R. VARLEY.
ELECTRIC COIL.
APPLICATION FILED OCT. 14, 1911.

1,073,060. Patented Sept. 9, 1913.

FIG. 1

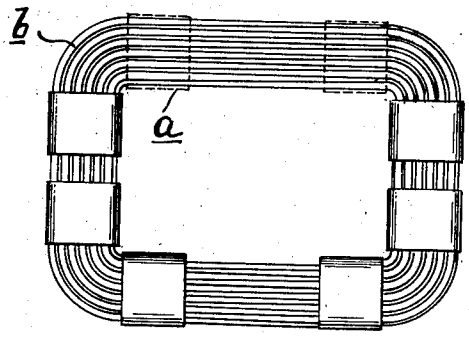


FIG. 2

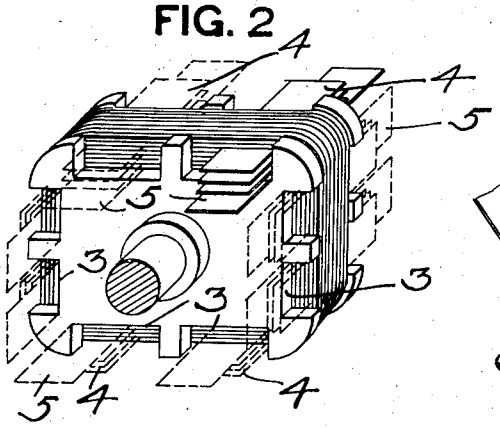


FIG. 3

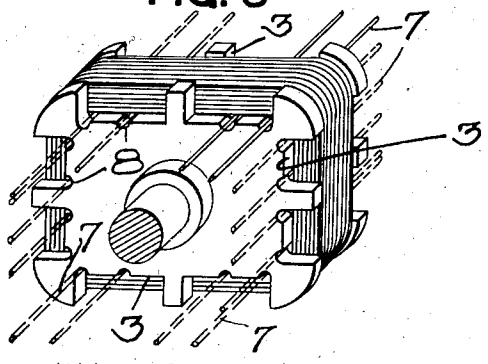
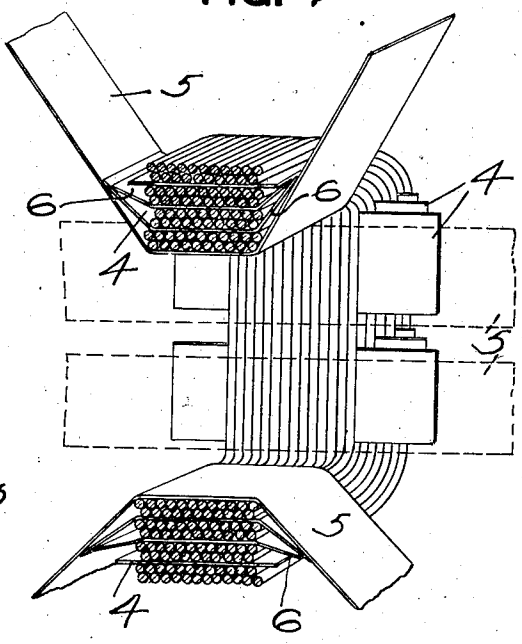


FIG. 4



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UNITED STATES PATENT OFFICE.

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ELECTRIC COIL.

1,073,060. Specification of Letters Patent. Patented Sept. 9, 1913.

Application filed October 14, 1911. Serial No. 654,754.

To all whom it may concern:

Be it known that I, RICHARD VARLEY, a citizen of the United States of America, and residing at Englewood, in the county of Bergen and State of New Jersey, have invented a new and useful Electric Coil, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form part of this specification.

This invention relates to electric coils and has as its primary object the production of a coil which is compact and symmetrical in shape.

Electric coils are usually readily distorted by strains which arise from handling, such as removal from the coil former and subsequent manipulation in the application of insulation thereto. This distortion of the grouped wires mainly takes place in a plane transversely to the length of wire and renders the coil very difficult of adaptation to apparatus in which fixed or given coil space obtains and it also sets up variations of determined capacity of the coil, for the reason that the distortion places certain turns of the wire between which potential differences exist, as in the case of transformer coils, in irregular juxtaposition. This difficulty of variation rises to great moment in such apparatus as transformers for the reason that it greatly varies the size and capacity of the transformer for given units of transformation. I overcome this difficulty by the provision of a coil having thin strips of binding material so incorporated therein as to not abnormally increase the size of the coil nor vary its shape formed by the symmetrical superpositioning of the layers of winding.

I also aim to provide other details of construction, as will be hereinafter more fully described.

It will be premised, of course, that my invention is not limited to any particular character or shape of coil as it may be equally embodied in transformer, dynamo, motor, induction, and other coils.

In the accompanying drawings I illustrate my invention in connection with a coil having angular bodily shape such as a coil having an angular core opening therein.

Figure 1 is a plan view of a coil illustrating my invention; Fig. 2 is a perspective view of a coiling mandrel showing coil wound therein; Fig. 3 is a similar view illustrating a modified form of coiling mandrel which may be used in the making of my improved coil; and Fig. 4 is a perspective view of a coil made in accordance with my invention.

In making my improved coil I wind the coil upon a suitable mandrel and incorporate therein strips or tapes of very thin material, preferably flexible, such as paper, cambric, or very thin fiber-board, in such manner as to so bind the different layers that there is prevented all possibility of accidental displacement of the turns of wire after they have been properly wound or applied, in the development of the coil on the former. I preferably bring this about by feeding such strips to the coil during the progress of winding and at suitable intervals both in the building up of the coil and in regard to the symmetrical disposition throughout the body lengthwise of the winding. Furthermore, I desire to so present the different strips of associated portions of the coil to the winding as to cause them to lie in superposed relationship at these points. This gives rise to mutuality of support for reinforcement of the several superposed tapes, thereby more efficaciously effecting their binding action upon the turns of wire. In order to bring about ready feeding of the strips to the coil, the mandrel or coil former 2 may be suitably notched as at 3 to permit of insertion or presentation of the tape to the coil, without binding thereof between the inner end faces of the mandrel and respective faces of the ends of the coil.

The tapes spoken of above are indicated by the numeral 4, and, if desired, a similar tape, or tape 5 of adhesive cambric, or any other desirable binding element, may be wrapped about the coil, as shown in Figs. 1 and 4, in the plane of the strips 4 so as to superficially bind the coil at this point and to more thoroughly bring about binding action of the tapes 4 by causing their terminal portions 6 extending beyond each end of the coil, to be brought into binding engagement with superficial turns of the winding at such ends of the coil. This is clearly shown in Fig. 4. The tapes 4 may be of any length that will provide for the extensions 4 and may afterward be cut to the

proper length in order to bring about neat and symmetrical placement or positioning thereof against the end faces of the coil.

In making angular coils, I preferably apply the binding element along straight portions of the body of the coil as indicated at *a* in Fig. 1 and not so as to bring such tape materially within the zone of the curved corner portions or arcs *b* of the winding. The purpose of this is to allow the turns of winding to geometrically or symmetrically position or adjust themselves as they draw across or over the corner portions of the coil. With the corners free from binding tape, the turns evenly contact with one another in a staggered or alternate manner at these points so that the layers are uniformly applied, resulting in the formation of coils of a determined or given number of layers having also a required number of turns. These conditions make it possible to wind the coil for any certain electric unit. As the turns are held in proper relationship at the corners of the coil, the crossing of the winding (which necessarily takes place in the reciprocal travel of the turns across the coil former to produce the layers) occurs in the body intermediate the corners, thereby resulting in a long or moderate crossing effect which does not abruptly bend the wire or irregularly or abnormally pile up the winding at these crossing points. By applying the binding so as not to interfere with proper application of the turns of the corners, I avoid bulky and unsymmetrical corner formation as would arise from uneven bearing or center binding of the tapes at the corner by reason of the small radii of the turns at this point. The application of the tapes at points contiguous to the corners enables the tapes to operatively contact throughout the whole width thereof with a straight, or substantially straight, (or moderate curve) portions of the winding, resulting in effectual binding action.

In lieu of a superficial binding tape 5 I may employ narrow binding elements such as suitable ductile strands of wire 7, shown in Fig. 3. These strands may be presented to the coil former prior to the application of the winding, in which case the coil former or mandrel may be provided with suitable accommodating recesses 8 sunk counterwise from the winding face of the former so as not to cause the strands 7 to lie materially above the said winding face and thereby affect the contour or shape of the coil to be wound.

As shown in Fig. 2, the tapes 5 may be fed to the mandrel, as in the case of the element 7, before the coil is made, or the coil may be held to prevent distortion upon its removal from the mandrel and subsequently bound by either binding elements 5 or 7.

The method of making the herein described coil forms subject-matter of my co-pending application Serial No. 654,752. The coil former disclosed herein also forms subject-matter of my co-pending application, Serial No. 654,753.

Many changes may be made in my invention without departing therefrom. For instance, tapes 4 may be fed to the mandrel preparatory to winding as in the case of the elements 5 and 7 or they may be subsequently applied as in the case of these elements. It is also apparent that other tapes may be terminally anchored among the turns of winding of the coil such as disclosed in the method set forth in my co-pending application Serial No. 654,752.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. An electric coil having a substantially angular opening forming corners in the body thereof, and comprising superposed layers of winding having a plurality of turns each, the turns of one layer lying in an alternate or staggered relationship with adjoining turns of another layer and the turns crossing one another at points intermediate the corners of the coil, and strips of binding element lying between different layers of winding at points intermediate the corners and the points of crossing of the turns of winding.

2. An electric coil having a substantially angular opening forming corners in the body thereof, and comprising superposed layers of winding having a plurality of turns each, the turns of one layer lying in an alternate or staggered relationship with adjoining turns of another layer, and crossing at points intermediate the corners of the coil, and a plurality of narrow superposed binding strips spaced from one another by intervening layers of winding and incorporated therein at points intermediate corners and the points of crossing of the turns of winding.

3. An electric coil having a substantially angular opening forming corners in the body thereof, and comprising superposed layers of winding having a plurality of turns each, the turns of one layer lying in an alternate or staggered relationship with adjoining turns of another layer and crossing at points intermediate the corners of the coil, a plurality of narrow strips of binding element spaced from one another by intervening layers of winding and incorporated in the coil at points intermediate corners and points of crossing of the turns of winding and a second binding element surrounding the coil and directly associated with the first named strips.

4. An electric coil having a substantially angular opening forming corners in the body thereof, and comprising superposed layers

of winding having a plurality of turns each, the turns of one layer lying in an alternate or staggered relationship with adjoining turns of another layer and crossing one another at points intermediate the corners of the coil, narrow binding strips incorporated in the coil at points intermediate corners and the points of crossing of the turns of winding and having end portions extending beyond the end faces of the coil, and means surrounding the coil and binding the extending ends against the end turns of winding.

5. An electric coil having a substantially angular opening forming corners in the body thereof, and comprising superposed layers of winding having a plurality of turns each, the turns of one layer lying in an alternate or staggered relationship with adjoining turns of another layer and crossing one another at points intermediate corners of the coil, strips of binding element incorporated in the coil at points intermediate the corners and points of crossing of the turns of winding and having end portions extending beyond the end faces of the coil and overlapping one another, and means binding the overlapping ends against the end turns of winding.

In testimony whereof, I have hereunto set my hand.

RICHARD VARLEY.

Witnesses:
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M. A. KELLER.