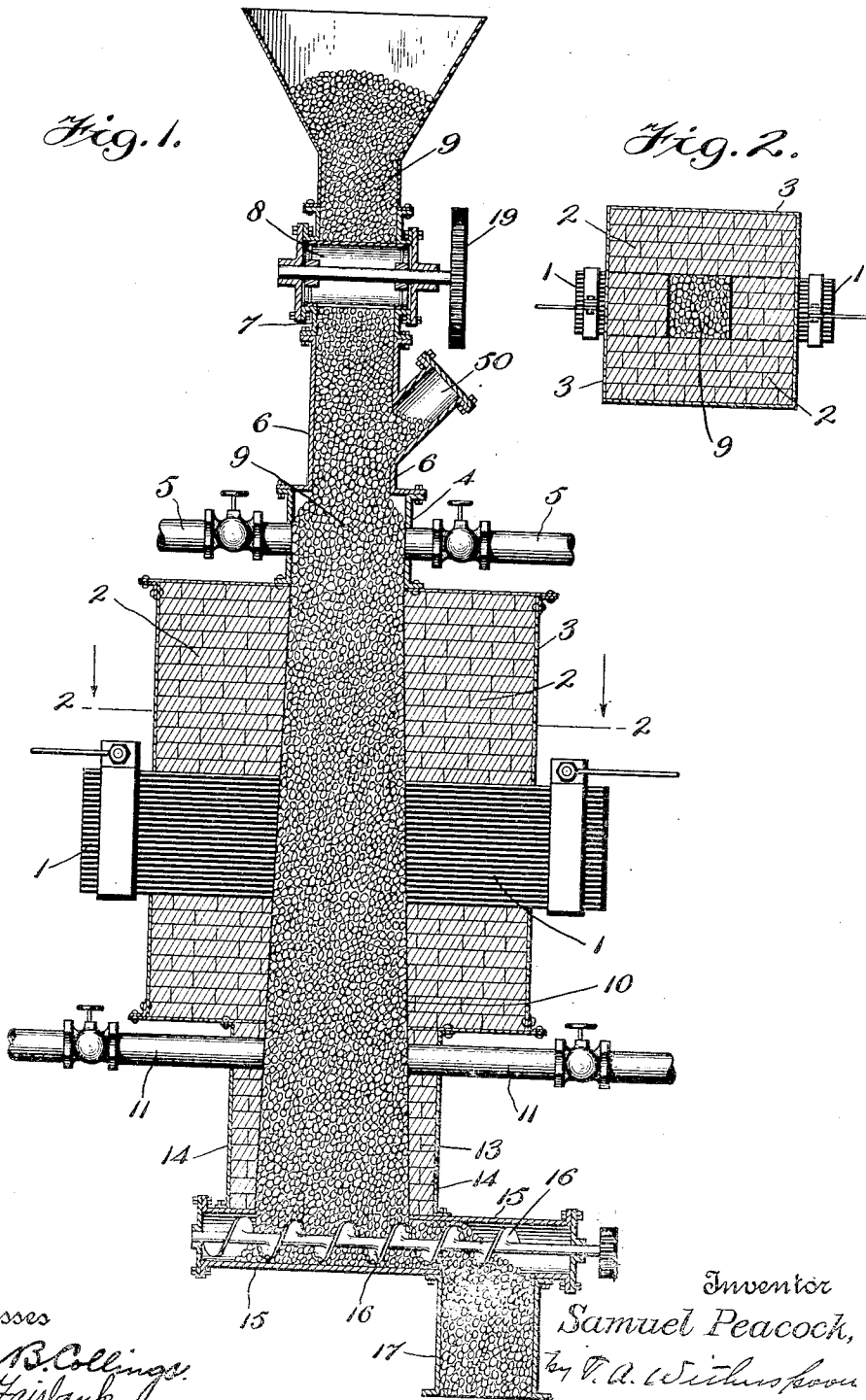


S. PEACOCK.
ELECTRIC FURNACE.
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1,129,512.

Patented Feb. 23, 1915.



Witnesses
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UNITED STATES PATENT OFFICE.

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ELECTRIC FURNACE.

1,129,512.

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To all whom it may concern:

Be it known that I, SAMUEL PEACOCK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to electric furnaces of the resistance type, and has for its object to produce a furnace of this character which will be more efficient in action in fixing atmospheric nitrogen than have been those heretofore proposed.

With these and other objects in view, the invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings, forming a part of this specification, in which like numerals designate like parts in all the views:—Figure 1 is a sectional view of a furnace built in accordance with my invention; and, Fig. 2 is a sectional view, taken on the line 2—2 of Fig. 1.

1 indicates the electrodes, which are preferably two in number and of a built-up construction, as shown.

2 indicates the body of the furnace, which may be of brick work or other insulating material; 3, a steel jacket for said body portion; 4, a metal section forming a continuation of the furnace shaft or bore; 5, valved conduits for leading off the exit gases; 6, a continuation of the section 4 provided with the hand feed opening 50; 7, a section bolted to the member 6; 8, a rotating gate or valve forming a gas tight connection with the furnace and adapted to feed measured quantities of charge material 9 to the furnace chamber 10 which is preferably tapered toward the bottom, as shown; 11 indicates oppositely disposed valved inlets for nitrogen, or producer gas, located below the electrodes 1, and preferably passing through the reduced portion 13 of the furnace body, as shown. Said reduced portion 13 is also provided with a steel casing 14, and its lower end opens into the conduit or delivery passage 15, preferably provided with the screw conveyor 16, and outlet or delivery 17,

adapted to pass the material into any suitable receiver, not shown.

18 is a gear means for rotating the conveyor 16, and 19 is a gear for rotating the rotating valve or feed member 8.

The furnace chamber 10 is preferably square, or almost square in cross section, and the area of each of the opposed exposed faces of the electrodes is preferably made at least as great as the area of said section, so that the path of least resistance through the molten material will be practically directly from one electrode face to the other; and therefore, the objectionable short circuiting and deflections of the current through said material, with the consequent unequal heatings thereof, now so annoying in furnaces of this type, are largely, if not entirely done away with. This, I consider an important feature of my invention, and is conveniently secured by building up the electrodes 1 from slabs of graphite, as shown. The furnace is gas tight, when operating, as will be clear from the drawings, and by oppositely disposing the gas inlets 11 as illustrated, and thus causing the streams to meet in the middle of the charge, an even and steady flow of nitrogen through the reaction zone is had, which would not be the case if only one inlet was employed.

The operation of my furnace will be clear from the foregoing, but may be briefly summarized as follows:—The chamber 10 may be filled with coke up to the electrodes, and then hot coke thrown in through the opening 50, the current turned on and the conveyor started while charge material is fed down through the chamber, or the said chamber may be filled with coke to a point above the electrodes, the current turned on and when the coke becomes incandescent, it may be fed out through the conveyor while charge material is caused to follow down into the reaction zone. In either case, the turning of the feed valve or member 8 will cause charge material 9 to be uniformly fed to the reaction zone, and the turning of the screw conveyor 16 will cause the product to be uniformly removed from said zone.

The current, in furnaces of this type, as is well known, has heretofore been exceedingly difficult to control, it being stronger through some parts of the charge than through others, and it has resulted from this that the heating of the charge has not been

uniform and the product as a consequence has been irregular in quality. In my invention, however, not only does the large area of the electrode faces above mentioned
 5 serve to remedy this grave defect, but I also preferably briquet my charge material 9, so that the original uniform distribution of conducting material is maintained in the reaction zone, and the current accordingly
 10 remains more steady than heretofore. Not only do I thus steady the current through the reaction zone, and therefore produce a more uniform product, but I also regulate the amount of current that flows through the
 15 reaction zone, and therefore the amount of heat generated therein or the temperature of said zone by regulating the amount of carbon in the charge. It follows from this that I may so regulate the amount of carbon in the charge as to produce a temperature of only say 1500° C. in the reaction zone, which would be suitable for producing calcium carbonitrid $\text{Ca}_3\text{N}_2\cdot\text{C}_3\text{N}_4$, or I may put in less carbon and thus raise the temperature to 1900° C. suitable for making a nitrid such as Ca_3N_2 , from the same charge material consisting of calcium oxid, carbon and nitrogen.

What I claim is:—

30 1. In an electric furnace of the resistance type having a chamber substantially rectangular in cross section; oppositely disposed electrodes each having an exposed face in said chamber of an area substantially as
 35 great as said cross section; means for feeding charge material to said chamber; means for withdrawing the finished product from said chamber; means for feeding a gas to said chamber; means for withdrawing the
 40 gaseous products of the reaction from said chamber; and means for maintaining said chamber substantially gas tight, substantially as described.

45 2. In an electric furnace of the resistance type having a chamber substantially rectangular in cross section; oppositely disposed electrodes each having an exposed face in said chamber of an area substantially as great as said cross section; rotating means

for feeding charge material to said chamber; rotating means for withdrawing the finished product from said chamber; valved means for feeding a gas to said chamber; valved means for withdrawing the gaseous products of the reaction from said chamber; and means comprising a metal casing for maintaining said chamber substantially gas tight, substantially as described.

3. In an electric furnace of the resistance type having a chamber substantially rectangular in cross section; means affording a passage for feeding charge material by hand to said chamber; oppositely disposed electrodes each having an exposed face in said chamber of an area substantially as great
 65 as said cross section; automatic means for feeding charge material to said chamber; automatic means for withdrawing the finished product from said chamber; means for feeding a gas to said chamber; means for
 70 withdrawing the gaseous products of the reaction from said chamber; and means for maintaining said chamber substantially gas tight, substantially as described.

4. In an electric furnace having a chamber substantially rectangular in cross section; oppositely disposed electrodes having a cross section of substantially the same dimensions as said chamber; an automatic rotating means for feeding charge material to
 80 said chamber; means opening into said chamber for feeding said material by hand into said chamber; a screw conveyer for removing the finished products from said chamber; oppositely disposed valved pipe
 85 for feeding a nitrogen bearing gas to said chamber; a valved pipe for leading off the gaseous products of the reaction from said chamber; and a means including a metal casing for making said chamber gas tight, 90 substantially as described.

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

SAMUEL PEACOCK.

Witnesses:

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