K. KURDA.

STEP-BY-STEP INSULATION FOR ELECTRIC CONDUCTORS OR THE LIKE.

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1,039,298.

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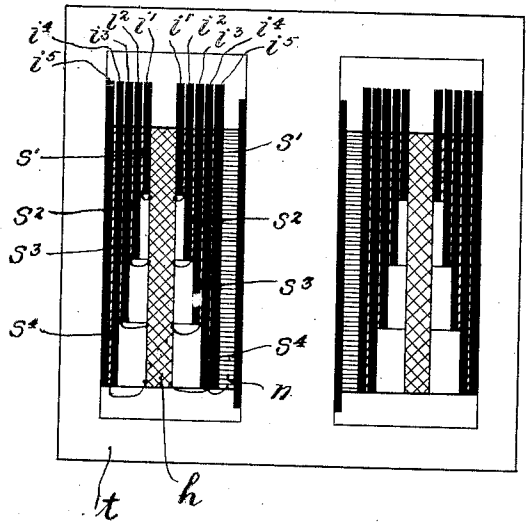

Fig. 1.

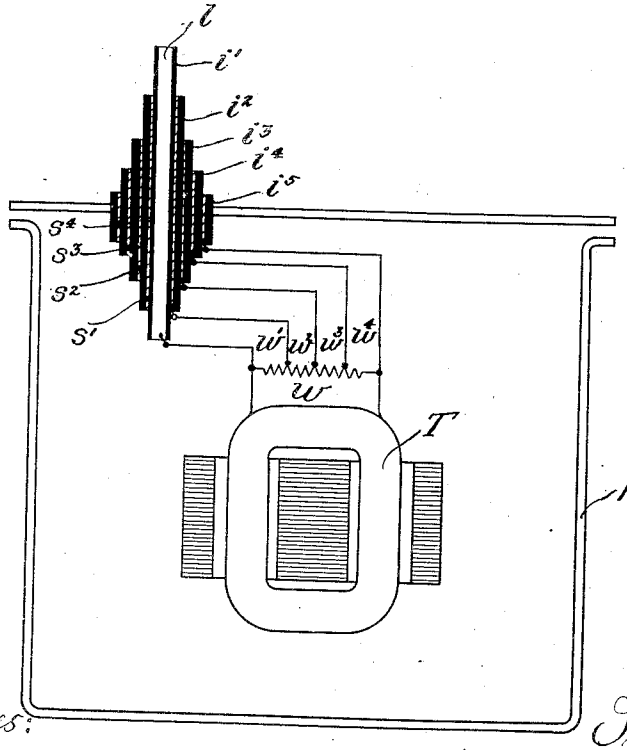

Fig. 2.

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UNITED STATES PATENT OFFICE.

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STEP-BY-STEP INSULATION FOR ELECTRIC CONDUCTORS OR THE LIKE.

1,039,298. Specification of Letters Patent. Patented Sept. 24, 1912.

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To all whom it may concern:

Be it known that I, KARL KURDA, engineer, a subject of the German Emperor, resident of Charlottenburg, near Berlin, Germany, have invented a certain new and useful Improvement in Step-by-Step Insulation for Electric Conductors or the Like, of which the following is a specification.

The present invention relates to an improved insulation of electrical conductors in general and in particular of transformers or like electrical apparatus.

When methods of insulation known hitherto are employed, the insulation of windings or conductors conveying current at a very high tension necessitates an amount of insulating material which is exceedingly great compared with the thickness necessitated for lower tensions. The cause of this is to be found in the drop of potential, in the case of very thick insulating material, not being distributed uniformly over the entire amount of the insulating material, but following laws which are dependent on the shape of the insulator, the size of the constant of the dielectric and on the amount of conductivity of the insulating material. Now a uniform distribution of potential over the entire thickness of the insulating material and therewith a less total thickness of the same can be obtained, as has been suggested hitherto, by composing the insulating material of alternate layers of electrically insulating and conducting material with superficial dimensions varying according to definite laws, or, as in accordance with the present invention, by connecting the conducting layers of the insulation to suitable points of the high-tension winding or of a resistance fed from the winding.

In order that the invention may be clearly understood reference is made to the accompanying drawing in which electrical apparatus insulated in accordance with the present method are represented diagrammatically by way of example, and in which:—

Figure 1 indicates diagrammatically a transformer in section, and Fig. 2 indicates a manner in which a conductor may be insulated according to this method.

Referring to Fig. 1 t denotes the iron core of the transformer, h the high-tension winding, n the low-tension winding, i_1, i_2, i_3, i_4, i_5, layers of insulating material and s_1, s_2, s_3, s_4, the layers of conducting material. As may be seen from this figure, the conducting layers s_1, s_2, s_3, s_4, are connected with points of the high-tension winding h, which are meant to represent steps of decreasing potential corresponding in number with the number of conducting layers and corresponding in their drop in potential with the thickness of the insulating material. The connections of the conducting layers are arranged so that the layers nearest the winding h are connected with the first step, the next layer with the next step and so on. Thereby a uniform distribution of potential is obtained in the insulating material arranged between the high-tension winding h and the low-tension winding n or transformer-iron t, and a better utilization of the same is obtained.

Instead of connecting the conducting layers directly with suitable points of the winding conveying the high-tension current, these layers may be also connected to the same advantage with points of a resistance disposed between the high-tension terminals which points represent steps of decreasing potential corresponding in size and sequence with the thickness and sequence of the insulating material, in a similar manner as described with reference to Fig. 1 without departing from the spirit of my invention as set forth in the annexed claims. Such an arrangement is represented in Fig. 2 in which, for instance, a round conductor conducting high-tension current is shown, which is to be insulated from the transformer casing p. In this figure, l denotes the conductor which is to be insulated; i_1, i_2, i_3, i_4, i_5, denote the layers of insulating material, and s_1, s_2, s_3, s_4, the layers of insulating material. The resistance w is connected to the transformer T and owing to the connection of the conducting layers s_1, s_2, s_3, s_4, with the points w_1, w_2, w_3, w_4, of the resistance w which represent steps of consecutively decreasing potential, and which correspond in their sequence with the sequence of layers of insulating material, a uniform distribution of potential is obtained within the whole insulation of the conductor l in the same manner, as described with reference to Fig. 1.

I claim:

1. A step by step insulation for electric conductors or elements of different potential, comprising a plurality of alternating layers

of insulating and conducting material disposed between said elements and a conductor connecting said two elements and having the full drop in potential between its two ends, equal to the drop between said two elements, said conducting layers being consecutively connected with a corresponding number of points of said conductor intermediate its ends, said points representing a consecutive corresponding number of steps of decreasing potential between said elements for the purpose set forth.

2. A step by step insulation for electric conductors or elements of different potential, comprising a plurality of alternating layers of insulating and conducting material disposed between said elements and a conductor connecting said elements and having the full drop in potential between its two ends, equal to the drop between said two elements, said conducting layers, commencing with the layer nearest to the element of highest potential, being consecutively connected with a corresponding number of points on said connecting conductor intermediate its two ends, said points representing a consecutive number of steps of decreasing potential between said elements for the purpose set forth.

3. A step by step insulation for electric conductors or elements of different potential, comprising a plurality of alternating layers of insulating and conducting material disposed between said elements, and a resistance connecting the element of highest and lowest potential, said conducting layers being consecutively connected with a corresponding number of intermediate points of said resistance, said intermediate points representing a consecutive corresponding number of steps of decreasing potential between said elements, for the purpose set forth.

4. A step by step insulation for electric conductors or elements of different potential, comprising a plurality of alternating layers of insulating and conducting material disposed between said elements, and a resistance connecting the element of highest and lowest potential, said conducting layers, commencing with the layer nearest to the element of highest potential, being consecutively connected with a corresponding number of intermediate points of said resistance, said intermediate points representing a consecutive corresponding number of steps of decreasing potential between said elements, for the purpose set forth.

In testimony whereof, I have signed my name to this specification in the presence of the two subscribing witnesses.

KARL KURDA.

Witnesses:
WOLDEMAR HAUPT,
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