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[54] **ELECTRICAL COIL**  
**4 Claims, 7 Drawing Figs.**

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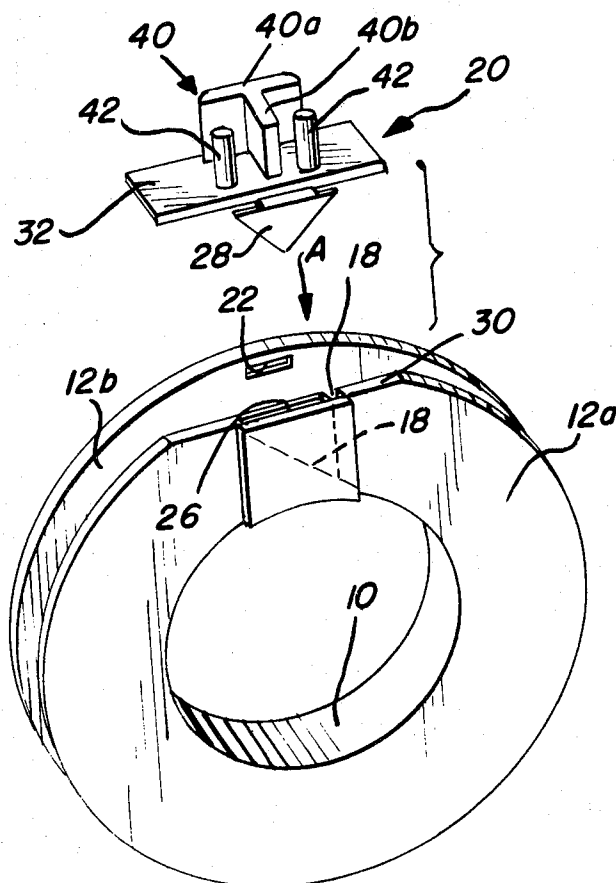
[50] Field of Search..... 336/192,  
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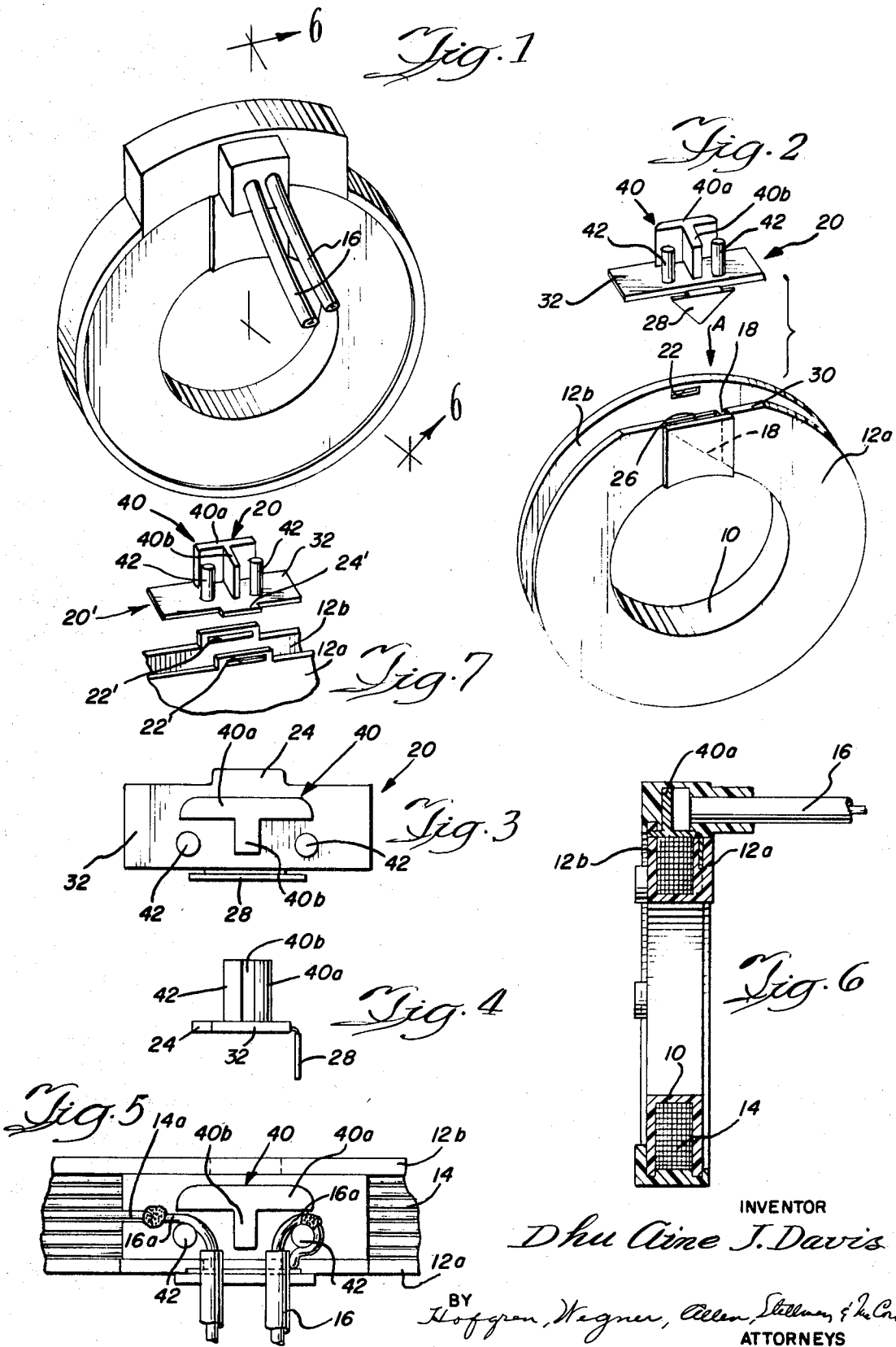
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**ABSTRACT:** An electrical coil which has a bobbin configuration with a terminal-mounting means. The terminal-mounting means includes a separate connector plate for receiving end wires from a coil wound on the bobbin for connection to appropriate terminal leads. The connector plate is snap-fit onto the bobbin at the peripheral edge of the bobbin end discs spanning the channel of the bobbin with the wound coil therein so as to position the connector plate for receiving the coil end wires and/or the terminal leads.





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## ELECTRICAL COIL

## BACKGROUND OF THE INVENTION

As seen in my U.S. Pat. No. 3,200,444 for an "Injection Molding Apparatus for Encapsulating Deformable Articles," one type of electrical coil has a bobbin configuration with a coil-receiving central portion and a pair of end discs at either end of the central portion defining a coil-receiving channel. A coil is wound on the central portion of the coil form within the channel and the ends of the coil winding extend outwardly from the wound coil. A separate terminal-mounting member is positioned against the outer surface of the winding and receives terminal leads which are connected to the winding end wires. The terminal-mounting member of such a coil, being a relatively small and separate member, is sometimes difficult to handle and to position against the outer surface of the winding while at the same time connecting the winding end wires and/or terminal leads thereto prior to encapsulating the coil. To solve this problem, as seen in my U.S. Pat. No. 3,453,575 for an "Electrical Coil," a terminal-mounting member may be formed integral with the bobbin, the terminal-mounting member permitting the coil to be wound onto the bobbin and providing a means to position the winding end wires for connection to appropriate terminal leads. The integral terminal-mounting member is sufficiently flexible to be turned across the bobbin spanning the winding to provide a compact electrical coil to facilitate subsequent encapsulation thereof. The integral-mounting member eliminates the tedious manipulation referred to above. However, when it is necessary to mold the bobbin of relatively rigid-type plastics of the like, the integral-mounting member oftentimes breaks off of the edge of the bobbin when turned across the bobbin, because of the insufficient flexibility of the rigid material. The present invention is directed to a solution to this problem by forming a terminal-mounting member which is snap-fit to the peripheral edges of the bobbin end discs, spanning the winding, and in position to receive the winding end wires and/or the terminal leads.

## SUMMARY OF THE INVENTION

The principal object of this invention, therefore, is to provide an improved bobbin structure for an electrical coil.

Another object of this invention is to provide an electrical coil of the character described having a terminal-mounting member in the form of a separate connector plate for receiving the winding end wires from a wound coil and/or terminal leads for connection together, and means are provided defining complementary interengaging surfaces on the connector plate and the bobbin end discs to provide a snap-fit therebetween to mount the connector plate onto the coil, spanning the channel of the bobbin with the wound coil therein.

In one form of the invention, apertures are provided in the end discs for receiving and holding lip portions of the connector plate which are snap-fit into the apertures.

In another form of the invention, an aperture is formed in one of the end discs for receiving and holding a lip portion on one side of the connector plate and a generally radial slot is formed in the peripheral edge of the other end disc for receiving a tab portion on the other side of the connector plate.

A further feature of the invention is to provide means on the connector plate for receiving the terminal leads in position for connection to the end wires and positioning the terminal leads so that the leads extend away from the coil generally perpendicular to the end discs thereof. In the preferred embodiment of the invention, the connector plate has a generally flat base portion spanning the bobbin channel with a wound coil therein and a generally T-shaped boss protruding from the base portion, the cross portion of the T-shaped boss being oriented generally parallel to the end discs. An upstanding boss protrudes from the base portion on each side of the leg of the T-shaped boss spaced from the leg and the cross of the T whereby terminal leads with exposed wire portions thereof

bent at right angles thereto may be positioned between the upstanding bosses and the leg of the T with the exposed wire portions of the leads extending between the upstanding bosses and the cross of the T for connection to the winding end wires.

## DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a fully encapsulated electrical coil embodying the concepts of the present invention;

FIG. 2 is an exploded perspective view of one form of bobbin configuration and connector plate of the present invention;

FIG. 3 is a top plan view, on an enlarged scale, of the connector plate shown in FIG. 2;

FIG. 4 is a side elevational view of the connector plate shown in FIG. 3;

FIG. 5 is a partial plan view looking at the edge of the electrical coil of the present invention, with the connector plate in position spanning a coil wound on the bobbin and with the terminal leads connected to the winding end wires;

FIG. 6 is a sectional view taken generally along the line 6—6 of FIG. 1; and

FIG. 7 is a perspective view of a second form of bobbin and connector plate, with the major portion of the bobbin cut away.

## DETAILED DESCRIPTION OF THE INVENTION

The electrical coil embodying the invention illustrated herein is especially designed to facilitate manipulation of the winding end wires of the coil for connection to terminal leads and positioning the same for subsequent encapsulation, as referred to above. The novel terminal-mounting means has many other useful applications for positioning and holding the winding end wires or the terminal leads for subsequent assembly in various electrical devices. The emphasis on encapsulation is but for illustrative purposes only to show how the end wires and terminal leads are manipulated and affixed to the mounting member for subsequent uses of the electrical coil.

Turning now to the drawings, an electrical coil is shown to have a bobbin configuration with a coil-receiving central portion 10 and a pair of generally parallel end discs 12a, 12b at each end of the central portion 10 defining a coil receiving channel. A coil 14 is mounted on the central portion of the bobbin, within the channel, and has end wires 14a for connection to appropriate terminal leads 16. A slot 18 (FIG. 2) is formed on the inner surface of end disc 12a and extends outwardly from the central portion 10 to the periphery of disc 12a for receiving the inner end of the coil winding so that the inner winding end extends outwardly for connection with its appropriate terminal lead.

A separate terminal-mounting member or connector plate, generally designated 20, is provided for receiving and positioning the terminal leads 16 for connection to the appropriate coil end wires 14a. The bobbin form and the separate terminal-mounting member 20 preferably are molded of relatively rigid plastic-type material.

Means are provided defining complementary interengaging surfaces on the connector plate 20 and the end discs 12a, 12b providing a snap-fit therebetween to mount the connector plate on the coil, spanning the channel, with the wound coil 14 therein. In the form of the invention shown in FIGS. 2 through 5, this means includes an aperture 22 (FIG. 2) in the end disc 12b for receiving and holding a lip portion 24 (FIG. 3) on one side of the connector plate 20. A radial slot 26 (FIG. 2) is formed in the peripheral edge of the end disc 12a for receiving a generally triangularly shaped tab portion 28 formed integral with and protruding from the underside of the connector plate 20 on the side thereof opposite the lip 24. With this embodiment, after a coil 14 is wound on the bobbin within the channel between the end discs 12a, 12b, the connector plate 20 is moved in the direction of arrow A (FIG. 2) and the tab portion 28 of the connector plate is inserted into the radial slot 26

in the end disc 12a to locate the connector plate whereby further movement of the connector plate in the direction of arrow A snaps the lip portion 24 thereof into the aperture 22 in the end disc 12b of the bobbin and the connector plate thereby is held in position for receiving the winding end wires 14a and/or the terminal leads 16 for manipulation to connect the end wires to the terminal leads, as will be described in greater detail hereinafter. Once the lip portion 24 of the connector plate 20 is snapped into the aperture 22, the tab portion 28 of the connector plate prevents the connector plate from moving perpendicular to the end discs and thereby holds the lip portion 24 in the aperture 22. It can be seen in FIG. 2 that a portion of the peripheral edge of the end disc 12a, as at 30, is flattened whereby a generally flat base portion 32 of the connector plate seats on the flattened edge 30 when snapped in position onto the bobbin.

In the form of the invention shown in FIG. 7, both end discs 12a and 12b are provided with apertures 22' for receiving lip portions 24' on opposite sides of the base portion 32 of the connector plate 20'. With this form of the invention, one of the lip portions 24' may be positioned in one of the apertures 22' in one of the end discs 12a or 12b and the opposite lip portion 24' is snapped into the aperture 22' in the opposite end disc.

Means are provided on the connector plate for receiving the terminal leads 16 in position for connection to the end wires and positioning the terminal leads so that the leads extend away from the coil generally perpendicular to the end discs 12a, 12b, as best seen in FIGS. 1 and 6. In the form of the invention shown herein, this means comprises a generally T-shaped boss, generally designated 40, having a cross portion 40a and a leg portion 40b, with the cross portion 40a oriented generally parallel to the end discs 12a, 12b. Upstanding generally cylindrical bosses 42 protrude upwardly from the base portion 32 of the connector plate 20 on each side of the leg portion 40b of the T-shaped boss 40 spaced from the leg portion 40b and the cross portion 40a of the T-shaped boss. With this structure, and referring particularly to FIG. 5, the terminal leads 16, with exposed wire portions 16a bent at right angles thereto, are positioned between the upstanding bosses 42 and the leg portion 40b of the T-shaped boss 40 with the exposed wire portions 16a extending between the upstanding bosses 42 and the cross portion 40a of the T-shaped boss 40 for connection with the winding end wires 14a of the coil 14. With such a structure, and referring particularly to FIGS. 1 and 6, the terminal leads 16 easily are manipulated for connection with the winding end wires 14a so that the terminal leads extend away from the coil generally perpendicular to the end discs 12a, 12b.

The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations

should be understood therefrom as some modifications will be obvious to those skilled in the art.

What is claimed is:

1. In an electrical coil having a bobbin coil form with a central portion and a pair of generally parallel end discs at either end of the central portion defining a coil-receiving channel, a coil wound on the central portion of the coil form within said channel and having end wires for connection to terminal leads, the improvement comprising:

a separate connector plate receiving the end wires of said coil and said terminal leads; and

means for mounting said connector plate between the end discs of the bobbin, including complementary interengaging surfaces on one disc and the corresponding edge of the connector plate, a tab extending from the opposite edge of the connector plate toward the center of the bobbin and means defining a radial slot in the other of said end discs, in which said tab is received and through which an end wire of the coil extends outwardly to the connector plate.

2. The coil of claim 1 in which said discs are circular and the edge of the other disc has a flat surface extending on both sides of said slot, the connector plate being seated on said flat surface.

3. The coil of claim 1 wherein the complementary interengaging surfaces comprise means defining an aperture in said one disc and a lip on the corresponding edge of the connector plate extending into the aperture.

4. In an electrical coil having a bobbin coil form with a central portion and a pair of generally parallel end discs at either end of the central portion defining a coil receiving channel, a coil wound on the central portion of said coil form within said channel and having end wires connected to terminal leads, a connector plate having a flat base portion mounted between said end discs for receiving said end wires from said terminal leads, the improvement comprising:

a T-shaped boss extending from said base portion generally radially of the bobbin, the T-shaped boss having a cross-shaped portion and a leg portion, the cross portion being oriented generally parallel to said end discs and the leg portion extending at right angles thereto, and a pair of upstanding bosses extending from said base portion, one on each side of the leg portion of said T-shaped boss, spaced from said leg portion and from said cross portion, said terminal leads having exposed wire portions thereof extending at right angles to the leads, one lead being positioned between each of said upstanding bosses and said leg portion, with the exposed wire portions thereof extending around the upstanding bosses and between them and the cross portion of the T-shaped boss, and connected to said coil end wires.

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