

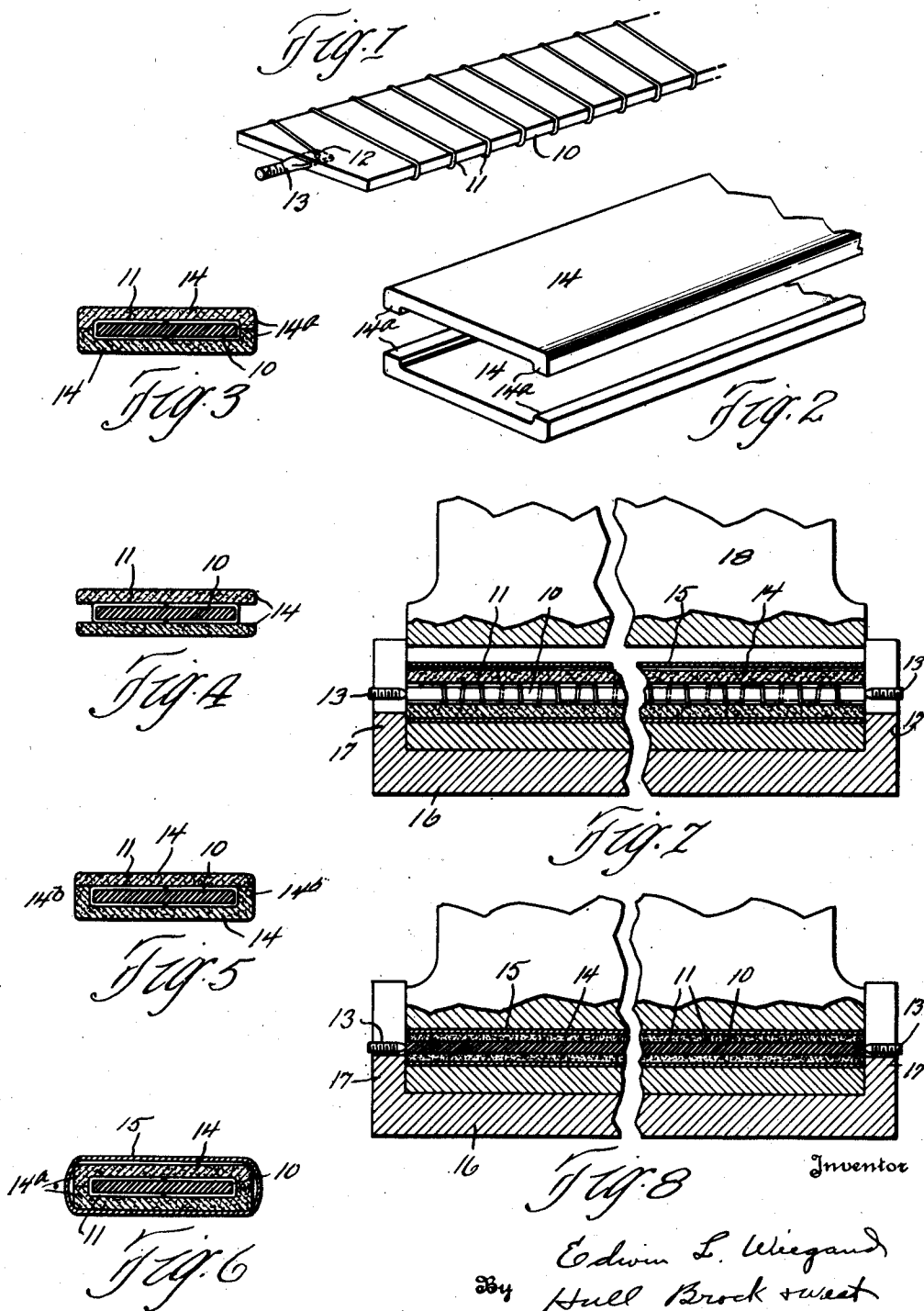
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METHOD OF MAKING HEATING ELEMENTS

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METHOD OF MAKING HEATING ELEMENTS

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This invention relates to an improved method of producing heating elements and has for its object to secure greater efficiency in manufacture and produce a superior product. Other and more specific objects will appear as the description proceeds.

In the drawing, Fig. 1 is a perspective view showing a core for the heating element and the method of winding a resistor thereon and securing the same thereto; Fig. 2 is a perspective view of a pair of slabs of friable non-combustible electrical insulating material; Figs. 3, 4 and 5 are sectional views showing the core of Fig. 1 introduced between slabs of friable material, the different figures showing variant forms of slabs; Fig. 6 is a sectional view showing the assembly of Fig. 3 introduced into a tubular sheath; Fig. 7 is a sectional view showing the heating element in the stage of Fig. 6 in the die preparatory to final forming pressure; and Fig. 8 shows the die in final pressure exerting position.

In carrying out my improved process I provide a plate 10 which may consist of mica or other suitable rigid non-combustible electrical insulating material. Upon this plate is wound a helical resistor 11 made of any suitable material, such as is generally used for this purpose in the art. This resistor is secured as at 12 to a terminal 13 by passing through an opening drilled in the plate 10 and being electrically connected to the terminal in any suitable manner. A pair of slabs 14 are provided to receive the core shown in Fig. 1 therebetween. These slabs may be made of any suitable refractory insulating material and may be produced by causing adherence of the particles together by pressure or by the use of a suitable binder in connection with the use of the mold or in any other manner known to those skilled in the art. The slabs 14 may be formed with angular portions 14^a extending at right angles at each end of each slab, as shown in Fig. 3, or the overhanging portions may be omitted and the ends simply extended beyond the edge of the core, as shown in Fig. 4, or overhanging portions 14^b may be provided on one of the slabs and the other slab left straight, as shown in

Fig. 5. In all cases, however, a sufficient amount of material is contained in the friable slabs 14 to admit of complete filling of the sheath 15 when final pressure is applied.

After the core of Fig. 1 is introduced between the slabs of Fig. 2, this assembly is inserted into a sheath 15 in the manner shown in Fig. 6. It will be observed that the sheath 15 is of such a size as to receive the slab and core assembly easily yet without excess of space. The cross sectional area of the slabs, the core and the sheath will, of course, be so proportioned that when the assembly is pressed to desired thickness, the desired compacting of the refractory material will be obtained.

After the element shown in Fig. 6 is assembled, the same is placed in a die 16 which is provided with end stops 17 to prevent extrusion from the ends of the refractory material and these stops are provided with slots to receive the terminals 13. The movable die 18 is now brought down laterally of the sheath and the desired final pressure is applied, resulting in a flattening of the sheath to the thickness shown in Fig. 8 and very high compacting of the refractory material around the core. It will be understood that when the pressure is applied to the assembly of Fig. 6, the friable slabs 14 will be crushed and fill up all the space between the core and the sheath.

By the use of this method I am enabled to avoid the necessity of pouring the refractory material around the core which necessitates setting up the sheath and core on end and some means to hold them in proper relation to each other while the material is being poured in. I also secure a more uniform density of refractory material in this way than is possible when the same is poured into the sheath around the core. The apparatus involved is also somewhat simpler and it is possible to manufacture the slabs of refractory material at one place and transport them already formed to the place where the heating elements are manufactured instead of transporting the refractory material in powdered form.

While I have shown and described certain

illustrative embodiments of my invention, I wish it understood that I am not limited to such embodiments but may carry out my invention in a number of variant forms within the scope of the appended claims.

Throughout the specification and claims I have used the term "resistor" to include a resistor alone or self-supported or a resistor with its support.

Having thus described my invention, what I claim is:

1. A method of producing electrical resistor heating elements which consists in positioning a resistor upon a core, covering the resistor and core by placing thereover a plurality of large slabs of friable, non-combustible, electrical insulating material, introducing said core and slabs into a sheath and applying pressure thereto to thoroughly crush said slabs and to compact said insulation material about the resistor and core.
2. A method of producing electrical resistor heating elements which consists in positioning a resistor upon a core, covering the resistor and core by placing thereover a plurality of large slabs of electrical insulating material, introducing said core and slabs into a sheath and applying pressure thereto to thoroughly crush said slabs and to compact said insulation material about the resistor and core.
3. A method of producing electrical resistor heating elements which consists in positioning a resistor upon a core, covering the resistor and core by placing on opposite sides thereof a plurality of slabs of insulating material, then enclosing the slabs, resistor and core within a sheath and compressing the same to thoroughly insulate the resistor and to compact the insulating material thereabout.
4. A method of producing electrical resistor heating elements which consists in positioning a resistor upon a core, covering the resistor and core by placing on opposite sides thereof a plurality of slabs of insulating material, then enclosing the slabs, resistor and core within a sheath and compressing the same to thoroughly insulate the resistor and to compact the insulating material thereabout, said slabs being of greater width than said core whereby in the final form said core may be entirely surrounded by the insulating material.
5. A method of producing electrical resistor heating elements which consists in positioning a resistor upon a core, covering the resistor and core with a plurality of slabs of insulating material shaped to provide a recess therebetween adapted to receive said core with resistor thereon, then introducing the resistor, core and slabs into a sheath and laterally compressing said sheath to crush said slabs and thoroughly compact the insulation material about the resistor.

6. A method of producing electrical resistor heating elements which consists in placing a resistor between a plurality of large slabs of friable non-combustible electrical insulating material, introducing said slabs with resistor therebetween into a receptacle and applying pressure thereto to thoroughly crush said slabs and to compact said insulation material about the resistor.

7. A method of producing electrical heating units which consists in positioning a relatively long resistor sidewise between relatively large slabs of friable non-combustible electrical insulating material, introducing said slabs with the resistor therebetween in a sheath and applying pressure thereto to thoroughly crush said slabs and to compact said insulation material about said resistor.

In testimony whereof, I hereunto affix my signature.

EDWIN L. WIEGAND.