No. 752,357. PATENTED FEB. 16, 1904.

E. F. PRICE.

PROCESS OF ELECTRICALLY HEATING ARTICLES.

APPLICATION FILED NOV. 5, 1902.

NO MODEL.

Fig. 1.

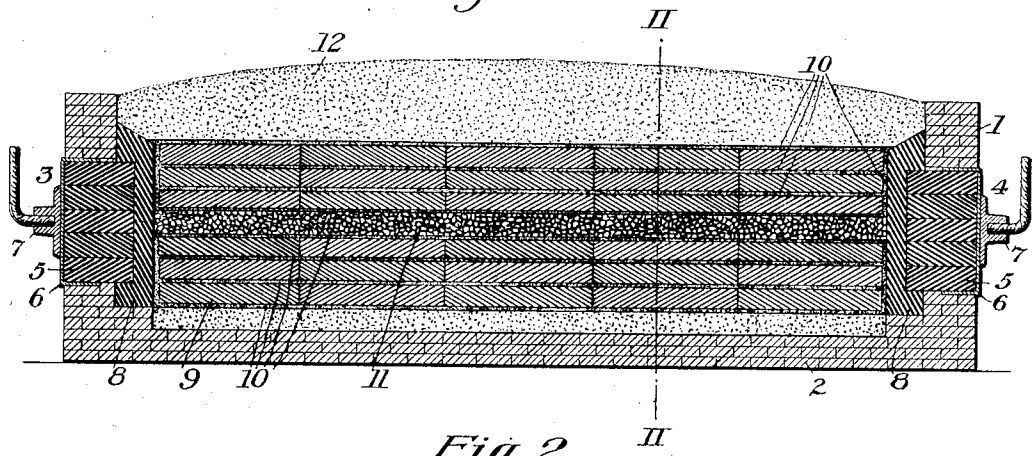
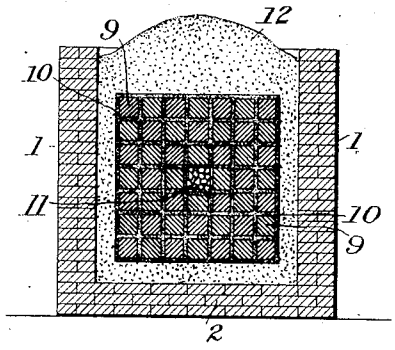


Fig. 2.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 752,357. Patented February 16, 1904.

UNITED STATES PATENT OFFICE.

EDGAR F. PRICE, OF NIAGARA FALLS, NEW YORK, ASSIGNOR TO UNION CARBIDE COMPANY, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF VIRGINIA.

PROCESS OF ELECTRICALLY HEATING ARTICLES.

SPECIFICATION forming part of Letters Patent No. 752,357, dated February 16, 1904.

Application filed November 5, 1902. Serial No. 130,182. (No model.)

To all whom it may concern:

Be it known that I, EDGAR F. PRICE, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Processes of Electrically Heating Articles, of which the following is a specification.

This process is primarily intended for baking the carbon bars which are used as electrodes in carbid and other electric furnaces, but may be employed for baking or heating other articles.

In carrying out the process the green or partially-baked carbon bars or other articles are arranged around or in proximity to a resistance-conductor and are embedded in or otherwise placed in contact with a layer of material which is normally a poor conductor of electricity, but which will become a good conductor when heated. The resistance-conductor, articles, and packing are so arranged with reference to the electrodes or terminals of the furnace in which they are placed that the electric current will in the first instance pass mainly or entirely through the resistance core or conductor, but will thereafter shunt through the packing material, as it is converted into a better conductor by the heat generated in the core.

The invention will be more easily understood by reference to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal central section of an electric furnace with the core, articles, and packings in position; and Fig. 2 is a transverse vertical section on line II II of Fig. 1.

The furnace chosen for illustration is a rectangular structure having side walls 1 and a hearth 2, of refractory non-conducting material, such as fire-brick. Electrodes 3 4 extend through the end walls of the furnace. These electrodes may each consist of a group of carbon blocks 5, inclosed at their outer ends in a metal casing 6, to which is secured the electric terminal 7. The inner end of each electrode projects slightly into the furnace inclosure and may be protected from wear by a molded carbon block or facing 8. In employing this furnace to carry out the process a number of the articles to be heated or baked (here shown as rectangular carbon bars 9) are placed on the hearth and along the side walls of the furnace, being separated from each other and surrounded by a filling or packing 10 of material which, as stated, will normally conduct little or no electricity, but whose resistance will be largely diminished when it is subjected to heat. Finely-pulverized anthracite coal has been found to be a suitable material for this packing. If the bars to be heated are of less length than that of the furnace, two or more of them may be placed end to end, as shown. The bars or other articles may or may not be placed in contact with each other and with the furnace-electrodes. A resistance-core 11, which may be of broken coke, is arranged centrally within the rows of articles to be heated, these articles being placed around the core, so as to entirely inclose it. A loose filling 12, of granular non-conducting material—such as lime, magnesia, or sand—is placed between the hearth and side walls and the charge and also overlies the charge and closes the top of the furnace.

When the furnace has been charged and an electric current is passed between its electrodes 3 4, the whole or a major portion of the current first passes through the central resistance-core, which soon becomes heated to incandescence. The articles which lie next the core will thereby be heated to the requisite temperature; but those in the outer layer or layers will not be sufficiently heated. The packing of anthracite coal, however, between the rows of articles will be converted into a conductor by the heat from the central core, and as this packing extends into contact with the electrodes or their conductive facing 8 a considerable portion of the current will be diverted from the central core and through these packings. As each article or row of articles is inclosed in a packing, the heat gen-

erated by the current shunted through the packing will suffice to heat the articles which lie at some distance from the central core to the desired temperature. If the articles lie in contact with each other and with the furnace-electrodes, a certain portion of the current may also pass through them and assist in the heating, as the articles will generally be of such material that their conductivity will increase as their temperature rises.

The process may be carried out by the use of furnaces which are widely different from that shown, and in some cases the inclosing walls may be entirely omitted. The central core may be circular or rectangular in cross-section or of any other desired form. The articles may be arranged around the core in any desired number of concentric or other layers. The packing may be of bituminous coal of high resistance, pulverized carbon, or other suitable material.

I claim—

1. The process of electrically heating articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated in proximity both to said conductor and layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor and thereby supplying further heat to the articles, as set forth.

2. The process of electrically heating articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated around said conductor and in proximity to said layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor and thereby supplying further heat to the articles, as set forth.

3. The process of electrically heating articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated around said conductor and within said layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor and thereby supplying further heat to the articles, as set forth.

4. The process of electrically heating articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and separate layers of a material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated around said conductor and between said layers, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layers of poorly-conducting material, converting said layers into a better conductor, and causing electric current to pass directly through the layers of material which have been converted into a better conductor and thereby supplying further heat to the articles, as set forth.

5. The process of electrically heating articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated end to end and in proximity both to said conductor and layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor and thereby supplying further heat to the articles, as set forth.

6. The process of electrically heating articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated end to end and around said conductor and in proximity to said layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer

of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor and thereby supplying further heat to the articles, as set forth.

7. The process of electrically heating articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated end to end and around said conductor and within said layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor and thereby supplying further heat to the articles, as set forth.

8. The process of electrically heating articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and separate layers of a material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated end to end and around said conductor and between said layers, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layers of poorly conducting material, converting said layers into a better conductor, and causing electric current to pass directly through the layers of material which have been converted into a better conductor and thereby supplying further heat to the articles, as set forth.

9. The process of electrically baking carbon articles, which consists in interposing between different portions of the electrodes of terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated in proximity both to said conductor and layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor, thereby supplying sufficient heat to bake the articles, as set forth.

10. The process of electrically baking carbon articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated around said conductor and in proximity to said layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor, thereby supplying sufficient heat to bake the articles, as set forth.

11. The process of electrically baking carbon articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated around said conductor and within said layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor, thereby supplying sufficient heat to bake the articles, as set forth.

12. The process of electrically baking carbon articles, which consists in interposing between different portions of the electrodes or terminals of a source of electric current direct-current paths comprising a resistance-conductor and a separate layer of material which is normally a poor conductor of electricity but is converted into a better conductor by heat, arranging the articles to be heated end to end and in proximity both to said conductor and layer, and passing an electric current directly through the resistance-conductor, thereby initially heating the articles and layer of poorly-conducting material, converting said layer into a better conductor, and causing electric current to pass directly through the layer of material which has been converted into a better conductor, thereby supplying sufficient heat to bake the articles, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EDGAR F. PRICE.

Witnesses:
D. WOODHOUSE,
F. B. O'CONNOR.

Corrections in Letters Patent No. 752,357.

It is hereby certified that in Letters Patent No. 752,357, granted February 16, 1904, upon the application of Edgar F. Price, of Niagara Falls, New York, for an improvement in "Processes of Electrically Heating Articles," errors appear in the printed specification requiring correction, as follows: In lines 26–7, 45–6, 64–5, 83–4, 102–3, and 121–2, page 2, and in lines 10–11, 29–30, 48–9, 67–8, 86–7, and 105–6, page 3, the words "direct-current paths" should read *direct current-paths;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of March, A. D., 1904.

[SEAL.]

F. I. ALLEN,

Commissioner of Patents.

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[SEAL.]

F. I. ALLEN,
Commissioner of Patents.