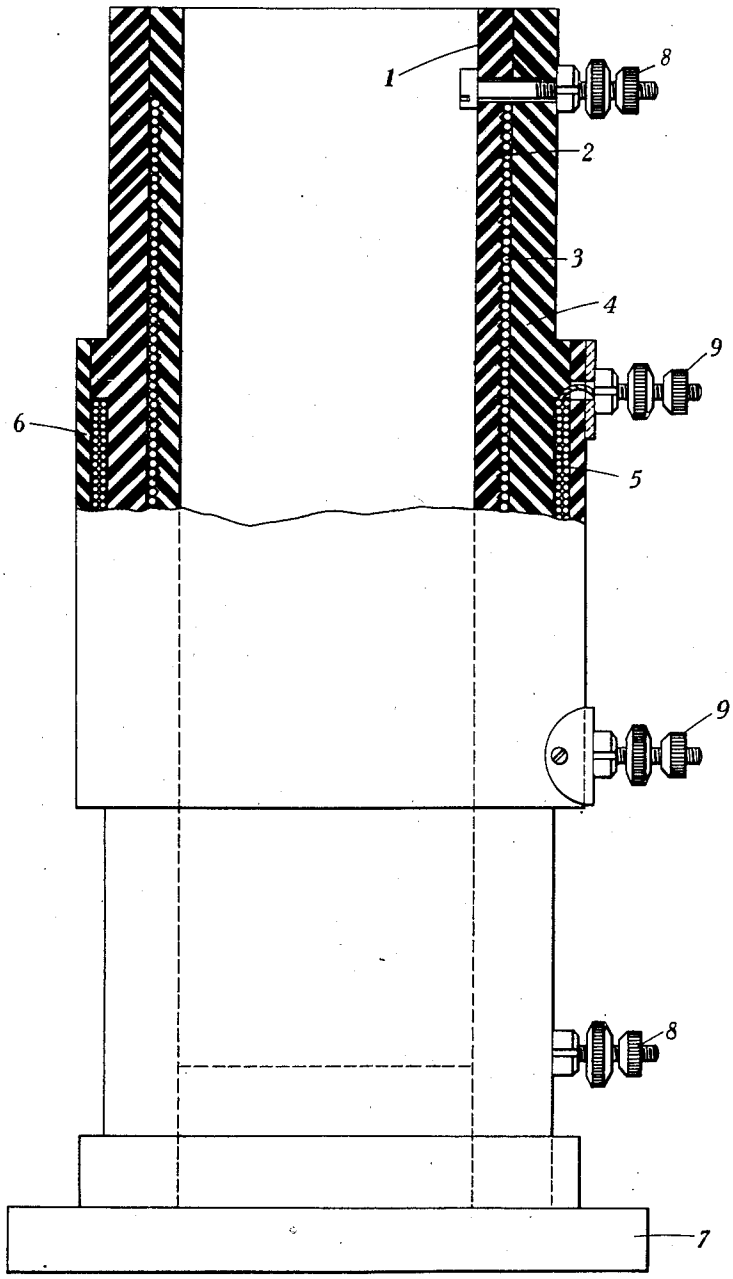
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ARTICLE FORMED FROM PAPER IMPREGNATED WITH POLYMERISED MATERIAL

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ARTICLES FORMED FROM PAPER IMPREGNATED WITH POLYMERIZED MATERIAL

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12 Claims. (Cl. 175—21)

This invention relates to the manufacture of coils, such as those of transformers and inductances, which are wound upon a former, usually of cylindrical shape.

Objects of the invention are to provide a coil which is mechanically robust, and to enable an accurate predetermination to be made of the dimensions of a coil and hence of such electric characteristics as depend on its dimensions.

The invention will be described with reference to the accompanying drawing which shows how best the inventor has been able, up to the present, to attain the objects mentioned above. This drawing is an elevational view, partly in section, of a small high-frequency transformer such as is used in radio equipment.

A core tube 1 is formed by hot rolling a paper that carries a synthetic resin, as will be described later, a channel 2 being provided in which the primary 3 is wound. One very convenient method, particularly for a single layer winding, is to cut a screw thread on the core tube into which the wire is fitted. Besides ensuring that the turns of the winding are accurately spaced, this method allows the use of bare wire which in the subsequent rolling process becomes completely embedded in the paper to the practical exclusion of air spaces. Further layers 4 of prepared paper are rolled on which also contain a channel in which the secondary 5 is wound. The secondary is protected by an outer winding of paper 6. A base 7 may also be rolled on and the windings are brought out to terminals 8 and 9 respectively.

Mechanically this method of construction produces a transformer which, considered as a whole, is very robust and at the same time the windings are thoroughly protected against damage since they are completely embedded in the paper winding itself. Since the material has excellent machining properties, the winding spaces can be cut very accurately and the completed transformer can be machined to fine limits.

Electrically the properties of resin-carrying paper are such that it is easy to secure very high dielectric strength between the windings, with small ionization losses due to the elimination of air space between the windings.

In the winding of the coil-former, a continuous strip of prepared paper, under an approximately uniform tension, is passed round a heated roller on to a removable winding mandrel, and is there wound into a bushing of the desired form, pressure being applied to the paper on the mandrel by means of a pressure roller.

The paper is prepared as follows:

(*a*) Impregnated with synthetic resin and lacquered; or

(*b*) Impregnated only; or

(*c*) Coated with a synthetic resin lacquer.

Any of the above methods of preparation enables a mechanically satisfactory bush to be made, but the electrical characteristics depend on the degree to which air can be excluded from the finished bush and the order of merit in this respect is *a*, *b* and *c*. The layers of fibrous material are thus cemented together under the action of heat and pressure by means of a thermoplastic material which the fibrous material carries either as an impregnation or as a coating or both. The paper (cotton sheeting and the like could also be used) may be impregnated with monostyrene which is then polymerized and/or coated with a lacquer containing polystyrene.

In the case of some impregnants which may be used, for example the material sold under the registered trade-mark "Bakelite," a further heat treatment will be necessary after rolling in order to complete polymerization, since "Bakelite" is a thermosetting material; however it is at present thought to be preferable to make use of a prepolymerized thermo-plastic material, thus eliminating the further heat treatment.

What is claimed is:

1. A method of making a coil which consists in winding paper carrying synthetic resin into a former, winding a layer of the coil onto said former, winding on more of said paper to form a covering, and bonding the whole.

2. A method of making a coil which consists in winding paper carrying styrene into a former, winding a layer of the coil onto said former, winding on more of said paper to form a covering, and bonding the whole.

3. A coil structure comprising a central core formed of laminated sheet fibrous material bonded together, said core being provided with a winding receiving groove, a coil wound in said groove, a covering formed of similar laminated sheet fibrous material arranged externally of said coil about said core and bonded thereto substantially throughout the length of said core and said covering, whereby said coil is embedded in a single bonded covering of laminated sheet fibrous material.

4. A coil structure according to claim 3 wherein said laminated sheet fibrous material comprises a fibrous material impregnated with a synthetic resin.

5. A coil structure according to claim 3, where-

in said laminated sheet comprises paper carrying styrene.

6. The method of making a coil which comprises winding paper impregnated with polystyrene into a former, winding a coil on said former, then winding more paper impregnated with polystyrene as a covering over said coil, then applying heat and pressure to the impregnated paper on both sides of said coil to cause the polystyrene to flow and bond the coil between the paper.

7. A coil comprising a core of laminated fibrous sheet material, a coil wound around the periphery of said core, a covering of fibrous sheet material over said coil, said core and said coil and said covering all being bonded together by a synthetic resin to form a rigid unit.

8. A method of making a coil which comprises producing a laminated paper former by winding paper carrying an insulating and bonding material softened by heat, winding a coil on the former, making a laminated paper cover by winding around the coil and former laminated paper carrying similar bonding material, and bonding the former, coil and cover into an integral unit by heating until the bonding material is softened and pressing the cover and former together while said material is soft until the paper and bonding material are forced into substantially all air spaces in and around the coil.

9. A method as set forth in claim 8 in which the former is produced by heating the paper until the bonding material softens and winding the paper around a form under pressure.

10. A method as set forth in claim 8 in which the bonding material is a thermo-plastic synthetic resin.

11. A method as set forth in claim 8, in which a spiral groove is formed in the outer face of the former and the coil is wound in said groove, the walls of the groove being deformed during pressing to fill air spaces contiguous to the coil.

12. A method as set forth in claim 8 in which a spiral groove is formed in the former and a coil of bare wire is wound in the groove, portions of the groove walls located between adjacent turns of the coil being deformed during heating and pressing to fill air spaces contiguous to said turns and form continuous insulation between successive turns of the coil.

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