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V. S. GOLOVIZNIN

2,179,257

INDUCTION COIL

Filed April 13, 1938

Fig. 1

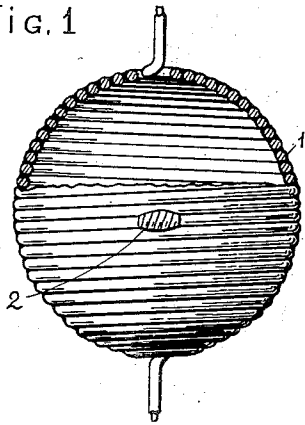


Fig. 2

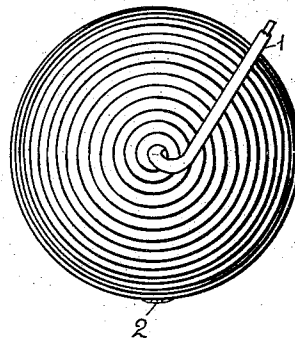


Fig. 3

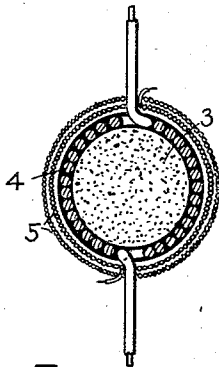


Fig. 4

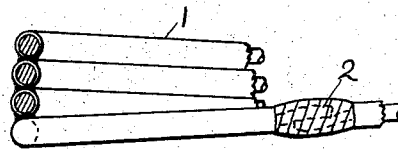


Fig. 5

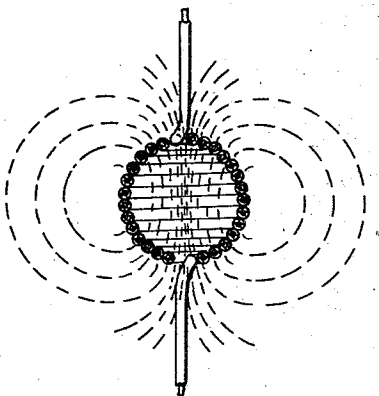


Fig. 6

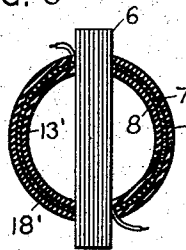


Fig. 7

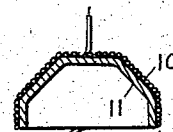
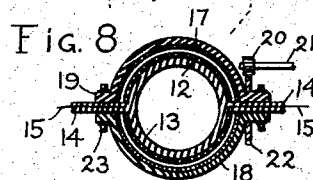


Fig. 8



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INDUCTION COIL

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6 Claims. (Cl. 175-359)

My invention relates to induction coils and has particular reference to induction coils used for producing reactance in circuits, for transformers, in radio and television apparatus, for relays, etc.

My invention has for its object to provide an induction coil, or any coil having reactance characteristics, in which distribution of the magnetic field is such that its density progressively increases toward the axis of the coil, and in which substantially all the magnetic lines emerge from the coil under direct influence of the turns of its wire. In this connection, I have found that the best results are obtained when the coil is wound so as to produce the type of magnetic field similar to the field of the earth, this field gradually increasing in strength from the equator toward its magnetic poles. In order to obtain a field of such characteristics, I provide a coil wound in the form of a hollow sphere or similar closed hollow body or shell, the surface of the body being everywhere closed upon itself. The turns in this coil gradually decrease in diameter toward its poles toward which the surface of the sphere converges and where the magnetic flux is the strongest or has the greatest density. My coil, unlike ordinary cylindrical coils, has no appreciable area uncovered by the turns of the winding so that at every point the emerging magnetic lines must pass directly through or between the wires. For this reason, the time lag of the coil is considerably decreased, and the coil becomes more responsive to quick changes in its excitation. My coil is, therefore, especially effective in faithfully responding to the slightest variations in current of radio, audio or television frequencies.

I have found by actual experience that my coil greatly improves the selectivity, sensitivity and sound qualities of radio receivers and transmitters, also increasing the volume of sound so that less amplification is required for the same reproduction.

My invention is more fully described in the accompanying specification and drawing in which—

Fig. 1 is a side view of my coil partly in section.

Fig. 2 is a top plan view of the same.

Fig. 3 is a sectional view of a coil with two windings.

Fig. 4 is a detail view of a joint between the two halves of one coil.

Fig. 5 is a diagrammatic view of the magnetic flux passing through my coil.

Fig. 6 is a sectional view of a coil with an iron core.

Fig. 7 is a view of one half of a modified coil.

Fig. 8 is a sectional view of my coil used as variometer.

My induction coil consists of a number of turns of an insulated wire wound in one or more layers so as to form a continuous surface closed upon itself. One example of such a surface is represented by a sphere as shown in Fig. 1. The coil is made by winding separately its two halves, beginning at the poles of the sphere where the turns have the smallest diameter. The individual turns are cemented together as more turns are added. Any suitable insulating cement or glue can be used for this purpose. For coils operating at the room temperature celluloid cement has been found quite satisfactory because it dries very rapidly and forms a firm but elastic joint between the successive wires. Bakelite and similar compounds may be used for coils which must stand higher temperatures or severer service. Upon completion of the two halves they are cemented together at the equator, the ends of the wires being joined together at 2 as shown in Fig. 1 and in detail in Fig. 4. In my experiments with such coils I have found that they are remarkably efficient for various purposes, especially for radio circuits. I believe this is due to the fact that the magnetic flux everywhere passes through a dense layer of wires so that all its lines of force are controlled by the turns as shown in Fig. 5, while in ordinary coils a large portion of the flux passes through the central portion at a more or less considerable distance from the wires. The flux, therefore, can respond very exactly and quickly to the slightest changes in the excitation of the coil, so that my coil is responsive in the highest degree to the variations in frequency and intensity. I have found that my coils, when substituted in ordinary radio sets for coils of ordinary types, greatly increase the selectivity of the set, reduce static and increase the sensitivity even in localities where there is considerable shielding effect as, for instance, in steel buildings. For the same reason my coil is very effective when used as a loop antenna. Another important feature of my coil is that the magnetic flux gradually increases towards its axis, there being no rapid change in its density, the latter at the center being relatively high.

My coil can be built in the form of an ordinary transformer as shown in Fig. 3, the core being formed, for instance, very conveniently of iron shavings or chips inside the primary winding

4, the secondary winding 5 being formed of several concentric spheres as shown. The core can be also made in the form of a rod 6 composed of iron wires, this form being especially suitable for relays and magnets. The coil 7 can be imbedded in supporting insulation shells 8 and 9. The supporting shells can be also made of a magnetic material as shown in Fig. 7 where the coil 10 is mounted on an iron core 11.

I have found that coils of my type are very efficient when used as variometers, one spherical coil rotating in the other as shown in Fig. 8. With this arrangement it is possible to vary the coupling rotation within wide limits up to and above 90°, thereby greatly facilitating tuning of circuits.

As shown in Fig. 8, the inside coil 12 is mounted on an insulation core 13 with tubular extensions 14 with terminal leads 15 inside. The coil 12 is wound so that its polar axis extends transversely to the axis of the extensions 14. The outer coil 17 is mounted inside an insulation sphere 18 with tubular extensions 19 rotatively supported on the extensions 14 and can be rotated by a pinion 20 on a shaft 21 in mesh with a gear 22 mounted on one of the extensions 14. The outer coil also has its polar axis transverse to the axis of its equatorial extensions so that by rotation of the outer coil the polar axes may be brought into coincidence or supported at any desired angle up to or more than 90°. It is possible, of course, to rotate the inner coil maintaining the outer coil stationary. The outer coil has collector rings 23 for conducting current to its windings.

When used as an antenna, my coil considerably increases its capacity for reception and transmission, the improvement in reception being especially noticeable, this effect being partly due to the large surface of the coil.

The coil can be wound not only in the form of a sphere but also in any other form of the same general type, the main characteristic being that the coil must represent a hollow body defined by a surface closed upon itself so that its inner volume is everywhere covered by the turns of its wire. For this reason, the coil may be wound as a combination of differently shaped surfaces as shown, for instance, in Fig. 7, a cylinder being combined with two frusto cones and flat polar portions.

The coil can be also wound in the form of an ellipsoid, polyhedron, etc., as an induction coil, choke coil, autotransformer, transformer, antenna, etc., all such variations being including in the scope of my invention as set forth in the appended claims.

I claim as my invention:

1. An induction coil formed of a plurality of turns of insulated wire, each insulated turn being wound in continuous contact with the preceding and succeeding insulated turns, the turns progressively diminishing in diameter toward the ends of the coil to the extent that the insulated turns alone form a fully closed hollow body of revolution, the insulated turns being cemented

together in such a relationship as to form a rigid shell of a thickness equal to the thickness of the insulated wire.

2. An induction coil formed of a plurality of turns of insulated wire, each insulated turn being wound in continuous contact with the preceding and succeeding insulated turns, the turns progressively diminishing in diameter toward the ends of the coil to the extent that the insulated turns alone form a fully closed hollow approximately spherical body, the insulated turns being cemented together in such a relationship as to form a rigid shell of a thickness equal to the thickness of the insulated wire.

3. An induction coil formed of a plurality of turns of insulated wire, each insulated turn being wound in continuous contact with the preceding and succeeding insulated turns, the turns progressively diminishing in diameter toward the ends of the coil to the extent that the insulated turns alone form a fully closed hollow body of revolution, the insulated turns being cemented together in such a relationship as to form a rigid shell of a thickness equal to the thickness of the insulated wire, and a metal core in the form of a body of revolution filling the space in the coil.

4. An induction coil formed of a plurality of turns of insulated wire, each insulated turn being wound in continuous contact with the preceding and succeeding insulated turns, the turns progressively diminishing in diameter toward the ends of the coil to the extent that the insulated turns alone form a fully closed hollow body of revolution, the insulated turns being cemented together in such a relationship as to form a rigid shell of a thickness equal to the thickness of the insulated wire, and a core made of an insulated material forming a body of revolution filling the space in the coil.

5. An induction coil formed of a plurality of turns of insulated wire, each insulated turn being wound in continuous contact with the preceding and succeeding insulated turns, the turns progressively diminishing in diameter toward the ends of the coil to the extent that the insulated turns alone form a fully closed hollow body of revolution, the insulated turns being cemented together in such a relationship as to form a rigid shell of a thickness equal to the thickness of the insulated wire, and a core made of an insulated material forming a hollow body of revolution filling the space in the coil.

6. An induction coil formed of a plurality of turns of insulated wire, each insulated turn being wound in continuous contact with the preceding and succeeding insulated turns, the turns progressively diminishing in diameter toward the ends of the coil to the extent that the insulated turns alone form a fully closed hollow body of revolution, the insulated turns being cemented together in such a relationship as to form a rigid shell of a thickness equal to the thickness of the insulated wire, and a protective covering fully enclosing the coil.

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