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ELECTRIC RESISTANCE ELEMENT AND METHOD OF MAKING SAME

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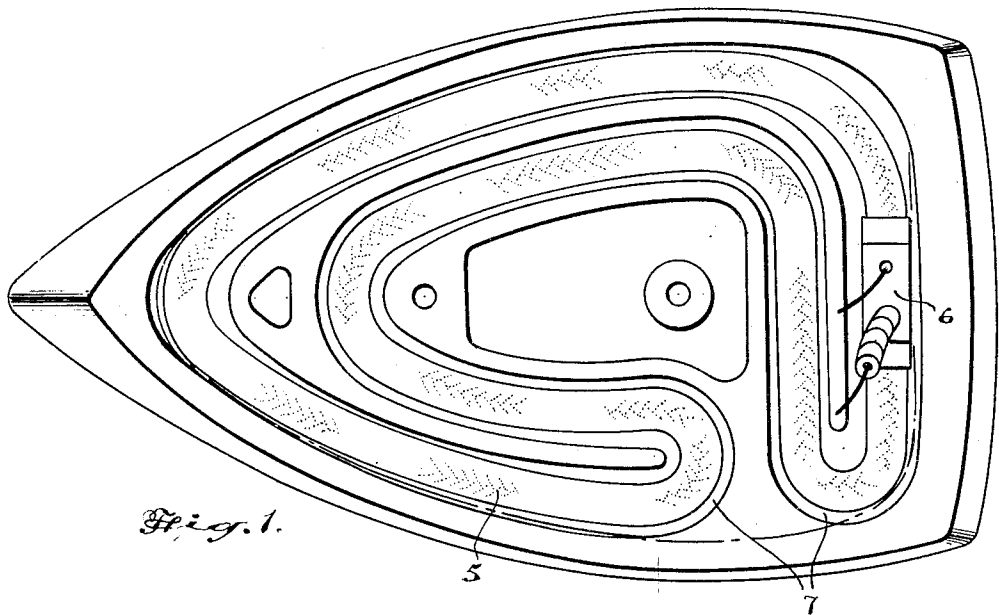


Fig. 1.

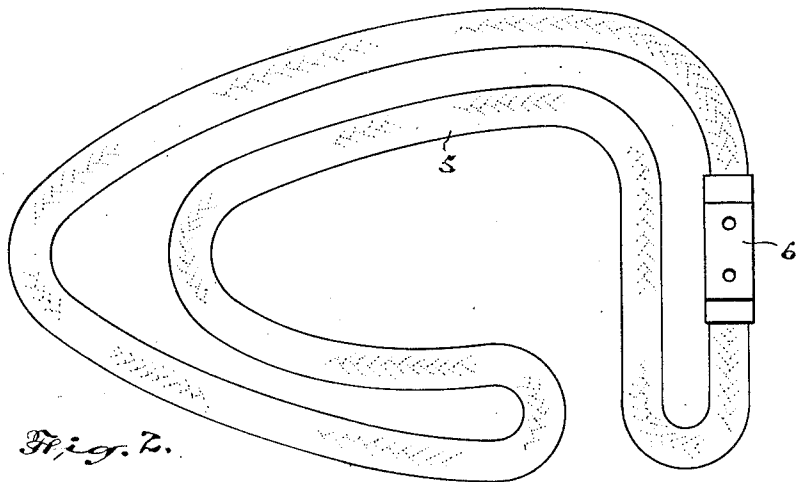


Fig. 2.

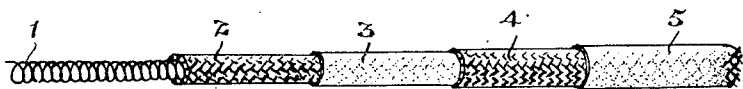


Fig. 3.

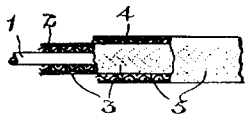


Fig. 4.

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UNITED STATES PATENT OFFICE

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ELECTRIC RESISTANCE ELEMENT AND
METHOD OF MAKING SAME

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6 Claims. (Cl. 201—64)

The principal objects of this invention are to devise a covering for electrical conductors of various kinds which will present a very effective electrical insulation and will have exceptionally high resistance to moisture penetration and will, when used as a covering for electric heating elements, permit a rapid transfer of heat from the electric resistance member.

A further object is to provide an insulating covering which may be very easily and cheaply manufactured and may be easily and quickly installed in heating devices such as electric irons, hot plates, etc., and when completed will be of very high efficiency.

The principal feature of the invention consists in the novel manner of covering an electrical conductor whereby a layer of dielectric material is interposed between fabricated surfaces to fill in the interstices between the fabricated strands and coat the surfaces thereof to present an effective resistance to moisture and the passage of electric current and to form a strong and durable element highly efficient in the transference of heat.

In the accompanying drawing, Figure 1 is a plan view showing my improved heating element arranged in the base of an electric iron.

Figure 2 is a plan view of the heating element.

Figure 3 is a perspective view illustrating the manner in which the insulation is fabricated around an electric heating element.

Figure 4 is an exaggerated sectional elevational view showing the fabricated insulation on an electric "conductor".

It has been previously proposed to manufacture a resistance element with a spirally coiled resistance wire surrounded by a braided, woven or spirally wound fibre construction which may or may not be impregnated with a suitable resistance material which will not be seriously affected by heat, and braided asbestos has been coated with various solutions which are then baked hard.

According to the present invention an electric heating coil or resistance wire 1 is preferably wound in an open mesh spiral coil and braided over this coil is a covering 2 preferably made from threads of asbestos fibre, which may however, be reinforced by a certain percentage of strong cotton threads.

After the covering 2 has been braided over the coiled resistance wire insulating or refractory material in a soft plastic or solution form is applied to fill the interstices in the fabricated covering and form a thin covering thereover.

Over this coating is braided a second covering 4 of asbestos and cotton fibres and as this covering is completed a thin coating of insulating or refractory material is applied to fill the interstices in the fabric and form a thin outer coating.

The second fibrous coating 4 is applied over the top of insulating material 3 while it is in a moist condition, so that the threads embed themselves in the soft material and the outer coating 5 is thoroughly embedded in the outer surface of the outer fabricated covering.

A resistance element thus constructed is cut to the desired length and a terminal block 6 of a desired form is connected to the ends. The element while still in a soft, plastic form, is preferably placed in a mould provided with means for shaping the element, fabricated as described, to the desired conformation, and when so formed it is subjected to a temperature higher than that which will be applied through the resistance member to fuse the refractory material to form a hard, moisture resistant element, which will, however, form an efficient heat transfer medium under the energy applied to the electric resistance.

It will be understood that in saturating or impregnating the first covering of fibrous material, then placing the second covering over that and in turn saturating it with a refractory or dielectric material, the spaces between the asbestos fibres or cords will be very completely filled in and any voids left through the burning out of the cotton threads in the fusing or baking operation will not impair the electric insulating value. Further, the baking of the refractory material forms a hard, moisture-resisting shell which effectively prevents corrosion of the enclosed metallic resistance wire.

It will be understood that elements of any desirable length and shape may be produced by the method of construction herein described and as it is common practice to braid cords of asbestos fibre around wires, the present types of machinery are available and the element may be produced at very low cost.

The invention as herein described is particularly applicable to resistance elements for electric heating devices, but it must be understood that the particular manner of insulating an electric conductor by means of more than one covering of fibrous material, wherein the successive coverings are coated with a dielectric material, may be utilized for the insulation of electric conductor wires of various kinds.

What I claim as my invention is:—

1. A method of insulating and permanently shaping an electric resistance unit, consisting in braiding a covering of asbestos fibre around the resistance element, applying a refractory in a plastic form to impregnate the fibres of said covering and completely enclose same leaving a substantial thickness overlying the braided covering, then braiding a second covering of fibrous material over the moist refractory covering while the latter is still plastic, then applying a refractory material in fluid form to the exterior of said outer fabricated covering to impregnate the fibres thereof, then bending the composite member so formed bodily while the refractory is in a soft plastic form to a desired configuration, then drying the moisture therefrom and finally baking the refractory material at a refractory fusing temperature to bond the same with the respective braided coatings and rigidly preserve the shape into which said composite member has been bent.

2. A method of forming an insulated electric conductor, consisting in preparing continuous strands of asbestos fibre and cotton threads, then braiding same around the conductor forming a covering of part asbestos and part cotton, then applying a refractory material in plastic form to impregnate the fabricated structure, then covering the impregnated structure with a second covering of fibre strands, then impregnating the outer covering with a refractory material in plastic form, then drying the moisture from the produced article, and finally burning out the cotton fabric and fusing the refractory material forming a rigid bond between the remaining asbestos fibres of said covers.

3. A method of forming a rigid configured insulated resistance heating unit comprising first enveloping a length of resistance wire in a strand-

ed fibrous sheath treated with a refractory in fluid or plastic form, then distorting the wire and envelope thereof while the refractory is still in plastic form to shape the unit to the required configuration, and finally baking the shaped unit to permanently set the refractory-treated sheath and retain the unit permanently in shape.

4. A method of forming a rigid configured insulated resistance heating unit comprising first braiding a fibrous coating about a coiled resistance wire and impregnating same with a refractory capable of being fused only at a temperature higher than the normal operating temperature of the resistance unit to form a hard refractory shell thereabout, then pre-shaping the thus treated wire bodily while the refractory is still plastic to form a unit of the desired configuration, and finally baking the thus shaped unit at a temperature sufficiently high to fuse the refractory and permanently set the same and retain the unit rigidly in shape.

5. A method as claimed in claim 4 in which the coated resistance wire is bent into a double loop configuration having one loop nested within the other and all of said loops being disposed in a common plane after which the unit is baked.

6. A method as claimed in claim 4 in which the refractory-treated coating and enclosed resistance element is made in long lengths and before baking is cut into shorter lengths, each short length being bent bodily into looped form with the ends adjacent, arranging a refractory terminal block to bridge the end portions of the looped unit in contact with the plastic refractory thereof and with the ends of the resistance wire projecting therefrom, and finally baking the composite structure to unite the refractory block with the refractory coating and permanently set the unit to shape.

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