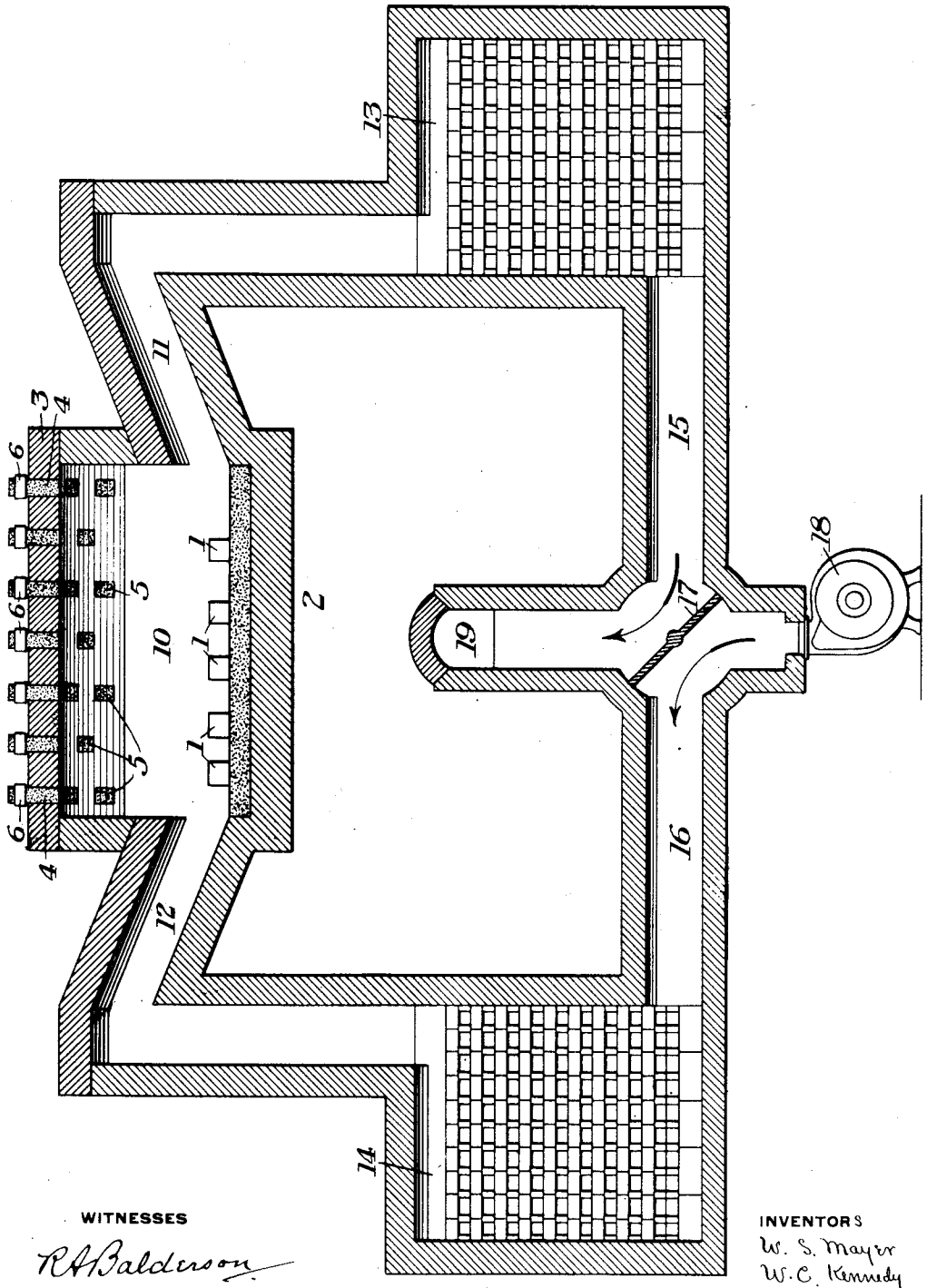
W. S. MAYER AND W. C. KENNEDY.

METHOD OF OXIDIZING MATERIALS IN ELECTRIC FURNACES.

APPLICATION FILED MAR. 17, 1917.

1,350,877. **Patented Aug. 24, 1920.**



WITNESSES

R. A. Balderson

W. B. Ryon

INVENTORS

W. S. Mayer

W. C. Kennedy

by Bakewell, Byron & Parmele

Attys.

UNITED STATES PATENT OFFICE.

WALTER S. MAYER AND WALTER C. KENNEDY, OF NEW BRIGHTON, PENNSYLVANIA.

METHOD OF OXIDIZING MATERIALS IN ELECTRIC FURNACES.

1,350,877. Specification of Letters Patent. Patented Aug. 24, 1920.

Application filed March 17, 1917. Serial No. 155,383.

To all whom it may concern:

Be it known that we, WALTER S. MAYER and WALTER C. KENNEDY, both citizens of the United States, residing at New Brighton, Beaver county, Pennsylvania, have invented a new and useful Improvement in Methods of Oxidizing Materials in Electric Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, in which the figure illustrates in cross-section, in a diagrammatic and conventional manner, the preferred embodiment of the invention.

The present invention relates to electric furnaces and to a method of treating materials therein. The object of the invention is to produce an electric furnace and a method for oxidizing the materials therein, as hereinafter more fully explained.

Heretofore, electric furnaces have been generally constructed to exclude air as far as possible from the furnace chambers, and such air as might leak in has been generally regarded as incidental and disadvantageous. We have found, however, that for certain purposes an electric furnace should have provision for supplying a certain amount of oxygen to the materials heated. For example, in the manufacture of some steel articles, it is found that in the process of manufacture from the ingots the material should have its surface oxidized or scaled. Heretofore, this has usually been accomplished as follows:

The molten steel is first cast in iron molds to form steel ingots. It is found that the surfaces of these steel ingots are full of surface pits or seams. To get a flaw-free surface in the finished articles, the pitted or seamed surface portion must be removed. This is done by the scaling process which takes place during the subsequent heating of the ingots and billets. The ingots are heated in gas-fired furnaces called soaking pits. The oxidizing atmosphere due to the gas firing oxidizes the surface of the ingot and thereby removes a part at least of the pitted surface. The heated ingots are then rolled and reduced in cross section and made into the form ordinarily known as blooms or billets. The blooms or billets are reheated in a second gas-fired furnace in which a second scaling occurs with a consequent removal of more of the pitted or seamed surface. The heated blooms or billets are again reduced by rolling. In certain processes of manufacture, the reduced billets are again or for a third time heated, and the surface is thus scaled three times. These successive scaling operations serve to effectively remove the pitted or seamed surface of the steel occurring in the ingot.

One of the objects of the present invention is to provide an electric furnace, in which the requisite scaling of the ingots or billets may be had, as contrasted with the usual form of electric furnace, in which such scaling process does not take place. By using an electric furnace, the heat can be accurately controlled, and as the heat is electrically supplied and is independent of the air supply, the oxidation can be accurately regulated and controlled.

Referring to the drawing, which illustrates in a diagrammatic and conventional manner the preferred embodiment of the invention, the material to be heated is shown as billets 1, which are placed in an electric furnace, indicated generally by the reference numeral 2. While any suitable type of furnace may be used, the furnace 2 is illustrated as an electric resistance furnace. The top or arch 3 of the furnace is provided with a number of resistor units 4, having heated portions 5 at the interior of the furnace. The external terminals of the resistor elements 4 are provided with electrical connectors 6. The particular form of resistor element is that claimed in our copending application Serial No. 137,100, filed December 15, 1916. It is to be understood, however, that the invention is not limited to any particular type of furnace, and any of the well known forms of electric resistance furnaces or electric arc furnaces may be employed, as will be readily understood by those skilled in this art.

The billets 1 are heated to the proper temperature in the furnace. To oxidize or scale the billets, air is supplied to the furnace chamber 10. As shown in the drawings, the furnace chamber 10 is provided with two passages 11 and 12, leading thereto and communicating respectively with checkerwork heat regenerators 13 and 14. The checkerwork regenerators are connected by passages 15 and 16 to a valve 17, illustrated conventionally as a butterfly valve. By means of this valve, either one of the passages 15 or 16 may be connected with a blower 18, while the other passage is con-

nected with an exhaust 19, leading to a suitable chimney, for example. As shown in the drawings, the valve 17 is turned so that the blower 18 supplies air through the passage 16, and checkerwork 14 and the passage 12 to the furnace chamber 10. The heated air leaves the chamber through the passage 11, passing through and heating the checkerwork chamber 13, and escaping to the atmosphere through the passage 15 and exhaust 19. The valve 17 is turned to alternately cause the air to pass through the two checkerwork regenerators, thereby preheating the air supplied to the furnace chamber, as will be readily understood by those skilled in the art.

While it is preferred to preheat the air and to preheat it by regenerators, the air might be supplied directly to the furnace. The air supplied to the furnace serves to maintain an oxidizing atmosphere therein, giving the requisite scaling or oxidizing for the materials therein.

The amount of oxidation can be accurately regulated by controlling the air-supplying blower 18.

While the preferred embodiment of the invention has been described with particular reference to the scaling of billets, it is to be understood that the invention is not limited to its preferred embodiment nor is it limited to any particular purpose. For example, in the smelting of certain metals from sulfid ores, the ores are first roasted in oxidizing atmosphere to oxidize them. The oxidizing electric furnace of the present invention can be readily adapted for this purpose. It is to be understood, therefore, that the present invention is not limited to its preferred embodiment, but may be embodied in methods and apparatus employed for various purposes and having different constructions within the scope of the invention as set forth in the following claims:

We claim:

1. The method of scaling steel billets to remove surface imperfections which consists in heating the billets in an electric furnace to a scaling temperature while supplying to the furnace chamber sufficient oxygen to form the scale on the billets, substantially as described.

2. The method of surface oxidizing metal for the purposes described, which consists in heating the metal in an electric furnace while maintaining an oxidizing atmosphere in the furnace chamber; substantially as described.

3. The method of surface oxidizing metal to remove surface imperfections, which consists in electrically heating the metal to a temperature sufficient to scale its surface and supplying a regulated amount of oxygen to the heated metal sufficient to form the surface scale, substantially as described.

4. The method of treating materials for the purposes described, which consists in electrically heating the materials and supplying a regulated predetermined amount of oxygen to the heated materials; substantially as described.

5. The method of treating materials for the purposes described, which consists in heating the materials in an electric furnace, while maintaining an oxidizing atmosphere in the furnace chamber; substantially as described.

6. The method of scaling steel billets to remove surface imperfections, which consists in heating the billets in an electric furnace to a scaling temperature, supplying to the furnace chamber a sufficient amount of air to form the scale on the billets, and utilizing the outgoing heated air to preheat the incoming air, substantially as described.

7. The method of treating materials for the purposes described, which consists in heating the materials in an electric furnace, supplying air to the furnace and utilizing the heated outgoing air to preheat the incoming air; substantially as described.

In testimony whereof, we have hereunto set our hands.

WALTER S. MAYER.
WALTER C. KENNEDY.