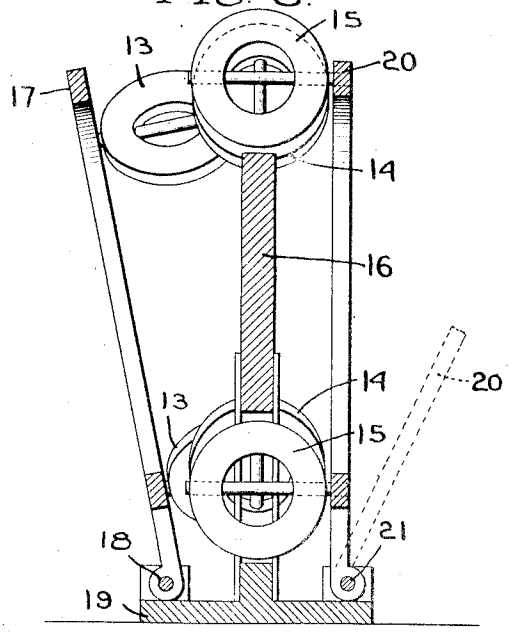
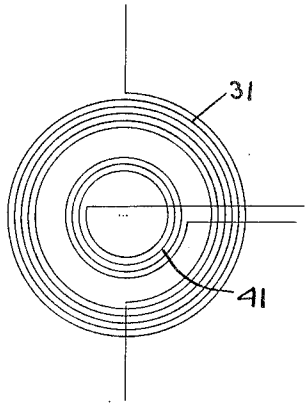


Fig. 7.



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UNITED STATES PATENT OFFICE.

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SECTIONAL INDUCTION COIL.

Application filed October 13, 1925. Serial No. 62,234.

This invention relates to radio inductance suitable for use in either radio receiving or sending circuits, and by means of which undesirable interaction between different circuits or different parts of the same circuit due to the external or stray magnetic fields of inductance may be minimized.

I accomplish the desired object by dividing the inductance coil, as a whole, into structurally independent coil sections, which are connected in series, each coil section having a fractional part of the total amount of induction in the coil, and by arranging these coil sections coaxially and radially about a common center, so that the field of the coil is symmetrically disposed in a general circular or doughnut shape.

My invention can be embodied in a single induction coil or in a unit arranged to provide variable inductance or in a coupler. When thus embodied the two coils of the coupler or the variable inductance will be constructed as above described, with the total winding arranged in coil sections and the coil sections of the two coils will be arranged so that they can be inter-leaved with each other, thereby to produce the variable coupling effect or to give the variable inductance.

In order to give an understanding of my invention I have illustrated in the drawings some selected embodiments thereof, which will now be described, after which novel features will be pointed out in the appended claims.

In the drawings, Fig. 1 is a view illustrating a vario-coupler embodying my invention;

Fig. 2 is an end view showing the movable coil in full lines and the fixed coil in dotted lines;

Fig. 3 is a fragmentary view showing one way of supporting the coil sections;

Fig. 4 illustrates how the various coil sections may be formed;

Figs. 5 and 6 are views showing a different embodiment of the invention and which comprises a primary coil, a secondary coil, and a tickler coil;

Fig. 7 is a diagrammatic view showing still a different embodiment of the invention.

Referring first to Figs. 1, 2 and 3, wherein I have shown a vario-coupler embodying my invention, 1 indicates a stationary coil or stator and 2 indicates a movable coil. Each of these coils is made up of a plurality of structurally independent coil sections which are connected in series, and which are arranged coaxially and radially about a common center. The coil sections of coil 1 are designated as 3 and those of coil 2 as 3^a. The coil sections 3 may be wound in any approved way, either as plain solenoid coils or so-called lattice coils. In the construction shown the coil sections are wound in the form of lattice coils, this being preferable because they are in the nature of low loss coils. The inductance of each coil section 3 is a fractional part only of the total inductance desired, and since these coils are all connected in series, a complete coil having the required inductance is produced. The coil sections of each coil are arranged coaxially and radially about a common center, as indicated best in Fig. 2. The coil sections 3 of the stationary coil 1 are shown as supported on a stationary support 4 of insulating material. This support is shown as having pairs of supporting fingers 5, one pair for each coil section 3, and these fingers are inserted into two of the openings 6 which are formed by the honey-comb or lattice structure of the coil section 3. The coil sections 3 are thus removable from the support 4, and will be held firmly in position thereon. The support 4 is circular and the pairs of supporting fingers 5 are arranged in a circular formation, so that when the coil sections 3 of the coil 1 are in place they will have the coaxial and radial arrangement illustrated in full lines in Fig. 1 and in dotted lines in Fig. 2. As stated above, the coil sections 3 are connected in series, as shown, by the wire sections 7.

The coil 1 may be readily formed in the coil sections, as shown in Fig. 4, by winding each section separately on a mandrel or support 8, these sections being wound in spaced relation. When one section has been wound, the next section will be started in an adjacent position, but separate from the first section, without breaking the wire, so that when the sections are completely wound, as shown in Fig. 4, they will be connected in series. These connected sections may then be slipped off from the mandrel or support 8 and arranged in their radial formation.

A coil such as above described is useful wherever an induction coil is required in radio work, and it has the advantage that while it provides the required inductance yet it reduces to a minimum any undesirable interaction between different parts of the circuit.

The coils of each coil section may be all in

the same circuit or may be divided between different circuits. In other words, each individual coil section may be composed of two or more parts entering into separate circuits or portions of a circuit. For instance, the inner and outer coils of each coil section may be part of a primary circuit while the remaining coils of each coil section may form part of a secondary circuit or may be divided between a secondary circuit and a tickler circuit. In each case, however, this arrangement is repeated in each of the coil sections and the component respective parts of the various coil sections of the group are severally connected in series respectively in their complete circuits of the assembled group.

This invention is also admirably adapted for use in various couplers or variometers or similar devices. In Figs. 1 and 2, which show a vario coupler, the movable coil 2 is also made with the coil sections, which are indicated at 3^a, and which are connected in series, as described with reference to the coil sections 3 of the coil 1. These coil sections 3^a are shown as supported from a central support 9 and are arranged radially with reference to said support. This central support 9 is mounted on a rod 10 which is slidable axially through the coil 1. If this device is mounted on a panel 11 of a radio receiving or sending apparatus, then the support 4 for the coil 1 will be attached to the panel and the rod 10 carrying the support 9 for the coil 2 will extend through the panel and be provided with a knob 12 by which it may be operated. The coil 2 has the same number of coil sections as the coil 1, and with the arrangement above described the coil sections of the two coils may be inter-leaved more or less to provide the variable coupling. This interleaving is accomplished by simply moving the stem 10 and knob 12 back and forth, as shown by the full and dotted lines. If the coils 1 and 2 are in the same circuit then the device would function as a variometer.

In Fig. 2 the movable coil 2 is illustrated in full lines, while the fixed coil 1 is shown in dotted lines. This Fig. 2, however, illustrates clearly how the coil sections are interleaved.

In Figs. 5 and 6 I have illustrated a different embodiment of the invention, which comprises three coils each formed of radially arranged coil sections, as above described. In this embodiment the three coils may constitute the primary coil, the secondary coil, and the tickler coil of an assembly. The coil sections of one coil are indicated at 13, the coil sections of one of the other coils are indicated at 14, and the coil sections of the third coil are indicated at 15. The coil sections 14 are stationarily mounted, they being supported upon a central fixed support 16 and being arranged peripherally of said support and in a coaxial and radial formation. The coil sections 13 are also arranged in a coaxial and radial formation and are mounted on a swinging annular member 17, which is pivoted at 18 to the base 19. The coil sections 15 are also arranged in a coaxial and radial formation and are mounted on a swinging support 20, which is pivoted at 21 to the base 19. These coil sections are so arranged relative to each other that the coil sections 15 and 13 may be inter-leaved with the coil sections 14 and with each other by swinging movement of the supports 17 and 20.

The relative number of coil sections in each coil may vary, depending on the results desired. In the construction shown there are twice as many coil sections 14 in the stationary coil as there are in each of the movable coils, and the coil sections 13 and 15 are staggered relative to each other. In this device one of the coils may function as a primary coil, another as the secondary, and the third as the tickler coil. It will be understood of course that the coil sections of each coil are connected in series. The wire connections between the coil sections 14, by which they are thus series-connected, are indicated at 22. The connections between the coil sections 13 are indicated at 23 and those between the coil sections 15 at 24.

I have referred above to a construction in which the coil of each coil section may be divided between different circuits. In Fig. 7 I have shown diagrammatically such an embodiment of the invention. This Figure 7 is a diagrammatic view of one coil section and the turns of the coil section are divided between the two circuits 31 and 41. One of these circuits may be a primary circuit and the other a secondary circuit.

There are various other arrangements which a coil embodying my invention may assume, and while I have shown in the drawings two arrangements merely to illustrate the principle of the invention, yet I do not wish to be limited thereto, as the invention may be embodied in a wide variety of coils.

I claim:

1. A radio inductance comprising a plurality of coaxial, structurally-independent, series-connected coil sections, each having a fractional part of the total inductance desired, said coil sections being arranged radially about a common center whereby a magnetic field of substantially circular shape is formed.

2. A radio inductance comprising two coils each formed of a plurality of coaxial coil sections connected together in series and arranged radially about a common center whereby each coil presents a substantially circular magnetic field, the coil sections of each coil being structurally independent and self-supporting and being spaced sufficiently from each other to permit the coil sections of the other coil to be interleaved therewith,

and means to move the coils relative to each other.

3. A radio inductance comprising a coil formed of a plurality of coaxial, structurally-independent coil sections connected in series and arranged radially about a common center, said coil sections being spaced from each other sufficiently to permit their being interleaved with the coil sections of another coil of similar construction.

In testimony whereof, I have signed my name to this specification.

WILLIAM H. ADAMS.