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1,625,465

M. B. GROUT

COIL

Filed April, 3, 1925

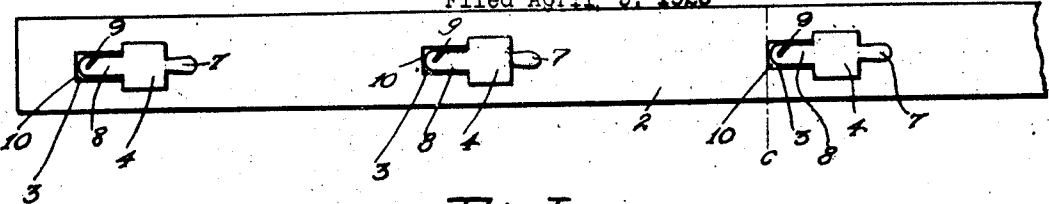


Fig. 1

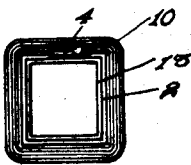


Fig. 2

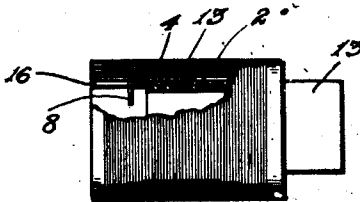


Fig. 3

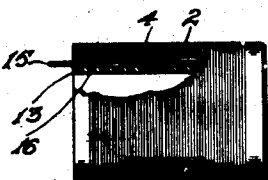


Fig. 4



Fig. 5

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UNITED STATES PATENT OFFICE.

MARTIN B. GROUT, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

COIL.

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My invention relates to coils and has to do more particularly with terminals such as are used for attaching external conductors to electrical coils, especially coils that are automatically wound, and to the core or winding tube construction thereof. As is known to all skilled in the art, a plurality of such coils are generally wound simultaneously and on one tube and are afterwards severed into individual and separate coils.

An object of my invention is to make a terminal that may be fastened to the tube upon which the coils are to be wound, in such a manner that it will not interfere with the winding process nor protrude in any direction from the coil when it is finished.

Another object of my invention is to make a terminal that is very economical to manufacture.

A further object of my invention is the provision of a winding tube or core construction which readily permits the attachment of the external conductors to the terminals of the coil, and which insulates the said terminal from the iron core that may be placed in the center of the coil.

A further object of my invention is the provision of a coil construction in which the insulating material placed between the layers of wire will be symmetrical in form and will not bulge in one spot due to the terminal and external conductor attached to winding of the coil.

A further object of my invention is the provision of a coil in which, while the terminals are within the confines of the coil, the external conductors may be attached after the coil is wound.

A still further feature of my coil is the provision of a winding tube construction, which is so made that the coil terminals may be readily attached thereto when the tube is made and before the coil is wound thereon.

The above features as well as others not hereinbefore mentioned will be more clearly described and explained in the following specification and in the appended claims. In the accompanying drawing, like reference characters, in the different views, denote like parts, and

Fig. 1 is a top view of a tube upon which coils are to be wound, showing a number of the terminals in place thereon;

Fig. 2 is an end view of a square coil

such as is used in transformers and the like, with a terminal therein;

Fig. 3 is a side view of a coil such as is used in transformers, partly drawn in section to more clearly illustrate the terminal of my invention;

Fig. 4 is a side view of a coil showing a terminal to which an external conductor has been attached;

Fig. 5 is a view of the terminal of my invention.

In Fig. 1 the part marked 2 represents a tube of any suitable insulating material such as paper or the like upon which electrical coils are to be wound. This tube 2 is provided with a number of oblong orifices 3 of a suitable size and spaced correctly. The terminal 4 is stamped out of any suitable conducting material and consists of a central portion 5 which has at each of its four corners small, pointed and depending legs integrally formed with the portion 5 as is a forward extending member 8 which is provided with a slot 9 of a sufficient size to permit the insertion of an external conductor for purposes as will be described later.

The terminals 4 are placed on the tube 2 so that the forward extending portions 8 are over the oblong orifices 3 in the tube 2. The four legs 6 are pressed into the paper tube 2 and are of a length greater than the thickness of the tube 2 so a portion of the legs 6 extends beyond the inside of the tube 2. This portion is then bent over or clinched and serves to secure the terminal 4 in place on the tube 2.

The terminals 4 may be attached to the tubes by a machine such as is a paper clip machine, i. e., the terminals may be all in one strip or placed in a hopper and the terminals fastened to the tube each time a trip device is operated. When the terminals 4 are in place on the tube 2 upon which the coils are to be wound, the tube 2 is placed on a winding mandrel and an end of the wire conductor, which is to compose the coil, is attached to the tail piece 7 of the terminal 4 by any suitable means such as solder. A piece of tape or other insulating material is then placed over the terminal. The wire is then wound on the tube 2 in the usual way to form the coil. The several coils on the tube 2 are then separated to form individual coils by cutting

the tube 2 upon which the coils are all wound. With some type of coils, such as shown in the drawing, layers of insulating paper are placed between the layers of wire. These layers of paper are cut or sawed with the tubing when the coils are formed into separate units. The tube is cut in such a manner that the orifices 3 are shorn of their end portions. This changes the orifices 3 into oblong slots in the tube 2 with their ends 10 open. The cutting is done along the lines *c-c* in Fig. 1. The forward extending portion 8 of the terminal 4 is above this slot 3 and may, by the use of a suitable tool, be bent down into the slot 3 to have an external conductor fastened to it by inserting the conductor into the slot 9 in the portion 8 of the terminal 4 and then twisting it around the portion 8 to which it may be secured by solder. When this is done the external conductor will be connected to the conductor forming the coil by means of the terminal 4, the external conductor being fastened to the portion 8 and the coil conductor being secured to the tail piece 7 of the terminal 4.

In coils of the square type, as illustrated in Figs. 2, 3 and 4 such as are used in transformers and the like, the terminals 4 are fastened to a tube 2, as before explained, and the layers of wire and insulating material which form the coil are wound on the tube 2 in the usual manner. A member 13 composed of any suitable insulating material, such as paper, and shaped similarly to the tube 11 is inserted into the open space inside the tube 2 generally before it is placed on the winding mandrel. This member 13 serves to strengthen the coil and is for other purposes well known in the art, such as insulating the terminals from the core of the coil, and is of the same length as the tube 2 but slightly smaller so that it may be moved longitudinally in the tube 12. After the coils have been wound on the tube 2 they are separated into individual coils as before explained and then the external conductors are attached to them. The member 13 is pushed partly out of the tube 2 and the portion 8 of the terminal 4 is bent down, through the slot 16 in the tube 2, into the open space in the tube 2. The member 13 is pushed out in a direction away from the end of the tube 2, upon which the terminal 4 is placed, all of which is illustrated in Fig. 3 of the accompanying drawing. The external conductor 15 is then secured to the portion 8 of the terminal 4 in a manner similar to that already explained and the portion 8 is then bent back to its normal position, the member 13 is also replaced in its proper position and the finished coil, with an external conductor attached, appears as illustrated in Fig. 4 of the accompanying drawing. The external

conductor attached to the terminal 4 and the solder used in so attaching the conductor to the terminal 4 are all within the orifice cut in the tube so that the thickness of the same does not cause a bulge in the coil at the point the conductor is attached to the terminal.

The terminal 4, being of very thin material and the outer tubing flexing slightly inwardly in combination with the orifice cut in the tubing, in which the external conductor lies when soldered to the terminal 4, permits the forming of a symmetrical coil without any bulging due to the thickness of the terminal and the external conductor, as in coils of the prior art.

It is obvious from the foregoing description and explanation that terminals of the type described are very economical to manufacture. It may be formed by one punching operation and is very quickly and easily attached to an insulating tube and allows the easy securing of external conductors to the winding of the coil. While I have illustrated and described a preferred embodiment of my invention, I do not wish to be limited to the same but aim to cover all such changes and modifications as fall within the spirit and scope of the appended claims.

Having described my invention what I claim as new and desire to secure by United States Letters Patent is:

1. A device of the character described including a tube provided with an orifice, a terminal secured to said tube by means of a plurality of integrally formed depending legs imbedded in said tube and having a free end extending into said orifice, said free end adapted to be flexed in said orifice to permit the attachment of an external conductor after the coil has been wound, and a winding supported on said tube and connected to said terminal.

2. A device of the character described including a tube provided with an orifice, a terminal secured to said tube by means of a plurality of integrally formed depending legs imbedded in said tube and having a free end extending into said orifice, a winding supported on said tube and connected to said terminal, and a second tube extending into said first tube adapted to be moved laterally to permit the free end of said terminal to be flexed so that an external conductor may be attached after the winding has been placed on the tube, said second tube adapted to be returned to its normal position to protect the terminal.

3. A device of the character described including a winding tube provided with an orifice, a winding on said tube consisting of layers of wire and insulating material, and a terminal secured to said tube by means of a plurality of integrally formed depending

legs imbedded in said tube having its free end extending into said orifice but within the confines of said coil, said terminal adapted to be flexed in said orifice to receive an external conductor after the winding has been placed on the tube, and a second tube inserted in said tube to protect the terminal and the external conductor.

4. A device of the character described including a winding tube provided with an orifice, a winding on said tube consisting of layers of wire and insulating material, a terminal secured to said tube by means of a plurality of integrally formed depending legs imbedded in said tube having its free end extending into said orifice but within the confines of said coil, said terminal adapted to be flexed in said orifice to receive an external conductor after the winding has been placed on said tube, and a tube adapted to fit within said first tube and to be moved laterally to permit the terminal to be flexed and to be returned to normal to prevent contact with said terminal.

5. A device of the character described including a winding tube provided with a plurality of orifices, a plurality of terminals adapted to be secured to said tube by means of integrally formed depending legs imbedded in said tube and having their free ends extending into said orifices, and windings for said tube adapted to be placed over said terminals, said tube adapted to be severed into sections so that a free end of each terminal extends to a face of said coils when separated into units, said free end adapted to be flexed to permit an external conductor to be attached after the winding has been placed on the tube, and a tube adapted to be inserted in each section of tube to protect the terminal.

6. A winding tube of the character described having a plurality of oblong orifices, terminals adapted to be secured to said tube by means of integrally formed depending legs imbedded in said tube and each having a free end extending into an orifice and windings adapted to be placed on said tube and connected to said terminals, said tube

adapted to be severed into sections to form separate units, each having a terminal and said units being so severed that the free end of its terminal extends substantially flush with the face of the unit, said free end adapted to be flexed in said orifice to permit an external conductor to be attached, and a second tube inserted in each section of first tube to protect the terminal.

7. A device of the character described including a winding tube, a second winding tube adapted to fit over said winding tube and having a plurality of orifices, terminals adapted to be secured to said second tube by means of legs imbedded in said tube and each having a free end extending into its associated orifice, and windings placed upon said tubes over said terminals and having ends thereof connected to said terminals, said tubes being adapted to be severed into section to form individual units so that the said free ends of said terminals extend flush with a surface of said coils, said first tube adapted to be moved laterally to permit the free end of said terminal to be flexed and attached to an external conductor and then returned to its normal position within said tube to protect the terminal.

8. A device of the character described including a winding tube, a second winding tube adapted to fit over said first winding tube, said second winding tube being provided with orifices, terminals for attachment to said first winding tube having a free end extending into said orifices, coils adapted to be wound on said tube over said terminals and connected thereto, said tube adapted to then be severed into sections to form individual coils with said terminals extending near the face of each section of coil, said first tube than being adapted to be moved laterally so that each terminal may be flexed to receive an external conductor and each section of the first tube then replaced in its normal position.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 1st day of April, 1925.

MARTIN B. GROUT.