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F. EICHENBERGER

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PROCESS FOR PRODUCING ELECTRICAL RESISTANCE ELEMENTS AND THE LIKE

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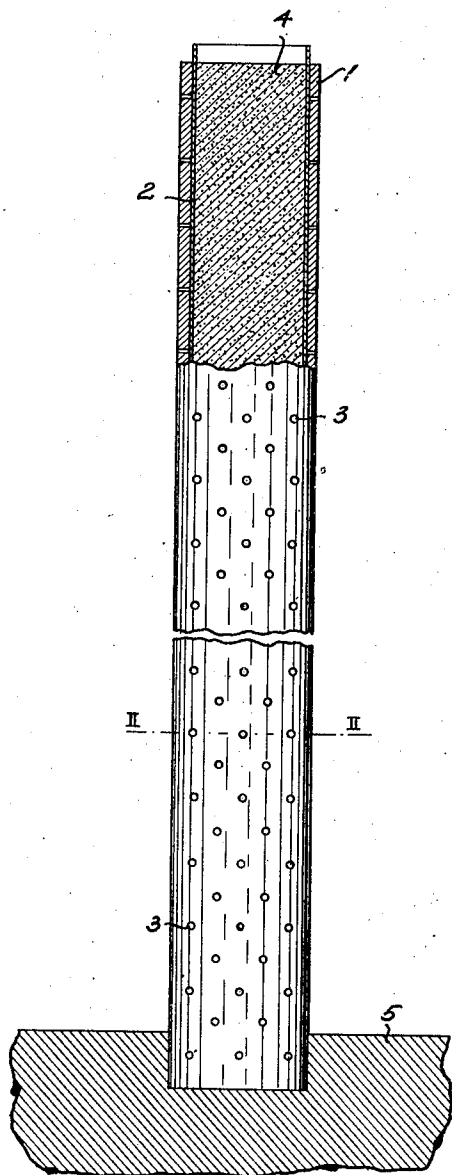


Fig. 1

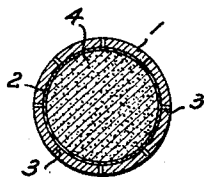


Fig. 2

Inventor
F. Eichenberger

by John J. Kane
Attorney

UNITED STATES PATENT OFFICE

FERDINAND EICHENBERGER, OF AARAU, SWITZERLAND, ASSIGNOR, BY MESNE ASSIGNMENTS, TO GLOBAL CORPORATION, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF NEW YORK

PROCESS FOR PRODUCING ELECTRICAL RESISTANCE ELEMENTS AND THE LIKE

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The present invention relates in general to the production of formed or shaped bodies, for example in the form of bars, and especially such as are adapted for use as electrical resistance elements of the general types and for general purposes described in my co-pending applications.

In the drawings:

Fig. 1 is a partly sectional view in elevation showing details of apparatus that may be used in carrying out features of the invention.

Fig. 2 is a sectional plan in the plane of the line II—II of Fig. 1.

Where it is sought to produce bodies of this character, especially electrical resistance elements formed wholly or partly from relatively hard and non-plastic material, such as sand mixtures or metals in powdered form, as described in my co-pending applications, in which case, certain binding mediums, such as graphite or the like, may not be used for one reason or another and where the element cannot be readily formed by pressing it from a nozzle in the form of a plastic mass, great difficulties are presented in the production of bodies or elements.

In accordance with the present invention, these difficulties of production are overcome or avoided in a manner that is just as simple as it is practical.

The present invention may be practiced by providing in comminuted form the material which serves for the production of the molded or shaped body or element, this material, such as silicon carbide, either substantially entirely or a mixture thereof, and one or more ingredients, such as a metal in powdered form and other substances capable of modifying mechanical or electrical characteristics of the final product, with a binding material, such as a dilute solution of water-glass or the like, as may be desired or satisfactory for the particular purpose at hand, being pressed, as by ramming, into a metal pipe or tube 1, or other desired form, the same constituting a mold whose inner wall is provided with a liner or coating 2 of paper or other carbonaceous or heat-decomposable material, the metal tube or other molding form being provided with

small through perforations 3 throughout its entire surface. In pressing the material of which the molded product, indicated at 4, is composed into the mold, the lower end of the tube 1 may rest against a portion of an anvil or table 5, and this closing portion of the latter may be the bottom of a recess in the table which receives the lower end portion of the mold and serves to steady the same.

With the working material pressed into the metal tube 1, or other desired form, and inside the paper lining 2 thereof, the metal tube with its contents can thus be readily heated for the purpose of drying the same or evaporating any moisture thereof; and this heating may be carried to incandescence or a red heat, without danger of the gases produced thereby in the molded body causing the latter to be rendered useless or damaged, as through the formation of fractures or cracks or by inflation, since any of these gases generated can readily pass out through the perforations in the wall of the pipe or tubular mold. Likewise, any gases generated in the combustion or decomposition of the paper lining 2 of the tube which is burned during the process, can readily pass off; and the remains of this paper lining may be readily pushed out of or removed from the metal tube, along with the formed and dried element, after the required heating or burning of the formed body or element to produce an element of the desired characteristics including mechanical strength.

The constituents used and the proportions thereof and the extent to which this process of burning the element is carried will depend to a major extent upon the desired characteristics of the resistance element or portion thereof constituting the desired final product.

It should be understood that the invention claimed is not limited to the exact details of production and characteristics herein specifically described, for obvious modifications within the scope of the invention will be apparent to persons skilled in the art to which this invention relates.

It is claimed and desired to secure by Letters Patent:

1. The process of producing bar-shaped

bodies from hard, non-plastic material, which comprises treating the forming or molding material with a dilute binding material, stamping the mixture into an enclosing mold provided with through apertures over
5 its entire surface and having its inner wall lined all over with a relatively thin heat-decomposable envelope or coating, and burning or incandescing the mold and its contents
10 to a degree sufficient to solidify said molded material and to decompose said envelope or coating.

2. The process of producing formed bodies from relatively hard and non-plastic material, which comprises pressing said material
15 into an enclosing mold of the desired shape having its wall provided with spaced through apertures and its inner surface covered by a lining of paper between such surface and
20 the material to be molded, and burning said material while contained in said mold and its lining to produce an element of the required characteristics and to decompose said lining.

3. The process of producing formed bodies, which comprises pressing the material to be molded in an enclosing mold capable of
25 withstanding the required heating without deterioration and having its wall provided with through apertures and its inner surface covered by a heat-decomposable liner, and
30 burning said material while contained in said mold and its liner to a degree sufficient to decompose the liner and produce a body of the required characteristics.

4. The method of producing molded and heat-hardened electrical resistance elements from a substance containing silicon carbide as an essential ingredient, which comprises
40 pressing said substance into an enclosing mold having perforated walls with a heat decomposable spacer between said mold and the substance therein, and heating said substance within said mold to the extent required
45 to unite the particles of said substance and burn said spacer.

5. The process of producing a self-sustaining molded resistance element from a substantially non-plastic conducting substance,
50 which comprises pressing said substance into an enclosing mold having perforated walls with a heat decomposable spacer between said mold and the substance therein, and heating said substance to the extent required to
55 mechanically unite the particles thereof to form a rigid conductor of electricity extending throughout said molded mass.

6. The method of producing an electrical resistance element, which comprises pressing
60 a deformable mixture containing silicon carbide as an ingredient into a heat-resistant enclosing mold which permits passage of gases therethrough with a separator readily decomposable by heat between the mold and
65 the molded material, baking said molded ma-

terial while confined in the mold at a temperature sufficiently high to solidify the molded material and decompose the separator, and removing the molded element from the mold.

7. The process of producing molded electrical resistance heating elements, which comprises pressing comminuted material containing silicon carbide as an essential and
75 substantial constituent thereof into an enclosing mold of tubular form and having its wall provided with through apertures and with a heat-decomposable liner between said mold and the material to be molded, heating the mold and its contents to an extent required
80 to solidify said element and to decompose said liner, and removing said element from said mold.

8. The method of producing an electrical resistance element, which comprises preparing a deformable mixture containing silicon carbide as an essential constituent, pressing
85 said mixture into a tubular enclosure having an inner wall which can substantially volatilize through the outer wall of the enclosure at the temperatures at which the resistance element is formed, subjecting said mixture to a heating operation which bonds the mixture and decomposes said inner wall of said enclosure,
90 and removing said finished element from said enclosure.

In witness whereof, I affix my signature hereto.

FERDINAND EICHENBERGER.