(No Model.)

E. THOMSON.

COMPOUND INSULATING LAYER FOR ELECTRIC COILS.

No. 422,550. Patented Mar. 4, 1890.

Fig 1

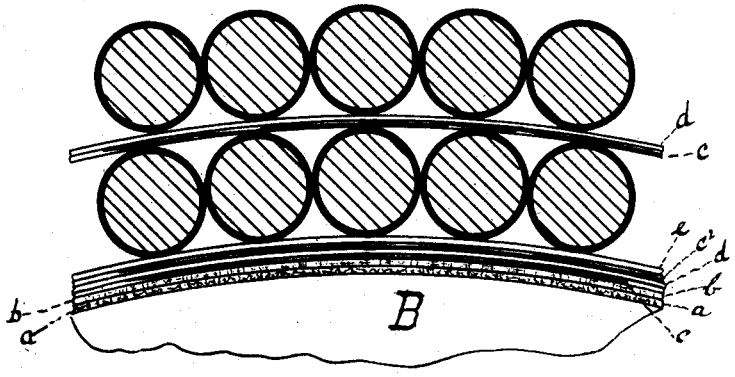
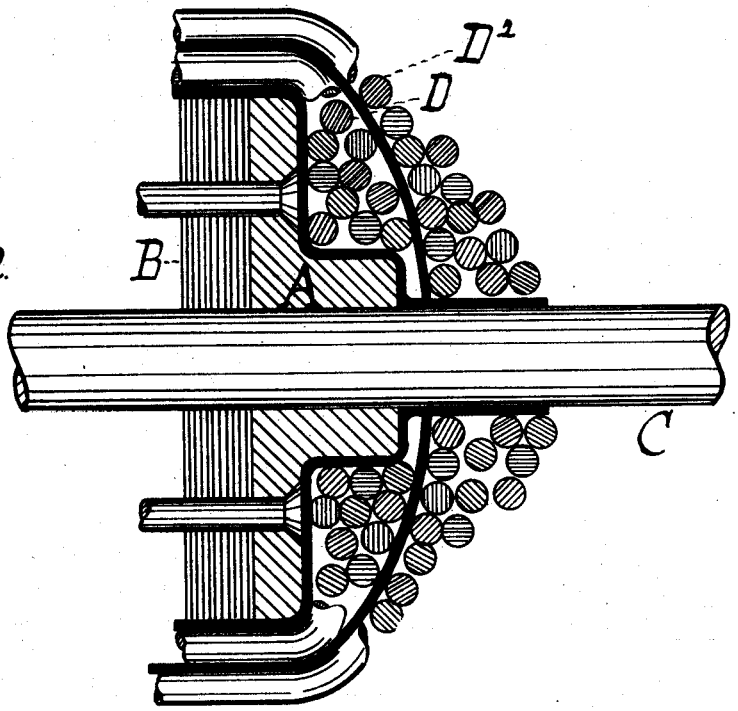


Fig. 2.



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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF LYNN, MASSACHUSETTS.

COMPOUND INSULATING-LAYER FOR ELECTRIC COILS.

SPECIFICATION forming part of Letters Patent No. 422,550, dated March 4, 1890.

Application filed August 5, 1889. Serial No. 319,828. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Compound Insulating-Layer for Electric Coils, of which the following is a specification.

My invention relates to the construction of an insulating septum or layer interposed between electric coils and their core or carrier, or between two sets of electric coils, for the purpose of maintaining thorough insulation between the parts lying at opposite sides of such layer.

My invention is particularly applicable to the case of armatures for dynamo-generators and motors having a laminated iron core of cylindrical form, upon which is first wound a layer or layers constituting one half the winding, connected, as is well known, to one half the segments of the commutator, superposed on which winding and altogether outside therof the other half of the winding is placed and connected to the other half of the commutator-segments. The winding then consists of two sets of superposed coils at right angles or approximate right angles placed on the core, the wires of one set underlying those of the other set.

The object of the invention, as thus applied, is to secure a satisfactory insulation between the wires of the two sets or two layers or sets of layers just referred to and at the same time secure a most effective insulation on the under side of the inner wire from the armature-core itself.

My invention consists, essentially, of a compound insulating layer or septum composed of two or more parts, one of which is non-porous or of close texture or nature—such as mica, glass, or similar earthy or mineral substance—and impervious to moisture, while the other part, forming a bolster or backing to which the first is bound, consists of some fibrous or non-laminated material, preferably in the form of cloth woven or felted, and composed, preferably, of non-inflammable material, like asbestus.

My invention consists, further, in certain additional features used in connection with the above, as will be hereinafter described.

In the accompanying drawings, Figure 1 is a cross-section through a part of an armature, showing my invention as applied thereto. Fig. 2 is a longitudinal section through one end of the armature, showing the location of the compound insulating-layers.

C is the armature-shaft; B, the plates or laminæ of iron forming, in connection with the head A, a portion of the core or carrier to which the armature-coils are applied.

D indicates the wires of the inner set of windings, and D^2 those of the outer set. These wires are provided with the usual attached insulating-sheath, as indicated.

In constructing the armature with my invention applied I proceed as follows: On the core I first place the fibrous coating *a*, which is preferably of non-inflammable material, such as asbestus paper or cloth. This layer of my compound insulation may be bound down upon its core or support by a covering *b*, of cotton or other cloth, or by other means, as desired. The cloth is preferably shellacked. If the fibrous coating or layer of asbestus or other material be strong enough in itself to withstand handling and working, the binding or layer of cotton or other cloth may be dispensed with. In practice, however, it is preferable to employ it. Next is applied the layer of insulating material (non-porous) formed of some vitreous or earthy material, such as mica in the form of thin plates. One or two layers of mica *c* may be applied, according to its thickness. The joints of the plates or laminæ are overlapped, so as to form a complete layer impervious and non-porous. This layer may be bound down by any suitable means and the coils of the armature wound directly upon it; but in order to prevent injury to the upper vitreous or non-porous layer I prefer to cover it with a protective layer *d*, of some material, such as cotton or linen cloth shellacked, or, better still, with one or two layers of hard, close, and strong paper, which is shellacked down in place. The work of winding the coils may be then done without risk of displacing the under layers.

As will be seen, by this procedure there has been produced a compound layer of insulating material consisting of the combination of fibrous material—such as asbestus—fire-resisting and heat-resisting in character,

and vitreous or mineral material in laminæ or plates, altogether impervious to the passage of vapors, and representing a thin sheet of glass, as it were, surrounding the core.

The mechanical attrition or vibration would be apt to disturb the mica if it were alone, while it would be difficult, if not impossible, to put it on the core. The asbestus, being fibrous or flexible in its character, thoroughly makes up for any deficiency in the mica coating, at least so far as a heat-resisting layer is concerned. If desired, an extra layer c^2 of mica may be applied over those already referred to, and a protective layer *e* applied over c^2. The ends of the core are insulated with card-board or asbestus plates, over which is placed a compound mica and linen plate or washer, or mica and paper might be used. The next step in the construction is the laying on of the first half of the system of coils, which constitutes the inner winding. This winding completely incloses the armature-core, and presents outwardly a surface of insulated wire, over which there is to be placed the other half winding.

Since the potential between the respective portions of this winding may at times be high, as my invention is particularly applicable to railway-motor work using potentials of four hundred, five hundred, or six hundred volts, I coat the first set of wire coils all over with a mica layer re-enforced on each side, or on one side only, with cotton cloth, linen, or paper, so as to combine again an impervious, vitreous, or mineral layer with a fibrous pervious insulating-layer. This is indicated in Fig. 1. The thickness of the insulation between the two sets of windings, outer and inner, is, however, not as great as that between the inner winding and the core itself. The shaft, where the wire of either winding comes near, is in like manner insulated, or two layers of stout twine may be wound around it and the whole be well shellacked. Between the two sets of windings on the ends are placed the same insulating material, so as to substantially divide the insulating-wire into two coil-sections, an inner and an outer, although the whole of the two sets consecutively follow in the ordinary plan of the Siemens windings, or consecutive coils angularly follow each other around the circumference of the armature.

The wire in each coil-section may be one, two, or more layers deep, according to the number of turns required to exist in a given space.

What I claim as my invention is—

1. The combination, with electric coils and the core or support upon which they are wound, of an interposed compound layer of insulating material comprising a layer or base of a fibrous insulating material, and an external layer of a hard non-porous material fastened upon the first, as and for the purpose described.

2. The combination, with electric coils and their core or support, of interposed layers of insulating material comprising a sheet or layer of an insulating mineral substance in a form impervious to moisture applied over a layer of a non-inflammable fibrous substance.

3. The combination, with electric coils and the base or support over which they are wound, of an interposed compound layer of insulating material consisting, essentially, of a base of asbestus paper or cloth, a superposed layer of mica, and an external covering of insulating material applied over the mica, as and for the purpose described.

4. The combination, with two sets of windings of conducting-wire having an attached insulating-sheath and applied to an armature core or body, of an interposed compound layer of insulating material consisting of a sheet or sheets of mica and a sheet or sheets of a fibrous insulating material.

5. A compound layer of insulating material consisting of a base of asbestus, a protective and fastening cover of a stronger material, a superposed layer of mica, and an external protective insulating-cover over the mica.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 1st day of August, A. D. 1889.

ELIHU THOMSON.

Witnesses:

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