

Dec. 19, 1961

D. W. HOWENSTINE

3,014,164

ELECTRICAL COIL BOBBIN AND METHOD OF WINDING THEREON

Filed April 16, 1958

2 Sheets-Sheet 1

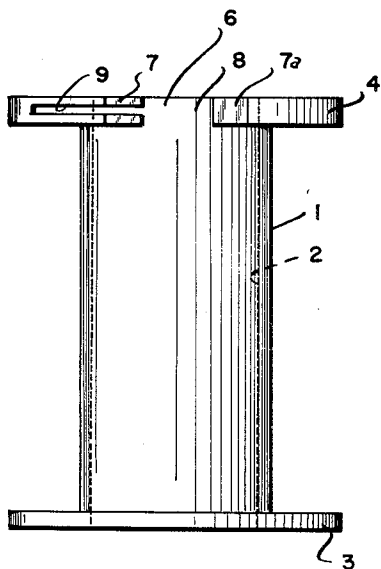


FIG-1

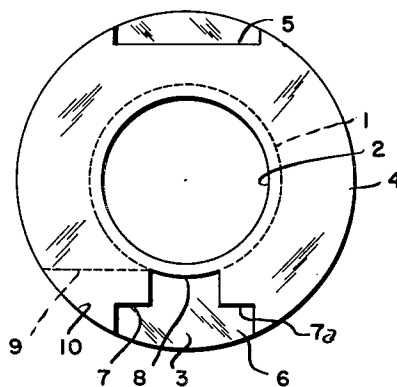


FIG-2

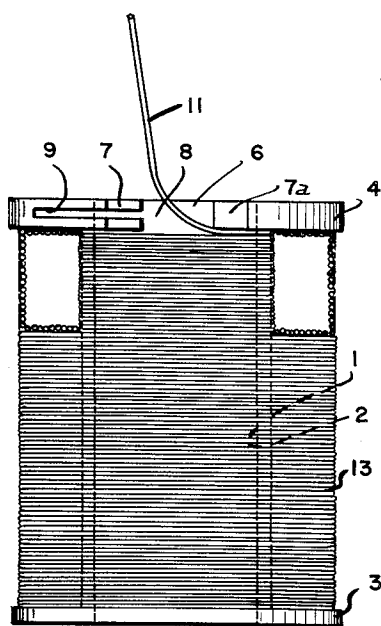
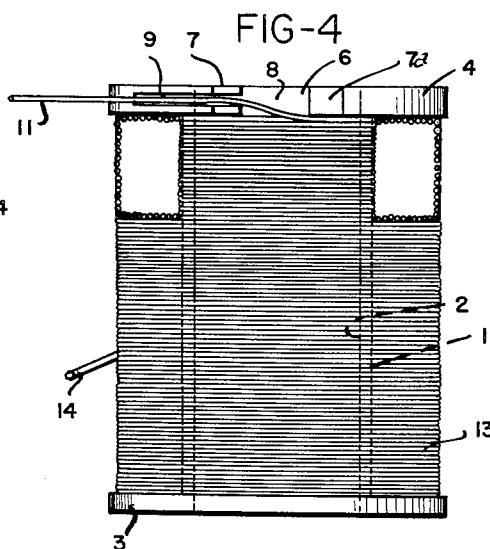


FIG-3



INVENTOR
DOUGLAS W. HOWENSTINE
BY *Toulmin & Toulmin*

ATTORNEYS

Dec. 19, 1961

D. W. HOWENSTINE

3,014,164

ELECTRICAL COIL BOBBIN AND METHOD OF WINDING THEREON

Filed April 16, 1958

2 Sheets-Sheet 2

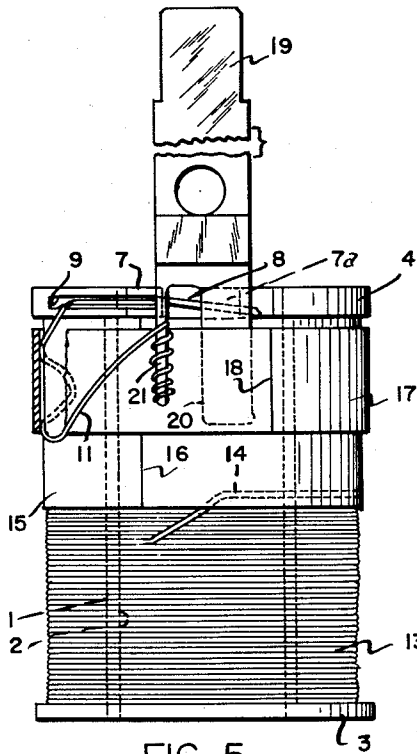


FIG-5

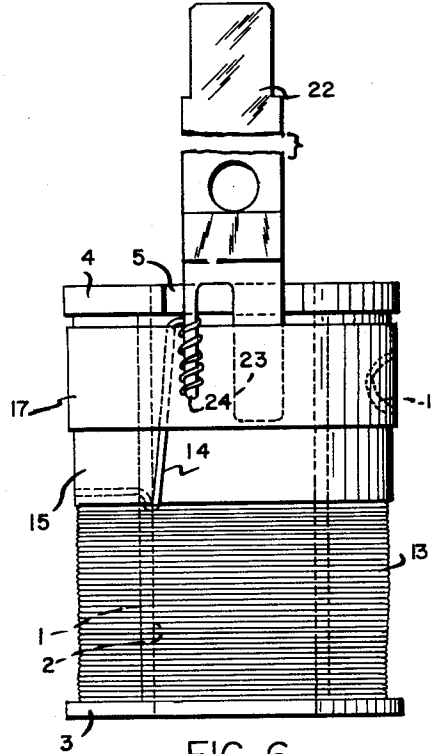


FIG-6

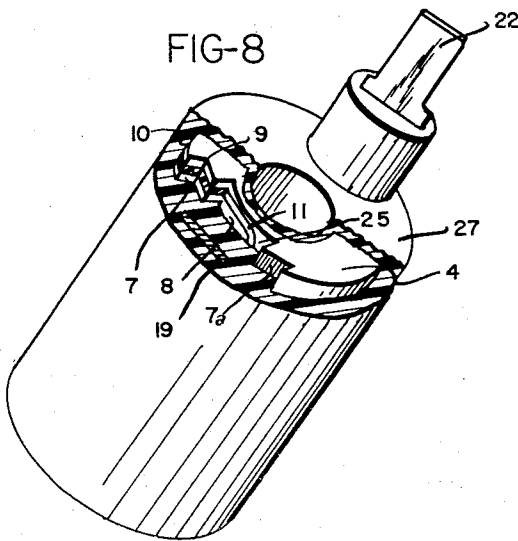


FIG-8

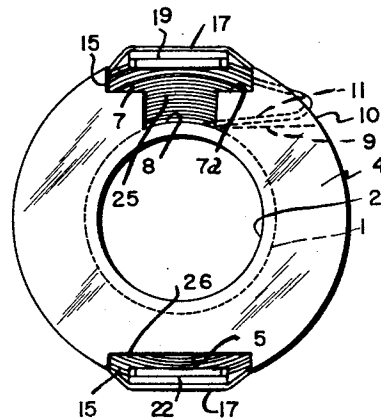


FIG-7

INVENTOR
DOUGLAS W. HOWENSTINE

BY *Toulmin Toulmin*

ATTORNEYS

1

3,014,164

ELECTRICAL COIL BOBBIN AND METHOD OF WINDING THEREON

Douglas W. Howenstine, Wabash, Ind., assignor, by mesne assignments, to Wabash Magnetic, Inc., a corporation of Indiana

Filed Apr. 16, 1958, Ser. No. 729,007
3 Claims. (Cl. 317--158)

This invention relates to bobbin-wound electrical coil production.

In conventional practice in the production of electrical coils it has been required that the start wire, which is the end of the coil first applied to the bobbin, be insulated from the body of the winding forming the coil, as the start wire extends up the end and over the periphery of the coil.

To achieve sufficient insulation from the body of the coil for commercial practice it has been the custom to provide a tape, a pad of insulating paper, or a washer of insulating material to separate the start wire from the body of the winding proper as the start wire proceeds from the inside diameter of the winding, up the end of the body and over the periphery of the coil. Such insulation is provided endwise on the bobbin over the start wire and is commercially termed up-ending insulation. The application of such insulating material is expensive in both time and material, and tends to materially slow the production of the bobbin-wound electrical coils.

This invention contemplates the provision of a bobbin having a bobbin flange which is formed to provide a built-in up-ending insulation feature.

A particular object of the invention is the provision of a bobbin-wound electrical coil in which the start wire is insulated from the body of the winding by the bobbin itself.

An important object of the invention is the provision of an encapsulated bobbin-wound electrical coil in which the encapsulating material fills and seals spaces in the bobbin itself and spaces formed between the bobbin, the electrical winding and the electrical terminals for the coil.

Another and primary object of the invention is the provision of a novel method for the up-ending insulating of a bobbin-wound electrical coil.

The invention will be more fully understood by reference to the following detailed description and accompanying drawings wherein:

FIGURE 1 is an elevational view of a bobbin produced in accordance with the invention;

FIGURE 2 is a plan view of the bobbin of FIGURE 1;

FIGURE 3 is a view similar to that of FIGURE 1 but illustrating the bobbin with a winding thereon having the start lead projecting from the bobbin;

FIGURE 4 is a view similar to that of FIGURE 3 but with the start wire retained by the bobbin in accordance with the invention;

FIGURE 5 is a view similar to that of FIGURE 4 but illustrating the start wire connected to a terminal and insulated from the body of the winding;

FIGURE 6 is a view similar to that of FIGURE 5 but taken from the opposite side of the coil;

FIGURE 7 is a plan view of the structure of FIGURE 6; and

FIGURE 8 is a view of the encapsulated coil with parts broken away to illustrate passage of the start wire.

Referring now to the drawings, and first particularly to FIGURES 1 and 2, the numeral 1 designates a bobbin of electrical insulating material such as epoxy resin having a core opening 2 therethrough and provided with end projecting flanges 3 and 4. Flange 3 is complete in a circumferential sense; flange 4 as shown in FIGURE 2 is apertured through a portion thereof to provide a shoulder

2

5. Diametrically opposite the shoulder 5 the flange is apertured through at 6 to provide shoulder portions 7, 7a. The aperture 6, as indicated at 8, is recessed beyond the shoulders to the tubular portion of the bobbin; thus the aperture opens from the core to the flange edge 10.

As shown in FIGURES 1 and 2 a groove 9 is provided edgewise in the material of the flange transversely to the longitudinal axis of the bobbin and extends partially around the periphery 10, as may be most clearly seen from FIGURE 2. Groove 9 communicates the aperture 6 and shoulder 7 with the flange periphery, the groove extending to the aperture where the aperture opens at the core.

In the formation of a winding on the bobbin 1 a wire end 11, commercially termed the start wire, is brought through the opening 6 and started around the bobbin periphery. The start wire extremity is retained in any suitable manner; one method is to bend the start wire extremity on itself and to insert it in the core opening 2 to hold the start wire in contact with the bobbin for machine winding of the wire.

The wound bobbin body of wire is indicated at 13 in FIGURE 3 and the finish wire or second end of the winding is indicated at 14 in FIGURE 4. Also as shown in FIGURE 4, in the next step of the procedure, the start wire 11 is drawn through the groove 9 and lies in the groove as may be seen in the plan view shown in FIGURE 7.

The winding body is provided with an inner layer of tape 15 which extends around the body and overlaps as shown at 16. A somewhat narrower body of tape 17 extends over the layer 15 and itself overlaps at 18.

The start wire 11 is drawn down over the lower or inner portion of the flange bounding the groove 9 and is passed between the tape layer 15 and the tape layer 17. The tape securely holds the wire positioned.

A terminal 19 (FIGURE 5) has the lower anchor portion 20 thereof formed to extend between the tape layers 15, 17. A narrower finger 21 of the terminal 19 extends outwardly of the tape layer 17 and receives the extremity of the start wire 11. Accordingly by the method described, through the provision of the grooved flange the start wire is insulated from the body of the winding and is also insulated sufficiently from the bobbin extremity by that portion of the flange that is the upper or outer portion which bounds the upper side of the groove 9.

It is to be noted that while the wire forming the body 13 is magnet wire and carries its own insulation, such insulation is insufficient to meet present commercial requirements, particularly with respect to the insulation wire at the bobbin extremity.

The present structure, that is, wherein the magnet wire is passed through the groove 9 and insulated from the end by that portion of the flange which bounds the upper side of the groove (FIGURE 5) has proven thoroughly satisfactory in commercial operation and completely acceptable to the trade.

The second terminal, that is, terminal 22 is provided with an anchor portion 23 which extends between the tape layers 15, 17 in the same manner as the anchor portion 20 of terminal 19, and terminal 22 is substantially diametrically opposite the terminal 19, and accordingly is positioned adjacent the shoulder 5. Terminal 22 has a finger 24 corresponding to the finger 21 of terminal 19. Finger 24 receives wound thereabout the finish wire 14 or second end in secure contact. In each instance the fingers are suitably soldered to the wires which they receive.

Generally the winding 13 plus the tape is of such a thickness as shown in FIGURE 6 that the terminals are provided slightly outwardly of the periphery and away

3

from the shoulders formed in the flange. Thus spaces 25, 26 occur as well as the spacing formed by the recess at 8 and the spacing formed by the groove 9. These spaces are filled, as more clearly indicated in FIGURE 8, when the coil is encapsulated with resin, such as an epoxy resin, for example. Filling of these spaces with an integral body of resin is important to the rigidity of the start wire and the terminals.

Most suitably the resin body 27 is simply molded about the coil and terminals are provided in the structure of FIGURE 8. It has been found that by providing the up-
 10 ending insulation within the structure of the bobbin itself as by the material defining the groove 9, materially speeds production. The bobbin itself is readily molded from plastic materials such as epoxy resin, with the shoulders and groove formed therein, thus avoiding any machine
 15 operations.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and accordingly, it is desired to comprehend
 20 such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. An encapsulated coil comprising a bobbin of electrical insulating material having a core and end flanges, a winding of insulated wire on the core between the flanges, said winding having a start wire and a finish wire extending from the body of the winding, one of said flanges having apertures therethrough in spaced relationship peripherally of the flange providing shoulders of the flange, said flange also having a groove extending in the material of the flange transversely to the longitudinal axis of the bobbin, the said groove extending partially around the flange periphery and communicating a shoulder in an aperture with the periphery, the groove being closed axially of the bobbin by the insulating material of the flange, terminals of the coil projecting over the winding in insulated relationship with the winding and through each of the apertures between the flanges and extending beyond one flange axially, said start wire passing through an aperture and the groove and being electrically insulated from the winding but connected electrically to the terminal

4

between the flanges, said finish wire being connected electrically to the other terminal between the flanges, and resinous electrically insulating material over the bobbin and the winding thereon and filling spaces between the terminals and bobbin and sealing the start wire in the groove.
 5

2. An encapsulated coil comprising a bobbin of electrical insulating material having a core and end flanges, a winding of insulated wire on the core between the flanges, said winding having a start wire and a finish wire extending from the body of the winding, one of said flanges having apertures therethrough in spaced relationship peripherally of the flange providing shoulders of the flange, said flange also having a groove extending in the material of the flange transversely to the longitudinal axis of the bobbin, said groove being closed axially of the bobbin by the insulating material of the flange, terminals of the coil projecting in insulated relationship with the winding and through each of the apertures between the flanges and extending beyond one flange axially, said start wire passing through an aperture and the groove and being electrically insulated from the winding and electrically connected to the terminal between the flanges. said finish wire being connected electrically to the other terminal between the flanges, and resinous electrically insulating material filling the spaces between said terminals and said bobbin and retaining the start wire in said groove.
 15
 20
 25

3. An encapsulated coil as set out in claim 2, and wherein said flange has an aperture extending wholly therethrough axially of said bobbin and which aperture extends from the outer edge of the flange and opens at the surface of the core.
 30

References Cited in the file of this patent

UNITED STATES PATENTS

1,742,018	Wermine	Dec. 31, 1929
1,752,866	Trombetta	Apr. 1, 1930
1,805,638	Scofield et al.	May 19, 1931
1,944,870	Apple	Jan. 30, 1934