(No Model.) 2 Sheets—Sheet 1.

F. J. PATTEN.

ELECTRIC FURNACE.

No. 577,493. Patented Feb. 23, 1897.

Fig. 1.

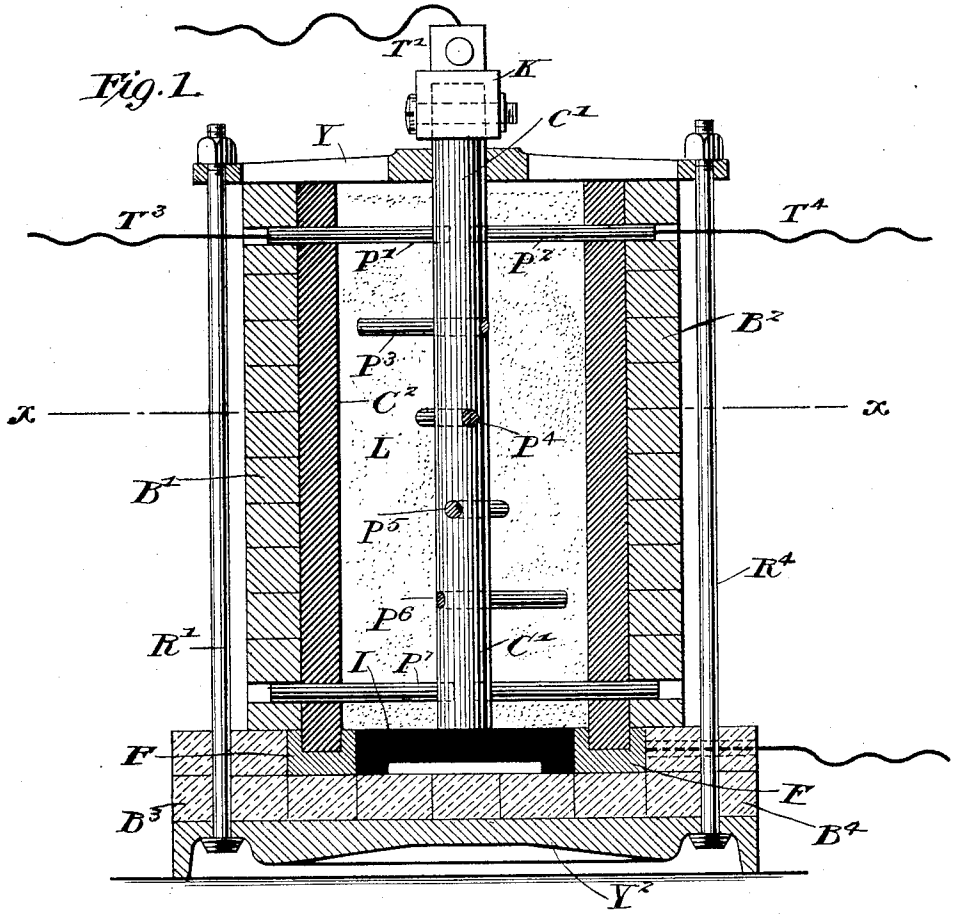
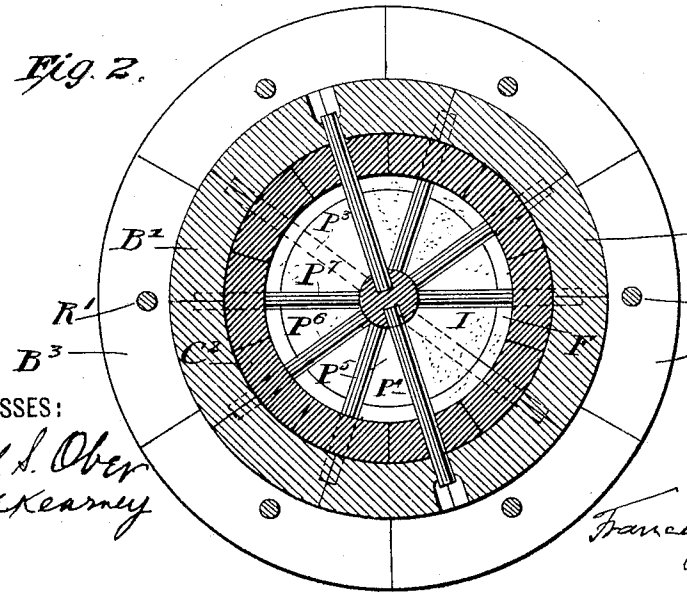


Fig. 2.



WITNESSES:

Frank S. Ober

Jno. A. Kearney

INVENTOR

Francis Jarvis Patten

(No Model.) 2 Sheets—Sheet 2.

F. J. PATTEN.

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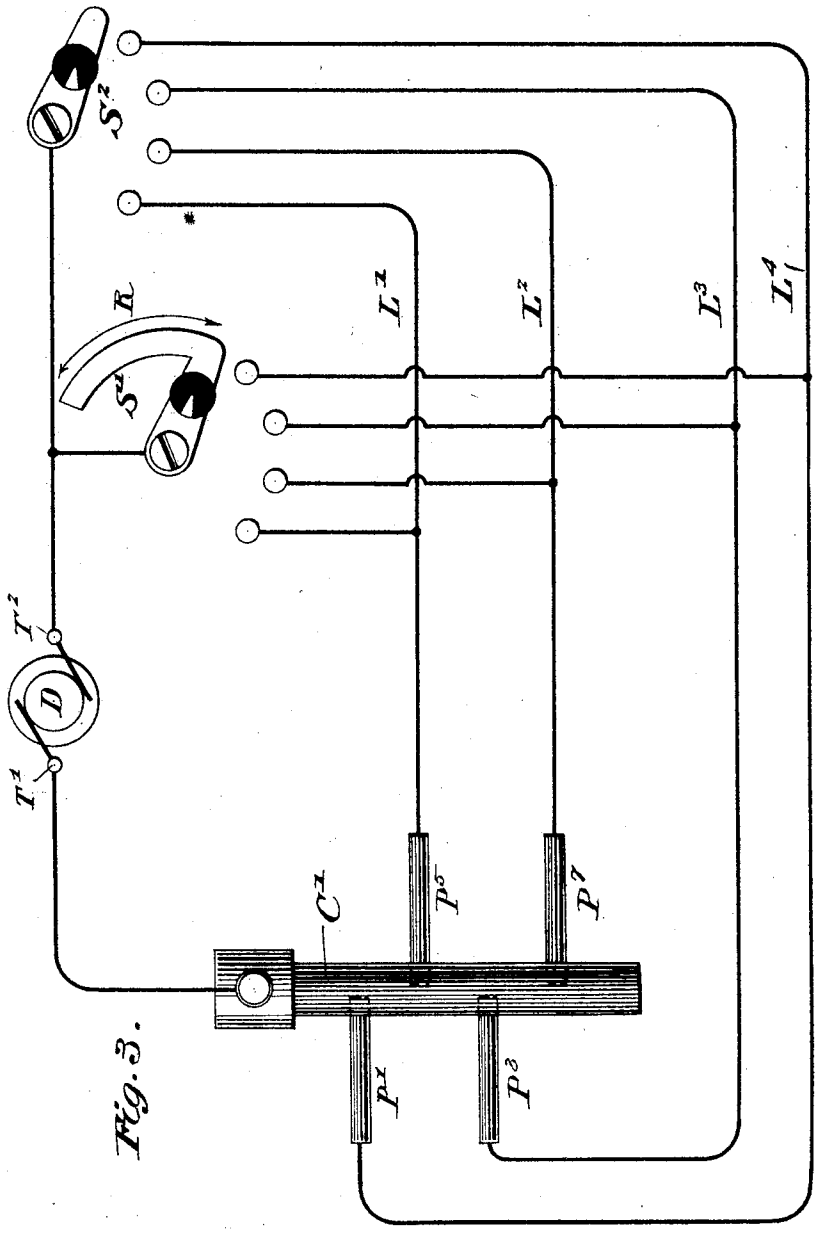

Fig. 3.

WITNESSES:

Frank L. Ober

Carleton A. Reeve

INVENTOR

Francis Jarvis Patten

UNITED STATES PATENT OFFICE.

FRANCIS JARVIS PATTEN, OF NEW YORK, N. Y.

ELECTRIC FURNACE.

SPECIFICATION forming part of Letters Patent No. 577,493, dated February 23, 1897.

Application filed August 1, 1896. Serial No. 601,302. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS JARVIS PATTEN, a citizen of the United States, residing at New York, in the county and State of New York, have invented a new and useful Improvement in Electric Furnaces, of which the following is a clear description and specification.

The invention belongs to that class of electric furnaces used for the production of carbids, and will be understood from inspection of the accompanying drawings, in which—

Figure 1 is a vertical section, Fig. 2 is a horizontal section, and Fig. 3 is a diagram, of the circuits used.

In all three figures like letters indicate the same parts.

Most furnaces of this description depend for their action upon the use of the electric arc to fuse the ingredients of the carbid it is desired to form.

I am aware that processes have been described in which no arc is availed of, such, for instance, as those in which a continuous pencil of carbon is brought to incandescence and so produces the heat of fusion. In my invention I use such a method, arranging the parts of the apparatus with a view to produce a large quantity of carbid at a single firing or action of the furnace.

In Fig. 1, which represents a vertical section of the furnace, C is a stick of carbon circular in cross-section and vertical in position. It constitutes one electrode of the furnace, being connected to the dynamo-terminal T. The main interior jacket of the furnace, also circular in cross-section, is of carbon and constitutes the other main electrode of the furnace, its retaining-wall or outer jacket of the furnace being built up of firebrick or other refractory blocks. (Indicated as B' B^2 B^3, &c., Figs. 1 and 2.) The shell is held together and the whole construction made rigid by the top and bottom yokes Y' and Y^2, joined and fastened by the rods R' R^4, &c. Inside the brick wall the carbon lining of the furnace extends for one form all around the inner surface, as indicated in Fig. 2. The carbon lining or interior jacket rests upon a circular metallic ring F, which is connected to the negative or remaining terminal T^2 of the dynamo that supplies the current. The central carbon-rod C' rests upon an insulating-plate I, of porcelain or other suitable non-conducting material, which separates the carbon-rod electrically from the carbon wall of the furnace and the metallic ring on which the carbon wall rests. If under such conditions of construction the distance between the carbon wall and the central electrode were considerable and the space were filled with a mixture of lime and coke, little or no current could pass between the wall and the carbon stick and no fusion would take place.

To provide passage or conducting material for a sufficient electric current, and, in fact, to so arrange the construction that the material will be simultaneously attacked throughout its whole mass by the electric current used for fusion, I provide and place a large number of comparatively small or slender carbon pencils, (indicated in the drawings as P', P^3, P^4, P^5, P^6, and P^7,) which traverse the mixture of lime and coke at intervals from the wall to the central core, each of which, when the current is put on, forms a nucleus or starting-point at which fusion of the mixture begins, this of course at as many different points as there are pencils placed between the carbon wall and the central electrode.

In the drawings the pencils are indicated as being arranged spirally from the lining-wall to the central core from top to bottom of the furnace. Evidently if several such spirals of pencils were placed in the mixture of lime and coke it would be so attacked by them if all the pencils were simultaneously brought to incandescence by passing through them a sufficient quantity of current that the mixture would be attacked throughout by a fusing heat and most of it fused to carbid. The process is practically as follows:

The pencils are put in place between the carbon wall and the central core in measure as the furnace is filled with the mixture of lime and coke to the top. The current of electricity is turned on in quantity sufficient to melt the pencils, or at least in quantity sufficient to bring them to a state of incandescence. Such a heat will fuse the ingredients of the mixture in the immediate surrounding vicinity of the carbon pencil and produce a mass of calcium carbid in the molten state, which, being a much better conductor

than the mixture of which it was formed, makes of itself a path for the current before provided by the carbon pencil, the carbon of the pencil uniting with the molten mass, and in measure as the carbid forms more and more current will pass between the wall and the central electrode, until finally a certain amount passing will indicate that fusion around the center of flow is complete. Evidently by this means I can produce at one firing or action of the furnace as many nuggets of carbid as I have pencils in such a furnace to operate with and so avoid the delay and labor incident to removing each nugget in turn as it is formed and refilling the furnace and resetting carbons for each successive firing or action of the furnace.

A modification of this invention is almost self-evident. It consists simply in the method of connecting one terminal of the dynamo to the central carbon-rod of the furnace and the other terminal successively to one or a group of two or more pencils in turn. This of course necessitates leaving the outer ends of the pencils electrically separate, and the general system of connection to operate the furnace either way is given in Fig. 3, wherein C′ represents the central carbon-rod, and P′ P^3 P^5 P^7 represent a number of the pencils that radiate from it.

D is the dynamo, having one terminal connected to the central carbon-rod and its other to two switch-terminals S′ and S^2. By throwing the switch S′ full over all the pencils are simultaneously put into circuit, or by throwing it part way as many as are desired are placed at once in circuit. On the other hand, by throwing switch S^2 from one point to the other any particular pencil through its particular and independent lead is put in circuit alone for the time. In such manner each nugget of carbid can be formed around its central pencil or nucleus of fusion in turn, and a considerable number can thus be made without a recharging and resetting of the furnace.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is the following:

1. An electric smelting-furnace containing a central carbon core constituting one electrode of the furnace, having numerous pencils of carbon radiating from it through the mixture to be fused, the outer extremities being connected to independent leads whereby they can be given current simultaneously or separately at will substantially as described.

2. In an electric furnace the combination of a central carbon electrode, an inner lining or wall of carbon, and carbon pencils of relatively small diameter extending from one to the other and means for passing an electric current through the pencils singly or in groups substantially as described.

In testimony that I claim the foregoing as my invention I have hereunto set my hand this 30th day of July, 1896.

FRANCIS JARVIS PATTEN.

Witnesses:

A. LEONARD HALL,

ISIDOR BRAND.