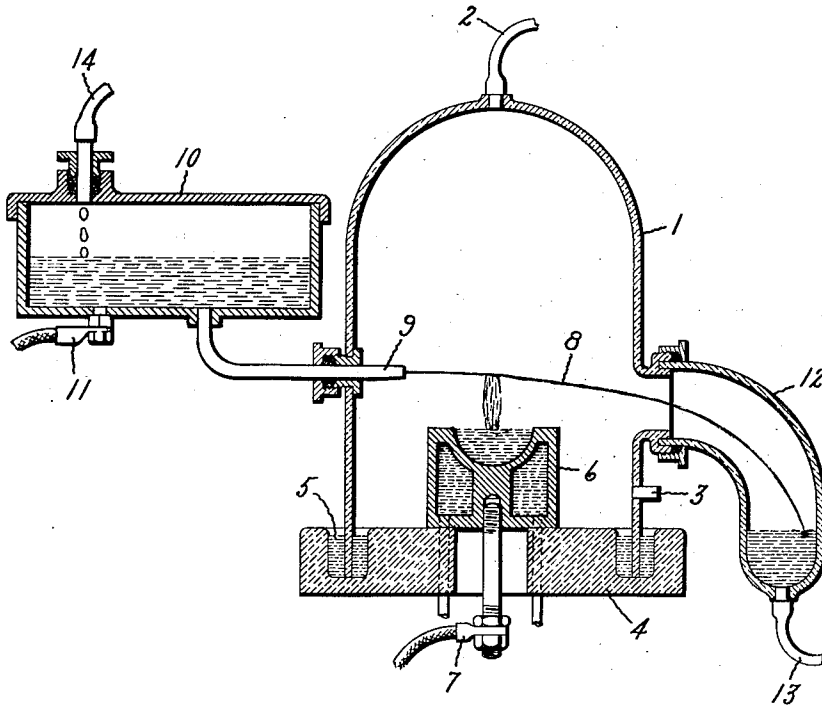


E. WEINTRAUB.
ELECTRIC FURNACE AND PROCESS OF OPERATING THE SAME.
APPLICATION FILED OCT. 5, 1912.

1,068,615.

Patented July 29, 1913.



Witnesses
E. S. Allen
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UNITED STATES PATENT OFFICE.

EZECHIEL WEINTRAUB, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC FURNACE AND PROCESS OF OPERATING THE SAME.

1,068,615.

Specification of Letters Patent.

Patented July 29, 1913.

Application filed October 5, 1912. Serial No. 724,090.

To all whom it may concern:

Be it known that I, EZECHIEL WEINTRAUB, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Electric Furnaces and Processes of Operating the Same, of which the following is a specification.

The present invention relates to electric furnaces and comprises a furnace suitable particularly for highly heating refractory materials without contamination with other substances as is apt to be the case when the ordinary arc heating means are used.

In my prior Patents #997,882 and #997,883 issued to me July 11, 1911, I have described an electric furnace in which the material to be highly heated is constituted one electrode of a vapor arc, such as a mercury vapor arc. In accordance with my present invention, the vaporizable electrode is a flowing stream within arcing range of the material to be melted.

My invention will be best understood by reference to the following description taken in connection with the accompanying drawing showing a longitudinal section of my new furnace.

The arcing space is inclosed by a hood, or envelop 1, consisting of any suitable material as iron, copper, or glass, and is preferably supplied with a protective gas, such as hydrogen or nitrogen through a tube 2, although in some cases the space may be evacuated. The gas may be carried away if contaminated with chemical by-products through a tube 3. The base 4 may conveniently consist of soapstone, or other suitable insulating material if the hood 1 is metallic, or it may be metallic itself if suitable provision is made to insulate the electrodes from each other. The base may be joined gas-tight to the hood by any well-known means such as mercury seal 5. A preferably water-cooled metal container, or electrode 6 serves both to support and carry current to the charge which may be in a powdered or non-coherent state. Suitable current connection 7 is made as indicated. The cooperating electrode is constituted by a stream 8 of vaporizable material, preferably mercury, which is inert with respect to the charge. The mercury stream is projected or otherwise passed within arcing distance to the charge from a tube 9, preferably con-

sisting of quartz, or similar non-conducting material, communicating with a reservoir 10 containing a column of mercury. Current connections to the mercury stream may be conveniently made by connection to the reservoir as indicated at 11. The arc may be started by a high potential discharge, or by first causing the stream 8 to come into contact with the other electrode and then increasing the pressure, so as to raise its level and cause it to flow into a receiving chamber 12. This chamber is preferably made of glass, or has a glass window through which the arc may be observed. The mercury, or other vaporizable material may be returned by any appropriate means through tubes 13 and 14 to the reservoir 10. The stream 8, preferably is made the cathode.

Some of the advantages which may be secured by the use of my improved furnace are as follows: Mercury is inert with respect to many refractory materials, such as boron, silicon, tungsten, titanium, refractory carbids, and the like and hence will not contaminate these materials when used as the opposing electrode. The electrode stream being constantly renewed is self-cooling and hence permits the use of currents of great power. Refractory materials in powdered state may be treated, or melted instead of first having to be pressed into coherent form, or molded with a binder, as is the case in my prior form of furnace. In a furnace as above described impure boron, or boron compounds, such as boron suboxid, may be highly heated and dissociated yielding chemically pure, coherent boron bodies.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. The combination of an envelop, an electrode holder therein and means for projecting a stream of vaporizable metal within arcing range of said holder, and electrical connections both for a charge supported by said holder and the stream of vaporizable material.

2. The combination of an envelop, means for supporting material to be heated as an electrode in said envelop and a stream of mercury within arcing distance above said electrode to constitute the cooperating electrode.

3. In an electric furnace, the combination of means for providing a stream of vaporizable material constituting an electrode and

a cooperating electrode out of direct contact therewith.

4. In an electric furnace, the combination of means for supporting material to be melted and constituting one electrode, and means
5 for passing a stream of vaporizable material constituting the other electrode in the vicinity of said material.

5. The process of heating materials which
10 consists in making the same one electrode of a vapor arc, and constantly renewing the material constituting the cooperating electrode.

6. The process of heating refractory conductive materials to high temperatures 15 which consists in making the same the anode of a mercury vapor arc in an evacuated space, and constantly renewing the mercury which constitutes the cooperating cathode.

In witness whereof, I have hereunto set 20 my hand this second day of October, 1912.

EZECHIEL WEINTRAUB.

Witnesses:

JOHN A. McMANUS, Jr.,
ROBERT SHAND.