

No. 754,656.

PATENTED MAR. 15, 1904.

C. A. KELLER.
ELECTRIC FURNACE.
APPLICATION FILED JAN. 17, 1902.

NO MODEL.

Fig. 1

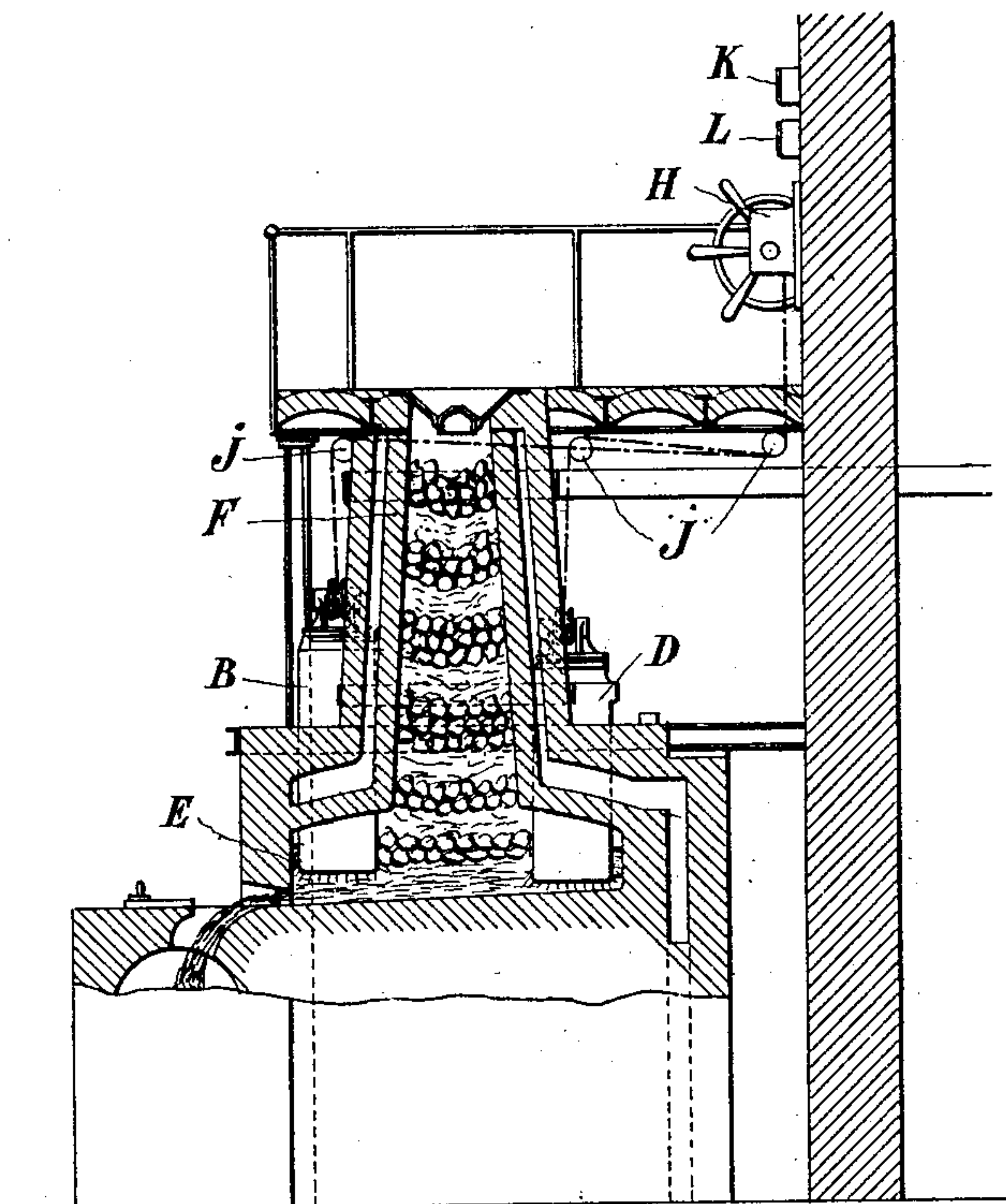
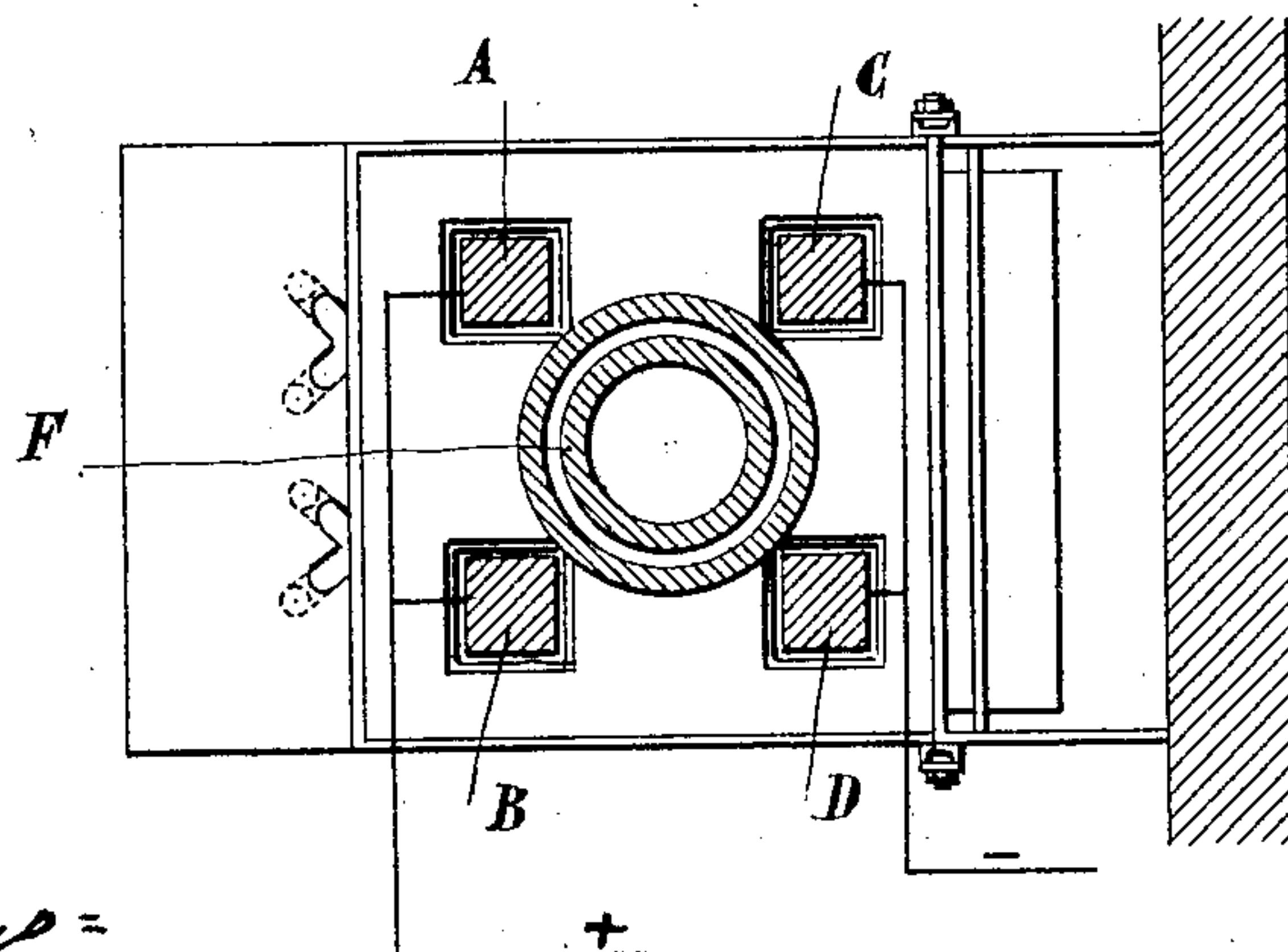


Fig. 2



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UNITED STATES PATENT OFFICE.

CHARLES ALBERT KELLER, OF PARIS, FRANCE.

ELECTRIC FURNACE.

SPECIFICATION forming part of Letters Patent No. 754,656, dated March 15, 1904.

Application filed January 17, 1902. Serial No. 90,151. (No model.)

To all whom it may concern:

Be it known that I, CHARLES ALBERT KELLER, a citizen of the Republic of France, and a resident of No. 3 Rue Vignon, Paris, France, have invented a certain new and useful Electrical Furnace for Obtaining Metals and Their Alloys, of which the following is a specification.

The present invention has relation to a double electric furnace intended for metallurgic purposes and in which the upper furnace is formed and operates as a stack-furnace for the manufacture of metal, while the lower furnace serves for refining or alloying metals, the upper furnace being characterized by the continuity of its operation and the possibility of the utilization of great power and great capacity, which makes of it a practical industrial apparatus for preparation of metal.

In the accompanying drawings, Figure 1 is a vertical section of the furnace, and Fig. 2 is a horizontal section.

The upper furnace comprises four vertical electrodes A B C D, disposed upon the four corners of a square, their lower extremities being placed in a refractory vessel E, constituting the fusion-chamber. The column F for charging may serve at the same time for a chimney with return-flue and is of an exterior diameter such that it may be located between the upper extremities of the electrodes A B C D, which emerge above the roof of the chamber of fusion, passing through openings in which they may slide vertically. The tap-hole of the upper furnace discharges the treated metal through suitable conduits upon the base of the lower furnace.

Each of the electrodes A B C D is supplied with an operating mechanism which permits its vertical regulation. The operating mechanisms are placed above a platform located at the upper part of the upper furnace, and each of them comprises an operating-windlass, such as H, and of which the chain passes over pulleys J, fixed to the platform, and around a pulley fixed to the corresponding electrode for attachment to a fixed point.

The electrodes A and B are connected in parallel with one electric pole and the two

other electrodes, C and D, with the other pole, so that the electric current divides itself in two parallel currents which arrive simultaneously and respectively at the electrodes A and B, traversing the material located upon the hearth, metal, mineral, and slag in fusion and rejoin the source of energy in passing, respectively, through the electrodes C and D. In this manner an arc springs in four points from the chamber of fusion—that is to say, to the two entrances of the current in the material being treated, when it simultaneously quits the electrodes A and B, and at its two exits from the said material for simultaneously rejoining the two electrodes C and D. Four distinct hearths are thus produced in the fusion-chamber, the two hearths of the electrodes A and C being in tension and the two other hearths of the electrodes B and D being equally in tension. With this disposition of the electrodes the operation of the furnace is made continuous. In fact, one of the four electrodes may be easily replaced during the operation without stopping the apparatus. During this replacement the total current passes then by the two electrodes, which remain in tension A and C or B and D. The readings made at four ampere-meters, such as K, arranged in the circuits connecting the electrodes, permit equalization of the intensity of the current in the four hearths. The readings made at two voltmeters, such as L, permit regulation of the tension between the electrodes A and C and between those at B and D. The lower extremities of the electrodes A B C D leave between them a free space intended to receive the materials to be treated which have been introduced through the upper part of the charging-column of the furnace. These materials at their lower part are thus heated throughout their area in a manner practically equal. A considerable mass may be cast because of the presence of four hearths in one single chamber.

It is quite evident that the electrodes may be arranged at the four corners of a rectangle and also may be in any other number which is a multiple of two.

The lower furnace serves exclusively for refining or for treating or doctoring. With-

out going into details here, any suitable electric furnace might be employed for refining as may be convenient; but that which defines the peculiarity of this furnace in the present
5 invention is the exclusive use of its capacity as a receptacle for metal prepared in a continuous manner in the upper furnace. The metal thus separated may be retained in the lower furnace the time necessary for it to be
10 examined and treated as may be convenient, having in view the modifications to be made in order to obtain the composition sought.

The complete operation of this double furnace constitutes a novel process in electric
15 metallurgy.

Having now fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

In a double electric and continuously-operating metallurgic furnace in which the upper
20 furnace, formed as a stack-furnace, is designed for the reduction of metal and in which the lower furnace of the ordinary kind, pierced at its upper part by a conduit located below

and in the prolongation of the charging-column of the upper furnace is designed for refining, purifying or alloying metals, a chamber of fusion of the upper furnace with a charging-column located at the central part of its roof, openings pierced around the charging-column in the roof of the chamber of fusion of the upper furnace, and vertical electrodes in two parallel series, passed through the openings in the roof of the chamber of fusion, the lower extremities of these electrodes being situated in the interior of the chamber of fusion and their upper extremities, exterior to the said chamber of fusion, being carried each by a suspension mechanism by the aid of which they are capable of
35 being vertically displaced and removed. 40

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

CHARLES ALBERT KELLER.

Witnesses:

F. MORELINK,
H. LELENT.