

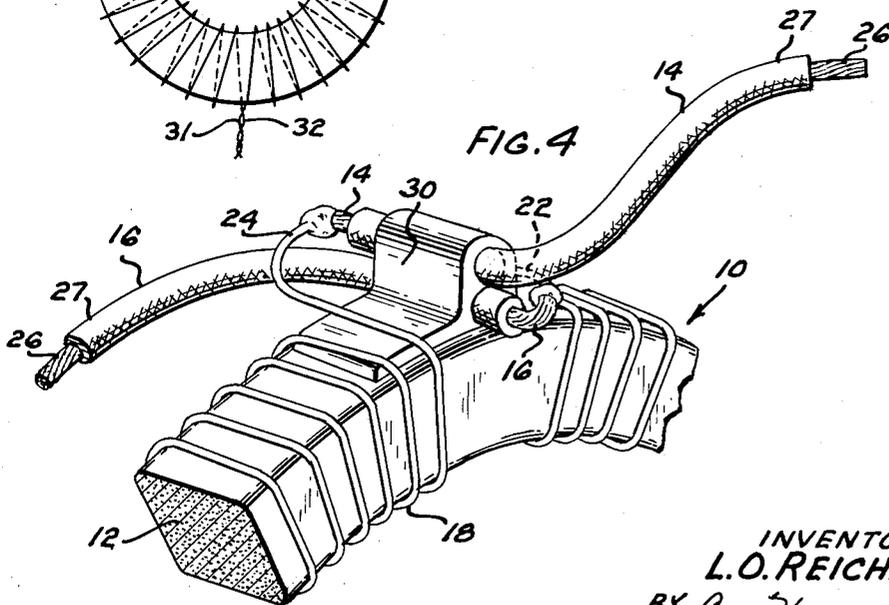
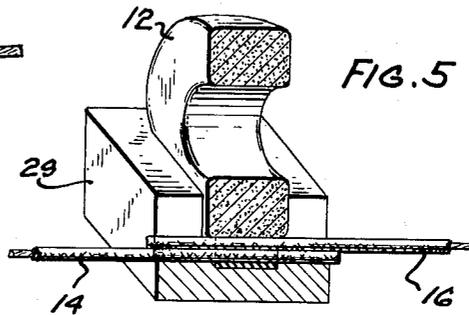
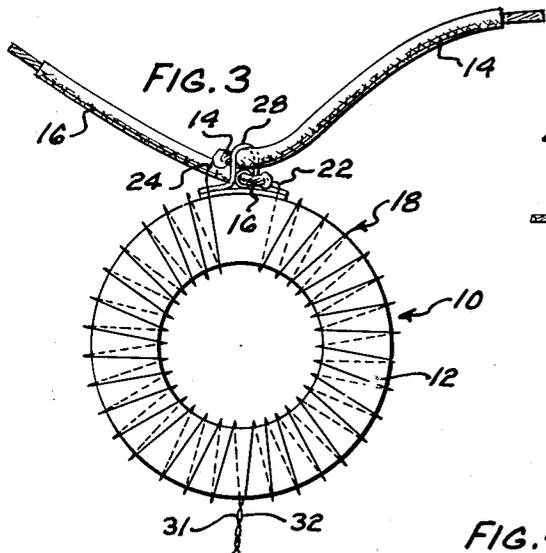
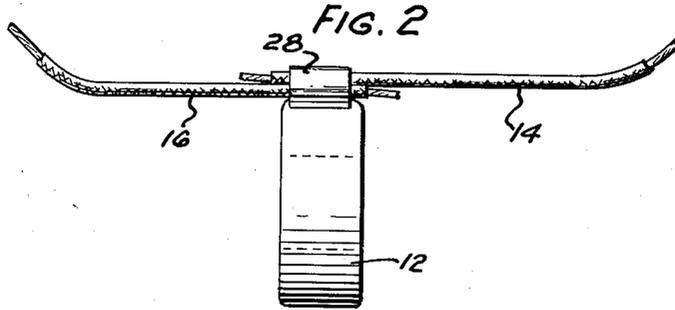
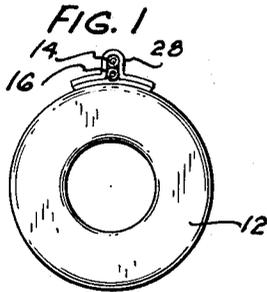
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METHOD OF MAKING TOROIDAL COILS

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## METHOD OF MAKING TOROIDAL COILS

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This invention relates to a method of making toroidal coils, and more particularly to a new and improved method of making a toroidal coil having terminals secured to the core thereof and to which the ends of the coil winding are connected.

Certain types of toroidal coils used in communications apparatus have windings made with very fine wire wound on a core, and a plurality of these toroidal coils are assembled and encased in suitable mounting means with the ends of the coil windings connected to the terminals which are secured to the mounting means and are separated from and are independent of the coil. After the ends of the coil windings have been electrically connected to their respective terminals on the mounting means, movement between the toroidal coil and the terminals secured to the mounting or casing of the coils, sometimes result in the breaking of the fine wire connections between the coil winding and the terminals, thereby electrically disconnecting the coil from the terminal.

An object of the present invention is to provide a new and improved method of making a toroidal coil having rugged terminals on the core thereof to which the ends of the coil windings are connected.

Other objects and advantages of the invention will become apparent by reference to the following detailed description and the accompanying drawings, illustrating a preferred embodiment thereof, in which

FIGS. 1 and 2 are front and side view, respectively, of the core of the toroidal coil showing a pair of terminals secured thereto;

FIG. 3 is a front view of the completed toroidal coil embodying the invention and showing the coil windings thereon in diagrammatic manner;

FIG. 4 is an enlarged fragmentary perspective view of the toroidal coil embodying the invention and showing only a single layer of the coil winding in somewhat simplified conventional form; and

FIG. 5 is a fragmentary perspective view of a mold for molding a pair of terminals onto the toroidal coil.

Referring to the drawings the toroidal coil 10 comprises a core 12 made from magnetic particles compressed with an insulating binder into a toroid. A pair of terminals 14, 16 are molded, bonded, or otherwise secured to the core 12 in insulated relation to each other and to the core. Preferably, the terminals are mounted on the outer periphery of the core in a direction parallel to the axis of the core and in side-by-side relation along a plane through the axis. A coil winding 18 of fine insulated wire as shown diagrammatically in FIGS. 3 and 4 is wound on the core and the ends 22, 24 thereof are connected to the terminals 14 and 16. The terminals may be rigid or flexible and as shown herein they are in the form of stranded wire conductors 26 covered with sheaths 27 of suitable insulating material and form long leads or extensions of the coil winding 18, which leads or terminals are capable of receiving a substantial amount of handling and abuse without being damaged.

In making the coil 10, terminals or lead wires 14 and 16 of a predetermined length are bonded to the core 12 with a thermosetting resin such as epoxy resin. This may be done by adhering the terminals to the core with adhesive tape 28 such as a tape of suitable dielectric plastic material impregnated with or having a coating of adhesive epoxy resin thereon, and then heating the tape

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to cure the resin and bond the terminals 14, 16 to the core 12. The terminals 14, 16 may also be bonded to the core 12 by placing them in a transverse groove in a mold 29 (FIG. 5), and placing the core 12 together with a predetermined amount of a suitable thermosetting resin such as epoxy resin in the mold cavity in contact with the terminals, and then heating the mold to cure the resin to form a connection 30, bonding the terminals to the core as shown in FIG. 4.

After the terminals have been bonded or otherwise secured to the core, the core is placed in a coil winding machine and the coil winding 18 is wound thereon in two parts. Insulation is removed from two adjacent ends 31, 32 of the windings and these ends are twisted together and soldered. They are then dipped into hot epoxy resin to form a protective dielectric coating thereon, after which they are pressed against the coil winding and adhere thereto. The insulation is also removed from the ends 22, 24, of the coil winding 18 and the ends of terminals 14, 16. These ends of the coil winding are then solder connected to the terminals 14, 16 and the exposed portions thereof are coated with plastic epoxy resin to form a protective dielectric coating thereon. With the ends of the coil windings thus well protected, the toroidal coils are less subject to damage from normal handling. All circuit connections to the coil are made to the terminals 14 and 16 which are anchored to the core 12 so that any force applied to the terminals 14, 16 during further handling of the toroidal coil 10 is not transmitted to the ends 22, 24 of the coil winding 18 and cannot cause damage or breaking thereof.

It will be understood that only one layer of the coil winding 18 is shown for purposes of simplifying the illustration and that the coil may have as many layers as is necessary and that the coil winding 18 is wound on the core in close proximity to the terminals 14, 16.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. The method of making an electrical coil which comprises bonding a pair of flexible insulated conductor leads to the outer periphery of a toroidal magnetic core so that the leads extend across the core in a direction parallel to the core axis and in side by side relation to each other, winding insulated wire around the core to form a toroidal coil thereon, and connecting the ends of the coil to said insulated leads.

2. The method of making an electrical coil which comprises bonding a pair of insulated leads to a toroidal core so that the leads extend across the core in a direction parallel to the core axis, winding insulated wire around the core to form a coil thereon, and connecting the ends of the coil to the leads.

3. A method of making toroidal coils which comprises placing a pair of flexible insulated conductor leads in abutting side by side relation to each other and with one of the leads in engagement with the outer periphery of a toroidal core of compressed magnetic particles with the leads disposed longitudinally in a direction substantially parallel to the axis of the core and disposed in side by side relation radially of the core, bond the leads to each other and to the core with epoxy resin, winding an insulated conductor around the core to form a toroidal coil thereon with the ends of the coil in close proximity to the leads, and connecting the ends of the coil to the leads.

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