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DHU AINE J. DAVIS

3,457,534

ELECTRICAL COIL

Filed May 23, 1967

FIG. 1

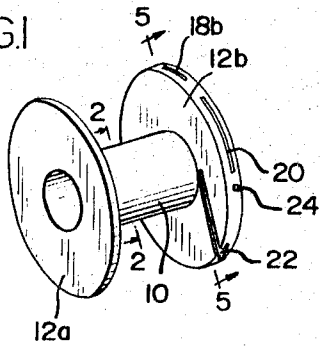


FIG. 1A

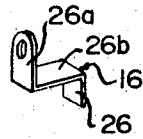


FIG. 2

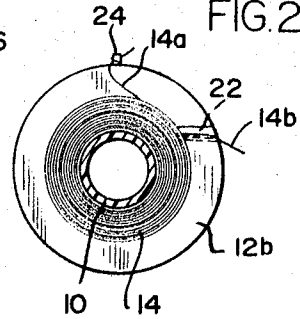


FIG. 3

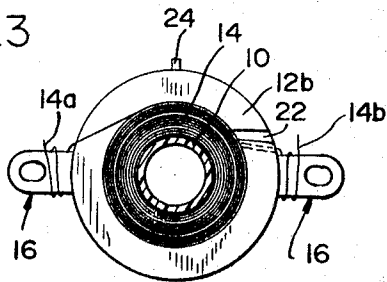


FIG. 4

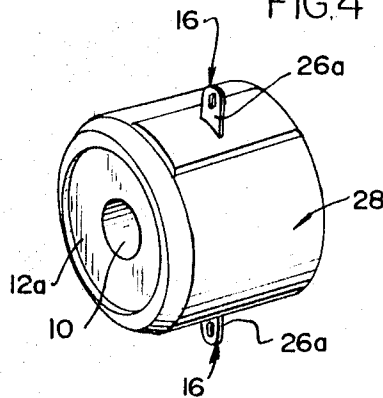
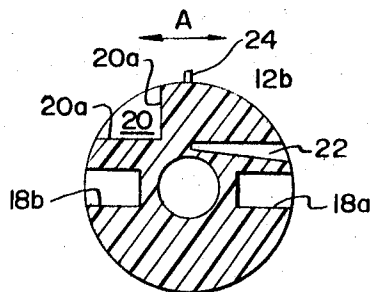


FIG. 5



INVENTOR

DhuAine J. Davis

BY *Hofgren, Wegner, Adler,*
Stellman & McLeod.

ATTORNEYS.

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ELECTRICAL COIL

Dhu Aine J. Davis, Wheaton, Ill., assignor to Hermetic Coil Co., Inc., a corporation of Connecticut
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U.S. Cl. 336—192

8 Claims

ABSTRACT OF THE DISCLOSURE

An electrical coil and method of forming the same, wherein the electrical coil has a bobbin with a central portion and a pair of end discs defining a coil receiving channel. Terminals are positioned in a pair of slots in the edge of an end disc of the bobbin for connection with the coil end wires. A radial groove in the inner face of one of the end discs receives and positions the inner end of the coil prior to winding the coil on said central portion of the bobbin, and a tab on the peripheral edge of the one end disc receives and positions the outer end of the winding for connection with one of said terminals.

Background of the invention

This invention is concerned primarily with electrical coils of many turns of very fine wire (as 40 gauge or lighter) wound on a spoollike bobbin of a molded plastic insulating material. The inner end of the wire, that is, the end adjacent the core or central portion of the bobbin, and the outer end of the wire extending from the last turn of the coil are connected to conductive terminals through which the electrical coil is connected in a circuit. The fine wire from which many coils are wound is extremely difficult to manipulate and connect to the terminals.

As shown in my application, Ser. No. 493,731, filed Oct. 7, 1965, for an Electrical Coil, the winding end wires may be connected directly to the inner conductors of appropriate terminal leads with the ends of the insulating coverings of the terminal leads subsequently encapsulated along with the wound coil on the bobbin form. However, in many situations, it is desirable to connect the winding end wires to separate terminals which protrude through the encapsulating material for subsequent connection in a circuit. The terminals are preferably fixed in relation to the bobbin on which the coil is wound so that only the winding end wires need be manipulated for connection to the terminals. However, fixed terminals often interfere with the winding of the coil on the bobbin.

This invention is concerned with a novel combination of bobbin, coil and terminals which cooperate to provide for easy manufacture resulting in great savings of time and labor.

Summary of the invention

An object of this invention is the provision of an improved electrical coil which is simple and easy to manufacture.

Another object of this invention is the provision of an improved electrical coil construction having a coil wound on a bobbin form, with terminals positioned in radial slots in the end disc of the bobbin after the coil is wound on the bobbin for connection with the end wires, the terminals extending inwardly over the wound coil.

A further object of this invention is to provide an electrical coil of the character described wherein the bobbin has means for pre-positioning the end wires for subsequent connection to the terminal arms.

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Still another object of this invention is to provide a simple method of forming an electrical coil of the character described.

Description of the drawings

FIG. 1 is a perspective view of a bobbin embodying the invention before a coil is wound thereon and before terminals are positioned thereon;

FIG. 1A is a perspective view of a terminal embodying the invention;

FIG. 2 is a sectional view of the bobbin taken generally along the line 2—2 of FIG. 1, with a coil wound thereon and the end wires positioned for subsequent connection to the terminals;

FIG. 3 is a sectional view similar to that of FIG. 2 with the terminals positioned on the bobbin and the end wires connected thereto;

FIG. 4 is a perspective view of a completely assembled and encapsulated electrical coil embodying the invention; and

FIG. 5 is a sectional view through one end disc of the bobbin taken generally along the line 5—5 of FIG. 1.

Detailed description

The electrical coil embodying the invention illustrated herein is especially designed to facilitate manipulation and positioning of the end wires of the coil for subsequent connection to terminals, as for subsequent encapsulation. The novel bobbin configuration and terminals have many other useful applications for positioning and holding the end wires for subsequent assembly in various electrical devices. The reference to encapsulation illustrates how the end wires and terminals are easily manipulated and affixed to each other, for subsequent use of the electrical coil.

Turning now to the drawings, a bobbin has a coil receiving central portion 10 (FIG. 1) with a pair of generally parallel end discs 12a, 12b at each end, defining a coil receiving channel. A coil 14 (FIGS. 2 and 3) is wound on the central portion of the bobbin within the channel and has end wires 14a, 14b for connection to terminals, generally designated 16 (FIGS. 1A and 3).

With particular reference to FIGS. 1 and 5, in the improved bobbin construction of the present invention, end disc 12b is slightly thicker than disc 12a and has a pair of generally radial slots 18a, 18b in the peripheral edge thereof. These slots receive terminals 16 for connection with the end wires 14a, 14b. The slots 18a, 18b (FIG. 5) are 180° apart in end disc 12b, but may have any desired angular disposition. For instance, slot 20 may be provided approximately 120° away from slot 18a should this particular angular disposition of the terminals be required for the particular electrical assembly or circuit of which the coil is a part. The side walls 20a of slot 20 are angularly disposed with relation to each other to facilitate the molding operation of the bobbin. The normal mold form is comprised of two parts which are separated after the molding operation is performed. Thus, the configuration of slot 20 permits the mold parts to separate in the direction of arrows A (FIG. 5) and thereby remove the mold portion which forms slot 20 by moving it to the left in FIG. 5.

The bobbin has means for prepositioning the end wires for subsequent connection to terminals 16. An undercut pocket or groove 22 in end disc 12b is generally tangential to the central portion 10 of the bobbin and extends to the end of disc 12b. The inner end wire 14b, that is, the end adjacent the bobbin central portion 10, is initially laid in pocket 22 as illustrated in FIGS. 2 and 3 and the coil is wound on the central portion 10. As seen in FIG. 2, the inner end 14b of the winding extends outwardly away from the channel and, being prepositioned

in the undercut pocket 22, is readily accessible after the coil is wound, for subsequent manipulation and connection to terminal 16. A tab 24 (FIG. 2) extends outwardly from the peripheral edge of end disc 12b. The outer end 14b of the wound coil, extending from the last turn of the coil, is wrapped around tab 24 to position the wire for connection to the terminal. Thus, as shown in FIG. 2 the wound coil has each of its ends positioned at the peripheral edge of disc 12b, accessible for connection to terminals 16 (FIG. 3).

Referring to FIG. 1A, terminal 16 includes a leg portion 26 for insertion in one of the radial slots 18a, 18b (or slot 20a as the case may be), and a body portion 26a at the end of an arm portion 26b. The arm portion 26a extends inwardly above the central portion 10 of the coil form and above the channel, and body portion 26a is centrally disposed and extends outwardly from the encapsulated coil (FIG. 4). The leg portions 26 of the terminals preferably have the same cross sectional dimensions as the radial slots 18a, 18b to provide an interference fit with the slots in order to hold the terminals in a fixed position in relation to the bobbin. The thickness of slot 20 is also preferably the same thickness as legs 26 of the terminals to provide a similar interference fit. After the terminals 16 are positioned in the respective slots in end disc 12b, the end wires 14a, 14b are easily grasped and wrapped around the body portion 26a or arm 26b of the respective terminals. The wires are soldered or welded to the terminals and the coil is ready for encapsulation by a plastic insulating material, generally designated 28 (FIG. 4).

The method of assembling the coil includes the steps of positioning the inner end 14b of the winding in the undercut pocket 22 and winding a coil on the central portion 10 of the coil form within the channel between end discs 12a, 12b and with the end wires extending outwardly from the channel. The outer end 14a of the winding is wrapped about tab 24 on the periphery of end disc 12b. The terminals 16 are positioned in radial slots 18a, 18b in end disc 12b, and the end wires 14a, 14b are wrapped around the arm portion 26b of the terminals. The structure is then encapsulated by a plastic insulating material around the wound coil and at least a portion of the coil form with a plastic insulating material.

The terminals 16, being placed in slots 18a, 18b after the coil is wound on the bobbin, can extend inwardly toward the bobbin central portion 10 above the channel without interfering with winding of the coil.

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.

I claim:

1. In an electrical coil having a bobbin with a coil receiving central portion and a pair of generally parallel end discs at either end of the central portion defining a channel, said end discs having peripheral edges, a coil wound on the central portion of said coil form within said channel and having end wires extending therefrom, the improvement comprising: a pair of generally radial slots in the peripheral edge of at least one of said end discs; and a pair of terminals each including a leg portion positioned in the radial slots in said one end disc, an arm portion extending from the peripheral edge of said one end disc inwardly toward the central portion of

said coil form above said channel for connection with said end wires, and a body portion extending radially outwardly of said coil to permit subsequent encapsulation of the coil with the body portion protruding through the encapsulating material for connection to appropriate lead wires or the like.

2. An electrical coil having a bobbin with a coil receiving central portion and a pair of generally parallel end discs at either end of the central portion defining a channel, said end discs having peripheral edges, a coil wound on the central portion of said coil form within said channel and having end wires extending therefrom, the improvement comprising a tab on the peripheral edge of one of said end discs receiving and positioning one of said winding end wires for subsequent connection with an appropriate terminal.

3. The electrical coil of claim 2 including a groove in the inner face of said one end disc receiving and positioning the other of said winding end wires for subsequent connection with an appropriate terminal.

4. The electrical coil of claim 3 wherein said groove extends outwardly from said central portion of said coil form receiving and positioning the inner end of said winding, with said tab receiving the outer end of said winding.

5. In a method of forming an electrical coil on a coil form having a bobbin with a coil receiving central portion and a pair of generally parallel end discs at either end of the central portion defining a coil receiving channel, at least one of said end discs having a pair of generally radial slots in its peripheral edge, and a pair of terminals having portions extending inwardly toward the central portion of the coil form above said channel, the steps comprising: winding a coil on the central portion of said coil form within said channel with the end wires extending outwardly from said channel; positioning said terminals in the radial slots of said one end disc; and connecting said end wires to said portions of the terminals.

6. The method of claim 5 including the step of encapsulating said wound coil and at least a portion of said coil form after said end wires are connected to said terminals.

7. The method of claim 5 including the step of wrapping one of said end wires around a tab on the peripheral edge of said one end disc prior to positioning said terminals in said radial slots.

8. The method of claim 7 including the step of positioning the inner end of said winding in a radial groove in the inner face of said one end disc prior to winding said coil on the central portion of said coil form, and wrapping the outer end of said wound coil around said tab prior to positioning said terminals in said radial slots.

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E. A. GOLDBERG, Primary Examiner

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