No. 699,146. Patented May 6, 1902.

W. M. CARR.

ELECTRIC COMBUSTION FURNACE.

(Application filed Mar. 3, 1902.)

(No Model.)

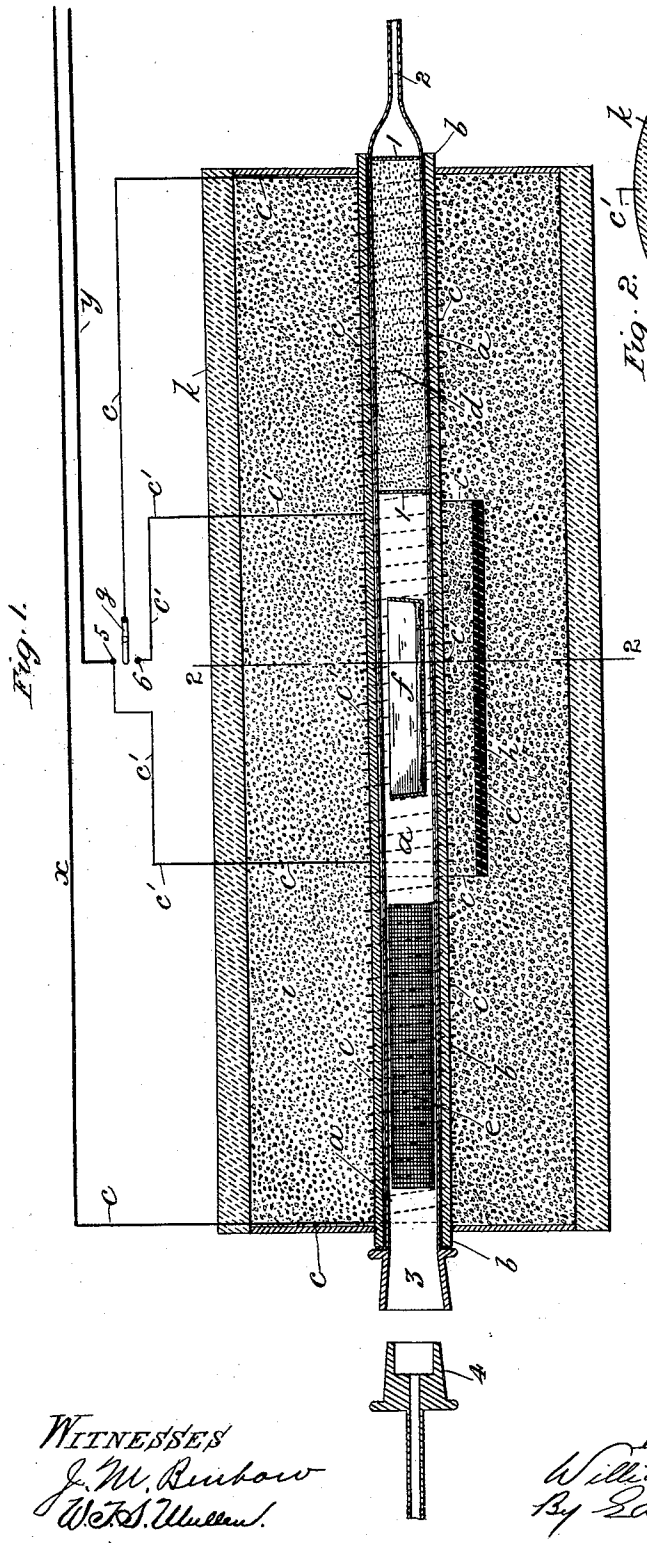


Fig. 1.

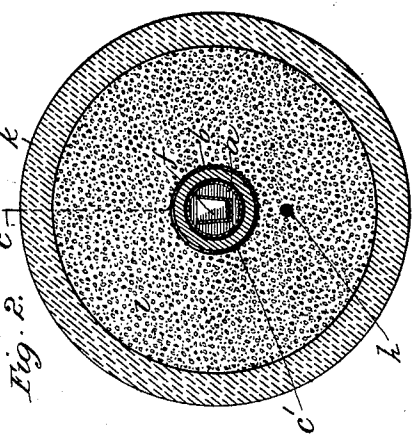


Fig. 2.

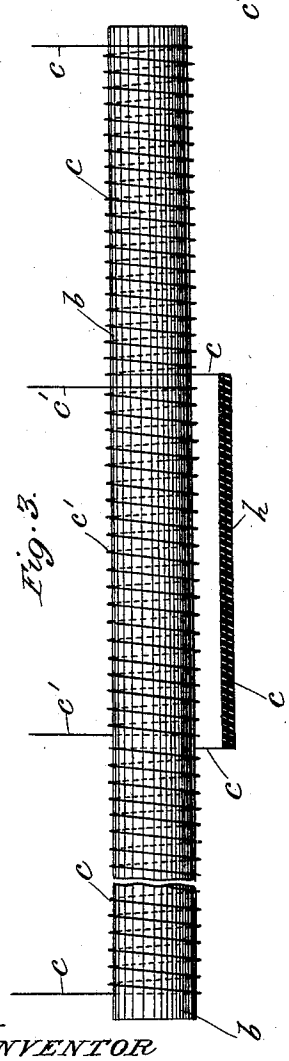


Fig. 3.

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UNITED STATES PATENT OFFICE.

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ELECTRIC COMBUSTION-FURNACE.

SPECIFICATION forming part of Letters Patent No. 699,146, dated May 6, 1902.

Application filed March 3, 1902. Serial No. 96,556. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. CARR, a citizen of the United States, residing at East St. Louis, in the county of St. Clair and State of Illinois, have invented a new and useful Improvement in Electric Combustion-Furnaces, of which the following is a specification.

My invention relates to that class of combustion-furnace wherein the heat is generated by an electric current passing through a small metallic wire, and has for its object to render the furnace practical for determining the carbon in any carbonaceous matter—such as wood, coal, and the like—and in pig-iron and steel by enabling the two end portions of the furnace to be first electrically heated and then subsequently the entire furnace electrically heated and held at any desired temperature.

The invention consists in features of novelty, as hereinafter described and claimed, reference being had to the accompanying drawings, forming part of this specification, whereon—

Figure 1 is a vertical longitudinal section through my improved electric combustion-furnace; Fig. 2, a cross-section thereof on line 2 2 in Fig. 1, and Fig. 3 a detached elevation of the porcelain cylinder containing the combustion-tube and wound around with wire, as seen in longitudinal section in Fig. 1.

Like letters and numerals of reference denote like parts in all the figures.

My improved electric combustion-furnace consists of a combustion-tube *a*, which is preferably composed of platinum, but may be of glass or porcelain and fits loosely within a porcelain cylinder or tube *b*, which corresponds in length to the combustion-tube *a* and around which is spirally wound, preferably, platinum wires *c c'*, as hereinafter more particularly described, or the cylinder *b* may be made of clay, china, glass, or other suitable non-electrical conducting refractory material, and the wire *c c'*, in lieu of platinum, may be of other suitable metal, as found most desirable.

Within the combustion-tube *a* for a suitable distance from one end thereof is placed granular cupric oxid *d*, which is held in position at each end by a platinum disk 1, and for a suitable distance from the other end of the combustion-tube *a* is placed a coiled cylinder *e*, of copper gauze, the object of the oxid *d* and gauze *e* being to oxidize any carbon monoxid into carbon dioxid.

Within the combustion-tube *a* between (preferably midway) the cupric oxid *d* and copper gauze *e* is placed a platinum boat or other suitable receptacle *f*, which contains the carbonaceous matter to be ignited. The end 2 of the combustion-tube *a* adjacent to the cupric oxid *d* communicates with the purifying and collecting apparatus (not shown) which is of the ordinary well-known description. The other end 3 of the combustion-tube *a* adjacent to the copper gauze *e* is open and adapted to be closed gas-tight by a stopper 4.

The wire *c* (and *c'*) is preferably platinum of 28 gage, which connects with the main electric-supply wire *x*, and is wound spirally around the porcelain cylinder *b*, beginning at one end thereof to about one-third (more or less) of its length, and is then directed without winding at a suitable distance from and past the middle third portion of the cylinder *b*, and thence wound spirally around the other end third portion of the cylinder *b*, from which it passes, preferably, to a two-point switch *g*, that portion of the wire *c* which is out of contact with the cylinder *b* between the spirally-coiled end portions thereof being covered with insulating material *h*.

Around the middle third portion of the cylinder *b* is wound spirally the wire *c'*, which is separate from the wire *c* and connects at one end with one point 5 of the switch *g*, the point 5 being also in connection with the main return-wire *y*, while the other end of the wire *c'* connects with the other point 6 of the switch *g*.

The entire apparatus above described, excepting the ends 2 and 3 of the combustion-tube *a* and cylinder *b* and the switch *g*, with its connections, is covered with, preferably, magnesia *i* and inclosed therewith in a cylindrical or other suitably-shaped box *k*, made of fire-clay, cement, tiling, porcelain, or other suitable material.

In operation a current of oxygen is first passed through the combustion-tube *a* from its end 3 to expel the air therefrom, after which the purifying and collecting apparatus (not shown) is attached to the end 2 of the

combustion-tube *a*. An electric current is then passed through the two end coils and intermediate insulated connecting portion of the wire *c* (the switch *g* being in contact with the point 5) for the purpose of heating the cupric oxid *d* and copper gauze *e*, but not the middle portion of the combustion-tube *a*. When the proper temperature (a dull red) has been reached, the switch *g* is thrown into contact with the point 6 and the electric current thereby passed through the coils of the wire *c'* around the middle portion of the cylinder *b* simultaneously with its passage through the end coils and connecting portion of the wire *c*, whereby the combustion-tube *a* or furnace is heated to a uniform temperature throughout and held thereat as long as desired. The current of oxygen is kept flowing during the entire operation. As fast as any carbon contained in the boat *f* is oxidized to carbon dioxid (a gas) it is carried off by the current of oxygen through the combustion-tube *a* and through the end 2 thereof into the purifying-train, the furnace being held at the desired temperature until all the carbon has been oxidized, when the electric current is turned off and the stream of oxygen then stopped.

The advantages of my invention are that by first passing the electric current through the wire *c* and so heating the end portions of the furnace independently of the middle portion and afterward passing the current through both wires *c c'* simultaneously for heating the entire furnace uniformly a more positive effect is obtained with absence of evolved heat. The heat is also more readily and quickly applied and better regulated and the desired temperature more easily reached and maintained with greater cleanliness and more accurate results than with the usual mode of heating this class of furnace.

What I claim as my invention, and desire to secure by Letters Patent, is—

In an electric combustion-furnace, the combination with the combustion-tube, and with its inclosing cylinder, of two wires separate from each other, one of the said wires being wound spirally around the end portions of the said cylinder, and the other wire wound spirally around the middle portion of the said cylinder, and means for passing an electric current alternatively through the wire around the said end portions, and through both the said wires simultaneously, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM M. CARR.

Witnesses:
EDWARD W. FURRELL,
ROBERT BULL.