Oct. 7, 1930. F. S. McCULLOUGH 1,777,571

COIL AND METHOD OF MAKING THE SAME

Filed June 4, 1926

Fig. 2.

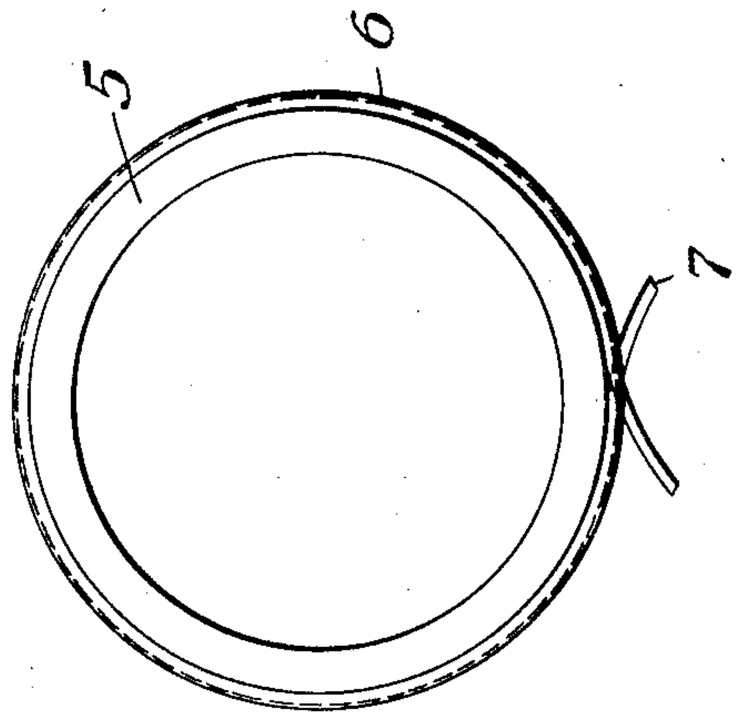
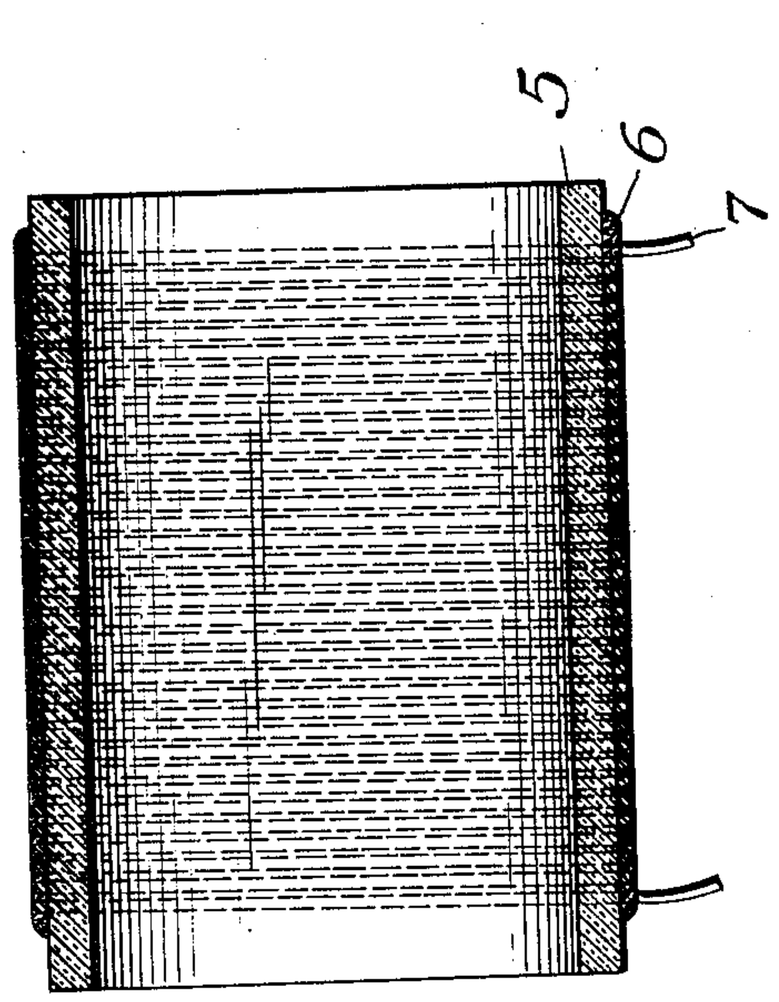


Fig. 1.



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UNITED STATES PATENT OFFICE

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COIL AND METHOD OF MAKING THE SAME

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This invention relates to coils and particularly coils used as transformers, inductances and the like, and to a method of making the same.

The invention has for its object to provide a coil especially useful as a transformer, which is formed of wire wound upon a core of porcelain or similar material, and embedded in a vitreous covering which serves as a high resistance insulation for the successive convolutions of wire and which also serves to retain the wire in place on the core.

A further object of the invention is to provide a novel method of producing the core wherein the adjacent convolutions of wire are separated and insulated one from the other and wherein the convolutions of wire are thoroughly embedded in the vitreous material and act to provide a method whereby the articles produced are of a neat and uniform appearance.

The invention may be readily understood by reference to the accompanying drawing which is illustrative of my invention and in which:

Figure 1 is a vertical section through a coil embodying my invention;

Figure 2 is an end view thereof.

According to my invention, a suitable core 5, preferably in the form of a hollow cylinder and made of porcelain, quartz or other vitreous or refractory material, is coated more or less uniformly with a layer of vitreous enamel 6. This coating may be applied by dipping or spraying, or in any other suitable manner, so as to thoroughly cover the part of the core over which the winding is to be placed after which the enamel may be subjected to a suitable heat treatment.

The core with its enamel coating is then heated to a temperature sufficient to reduce the vitreous coating to a soft or a semi-plastic condition. When the coating of vitreous enamel has been softened to the desired degree, bare copper or other suitable wire 7 is wound on the coated surface with a slight spacing between the successive convolutions. The wire as it is wound is embedded in the plastic or semi-plastic vitreous surface of the core and the vitreous material flows between the successive convolutions to provide a high resistance insulation between the convolutions and to thoroughly protect the wire against exposure. After the coil has been wound on the core, the enamel is allowed to set whereby the turns of wire are firmly secured to the core and thoroughly insulated from one another, being also at the same time protected from exposure to the atmosphere.

In practicing the invention, the core which has been coated with vitreous enamel may be mounted in a lathe or other machine where it can be turned and at the same time heated to a point where the enamel can be kept at the desired degree of plasticity. The wire may be coiled on to the core as the core is turned from a traveling support fed along by the screw of the lathe so as to secure a uniform spacing of the convolutions of wire. The wire can be kept under sufficient tension to insure its being thoroughly embedded in the soft enamel.

The coil, as thus produced, is of neat appearance and the turns of wire are thoroughly insulated one from another. The vitreous enamel used has an extremely high resistance so that even with closely adjacent turns of bare wire there is a resistance in the neighborhood of at least one megohm between turns. The turns of wire are entirely protected so that they cannot become loose or be deformed, and the entire winding is moisture-proof, so that its inductance or characteristics are not affected by humidity or moisture conditions. Such a coil can be successfully immersed in water without injury thereto or without short circuiting the successive turns of wire.

According to the method as herein described, the wires actually become buried in a surface coating on the core and they can be of a neat and uniform appearance. The wires are also most firmly united to the core in this manner, and the way of embedding the wire in the enamel coating insures adequate insulation between turns.

While I have described a preferred coil and method for manufacturing the same, it will be understood that various changes and modi-

fications may be made within the spirit of my invention and under the scope of the appended claims.

I claim as my invention:

1. The method of forming an inductance which comprises the application of a surface layer of insulating material adapted to be softened by heat to an insulating core adapted to hold its form under a heat sufficient to soften said surface layer, heating the surface layer to a softening point, but to a temperature below the softening point of the core, and then winding a wire about the core under a tension sufficient to imbed the wire in the surface layer, and thereafter allowing the article so formed to cool.

2. The method of forming an inductance coil which comprises the application of a surface layer of a vitreous enamel material to a ceramic core, the melting point of the enamel being below the melting point of the core, heating the surface layer to its softening point but to a temperature below the softening point of the core, and then winding a wire about the core under tension sufficient to imbed the wire in the enamel coating, and allowing the article so formed to cool.

In testimony whereof I have hereunto set my hand.

FREDERICK S. McCULLOUGH.