(No Model.)

F. J. PATTEN.

ELECTRIC FURNACE.

No. 577,317. Patented Feb. 16, 1897.

Fig. 1.

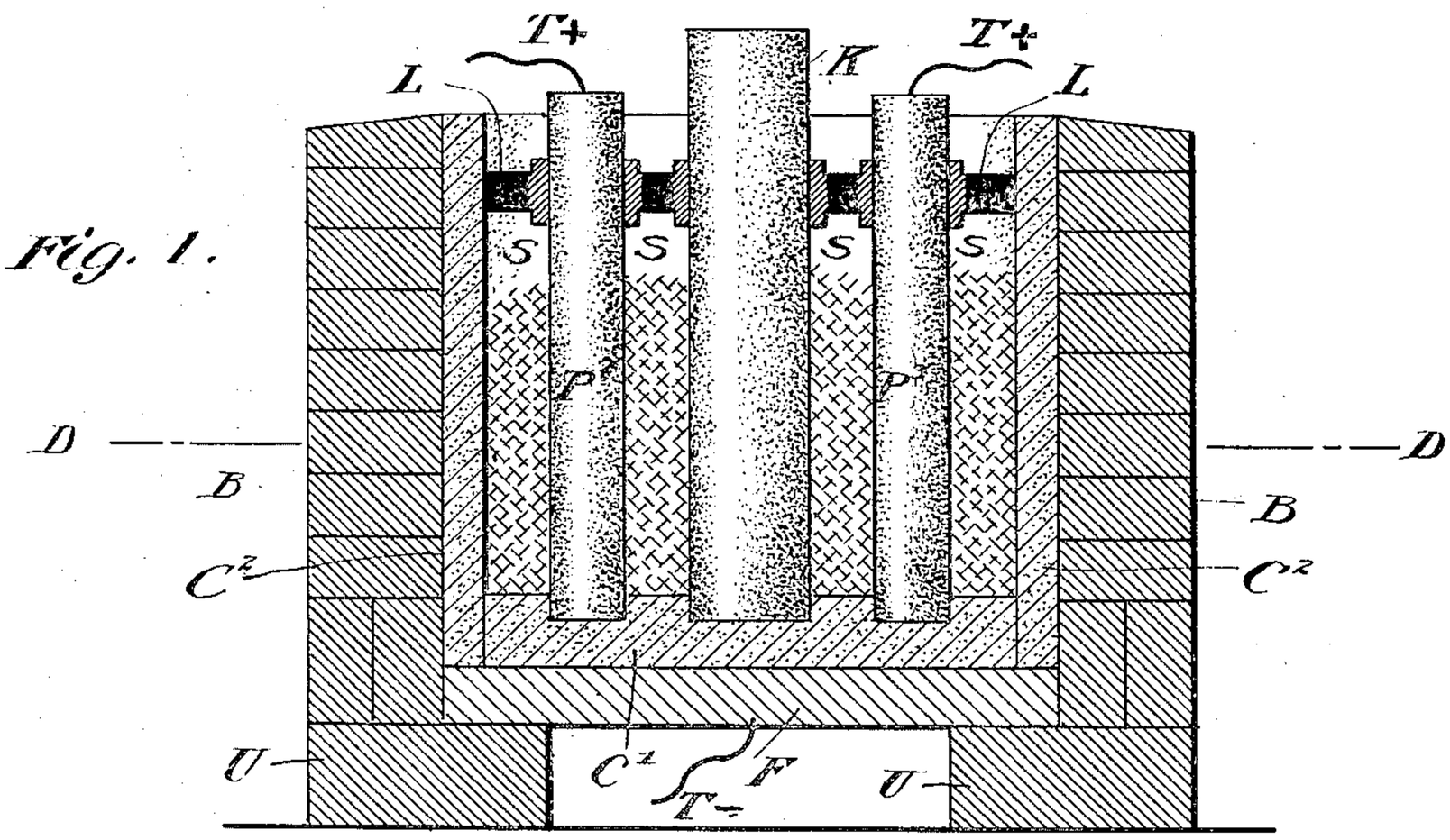
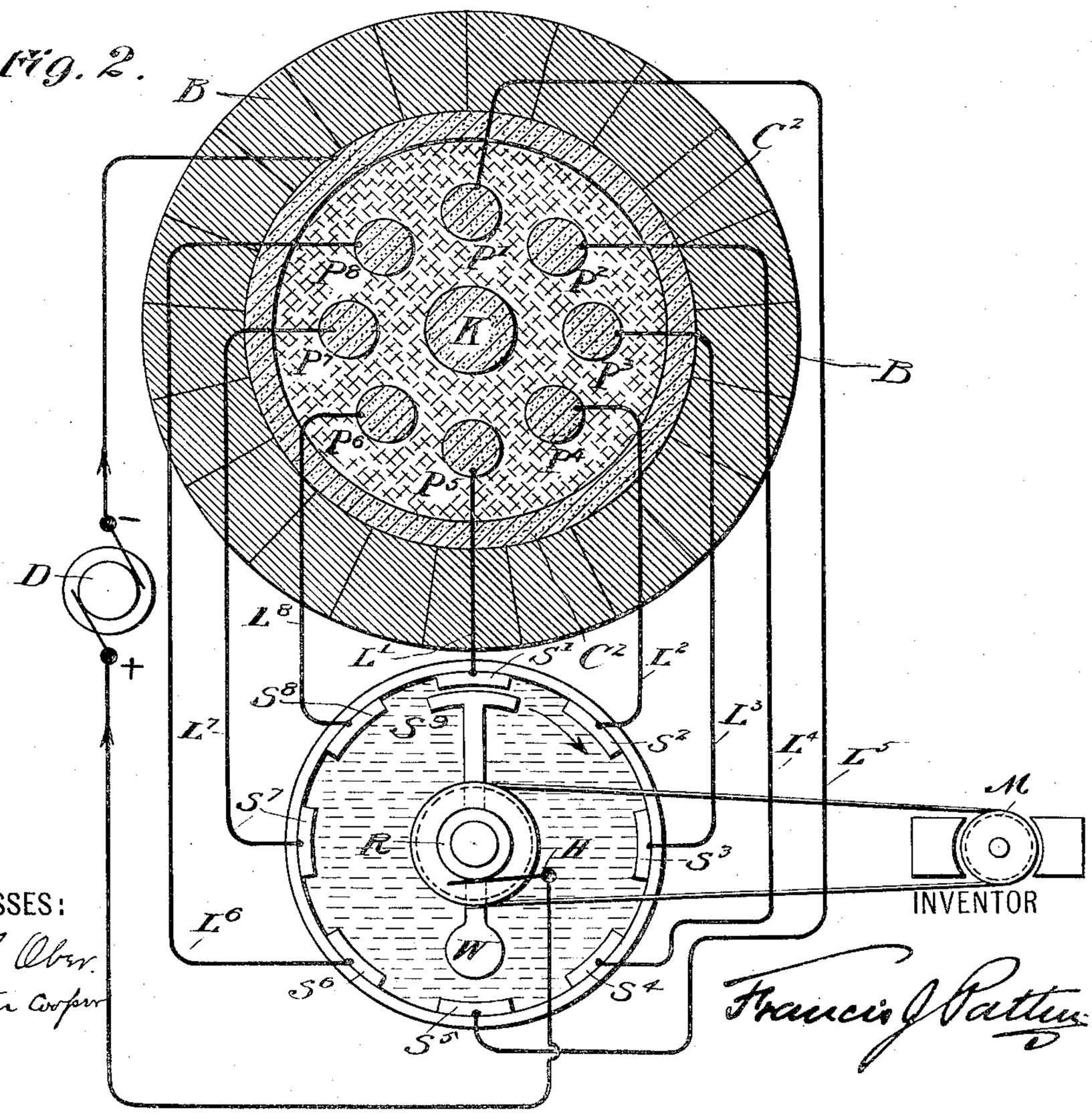


Fig. 2.



WITNESSES:

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ELECTRIC FURNACE.

SPECIFICATION forming part of Letters Patent No. 577,317, dated February 16, 1897.

Application filed September 15, 1896. Serial No. 605,869. (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 certain new and useful Improvements in Electric Furnaces, of which the following is a clear description.

My invention relates to that class of furnaces for making calcium carbid in which a pencil of carbon or a number of them are brought to a fusion heat by passing a heavy electric current through them. It is not materially different in its essential features from other furnaces of the same general type, my improvement consisting mainly in a means of extending the operativeness of the furnace and enlarging its output. It will be understood from the accompanying drawings, in which—

Figures 1 and 2 represent the furnace in vertical and horizontal section, the latter showing more particularly the peculiar system of electrical connections used by which the desired result is attained, which is to keep a number of carbon pencils in a furnace continuously active without maintaining a volume of current-flow sufficient to heat them all to incandescence simultaneously.

In both figures a circular furnace is shown, in the interior space of which a number of carbon pencils P' to P^8 are arranged at a suitable distance from each other in a circle. In the vertical section, Fig. 1, only two diametrically opposite pencils are shown, P^8 and P^7, the others being omitted to avoid confusion of the drawings. The pencils are of comparatively small diameter or cross-section, such in fact as to admit their being heated to incandescence by a current of from two hundred to six hundred amperes, according to the size and desired output of the furnace. The space between them, on the other hand, is determined chiefly by the distance around its axis to which the heating action of the incandescent carbon pencil extends, the idea being to make the action as nearly continuous as possible throughout the mass, the space S S around and between the pencils being filled with the mixture to be fused except at the central portion, which is filled with a carbon core K, Figs. 1 and 2, the sole purpose of which is to occupy the central space or core of the furnace where the mixture would be little, if any, attacked by the heat of the surrounding pencils. The central core K, as represented, simply occupies a dead space in the center of the furnace. It may or may not be connected to the positive pole of the dynamo like the others through an additional plate in an independent circuit to the liquid commutator. As the central core K is shown permanently connected to the negative pole of the dynamo, some current will always pass between it and that particular pencil of the surrounding group which is temporarily connected to the positive pole of the dynamo through the liquid commutator, which is equally true of all the others when temporarily cut out of direct circuit by the commutator. The whole is incased in the usual way in a surrounding wall of brickwork B B.

The pencils P' P^8 are held in position at the bottom by being let into the bottom carbon slab C', that forms the floor of the furnace, and at the top they are held in separate metallic supports, which keep them electrically separate or insulated from each other. These supports are indicated at L L.

The lower carbon slab or floor C' rests upon an iron support or similar slab F, which is itself one terminal electrode of the furnace, the lead T going to one terminal of the dynamo D. Thus all the carbon pencils are connected at their lower ends to one terminal of the source of current. The upper or free ends of the carbon pencils are each connected independently and in rotation to the other terminal by the electric device shown in Fig. 2, which is peculiarly adapted to this purpose by reason of the fact that it serves to switch the current, however great its volume, from one pencil to the next in rapid rotation without breaking the current or forming any arc whatever. In this feature as adapted to electric furnaces lies the chief merit of this invention.

By taking a current of a given volume, say three hundred amperes at fifty to one hundred volts, and passing it in quick succession through a number of carbon resistances they can each in a comparatively short time be brought to incandescence, and a very much larger mass of material can be simultaneously attacked by the temperature of incandescence

than if the current were sent through one pencil or a small number. Thus I am enabled to construct on these lines a furnace of considerably enlarged output. The operativeness of such a system of course depends upon the use of my peculiar switching device or commutator, which transfers the heaviest currents gradually from one carbon pencil to the other without interrupting or breaking the continuous or steady flow of current in any way. No device that broke or interrupted such heavy currents would serve the purpose, by reason of the intense arcing and flaming at the switches or commutator-segments and brushes that would necessarily take place. I accomplish this result by using what I term a "liquid" or "bath" commutator which I invented many years ago and which serves the purpose admirably where the object is to throw heavy electric currents rapidly from one circuit to another. The device will be understood from Fig. 2, where the different parts are shown.

The eight pencils of the furnace, P' to P^8, are connected at their upper extremities, as shown, each to a separate carbon plate or slab S' S^2 to S^8, placed around the inside wall of a circular tub. This tub, constructed of non-conducting material, is nearly filled with acidulated water, which conducts the current. Another carbon slab S^9 is carried on a pivoted arm centrally swung at the axis of the tub, being balanced by a counterpoise or weight W, and a motor M, by a belt or otherwise, is caused to drive the arm carrying the movable slab S^9 at a suitable rate. On the spindle of the arm is fixed a conducting-ring or sliding contact, on which a brush H bears, which latter is connected to the other dynamo-terminal or opposite the one to which the lower furnace-terminal or carbon slab is connected, as shown by the circuits in Fig. 2. The ring on the arm or spindle upon which the brush H bears is also connected to the slab S^9, which revolves, and is thus brought successively into close proximity to the several slabs S' S^2 to S^8 in turn, giving the current to each of the eight carbon pencils in rotation without any rupture of current or of circuit.

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

1. In an electric furnace two or more carbon pencils connected through independent electric circuits to a source of electric current said circuits including a liquid commutator whereby the pencils can be given current singly and in groups successively in rotation.

2. In an electric furnace two or more carbon pencils connected through independent circuits and a liquid commutator to a source of electric current whereby the pencils can be given current in rotation without rupture of said current between the source of energy and the pencils.

3. In an electric furnace the combination of a number of electrodes connected to independent electric circuits, and a liquid commutator or switch whereby the current is sent successively through the different circuits to different electrodes substantially as described.

In testimony that I claim the foregoing as my invention I have hereunto set my hand, this 11th day of September, 1896, in the presence of two witnesses.

FRANCIS JARVIS PATTEN.

Witnesses:
A. PRESTON COOPER,
A. LEONARD HALL.