M. RUTHENBURG.

ELECTRIC FURNACE.

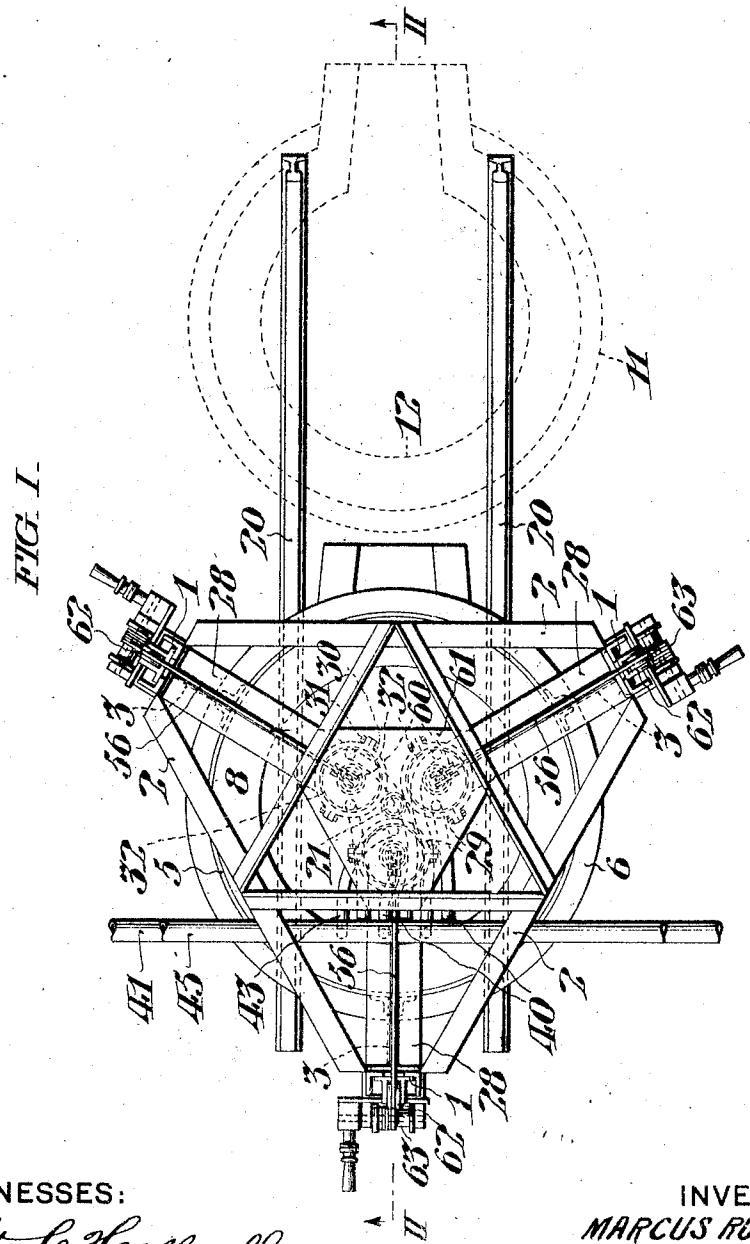
APPLICATION FILED JUNE 2, 1909.

1,018,727.

Patented Feb. 27, 1912.

2 SHEETS—SHEET 1.

FIG. 1.



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2 SHEETS—SHEET 2.

FIG. II.

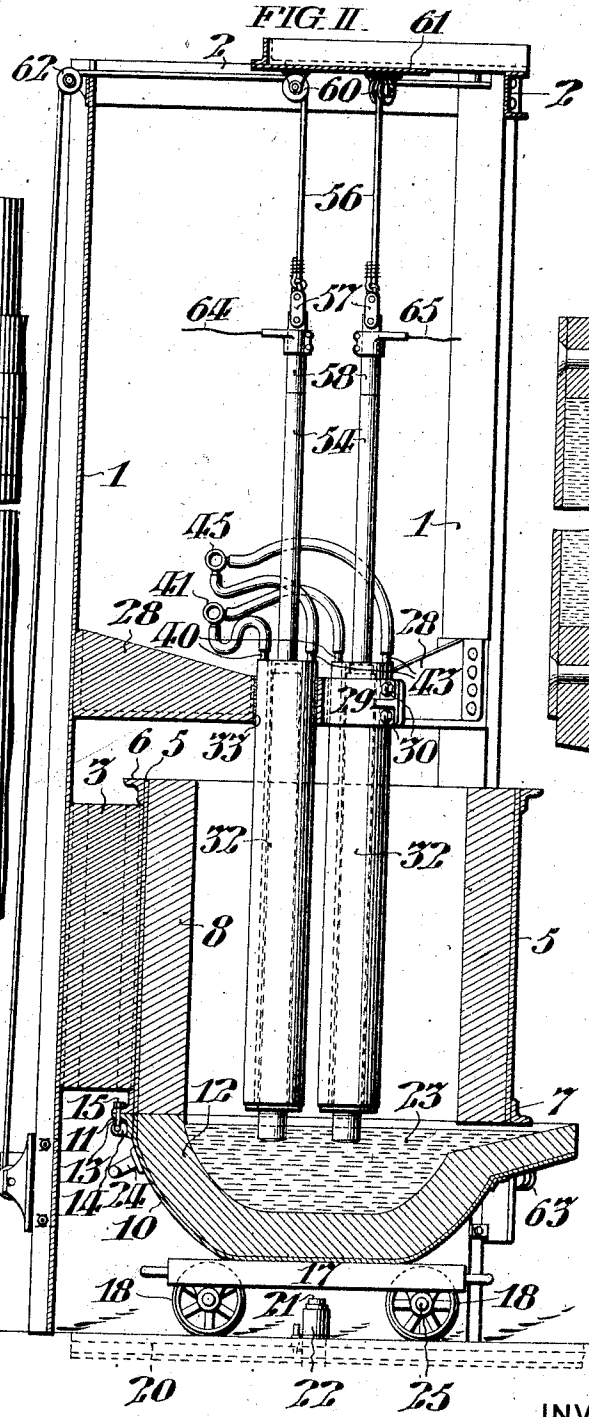


FIG. III.

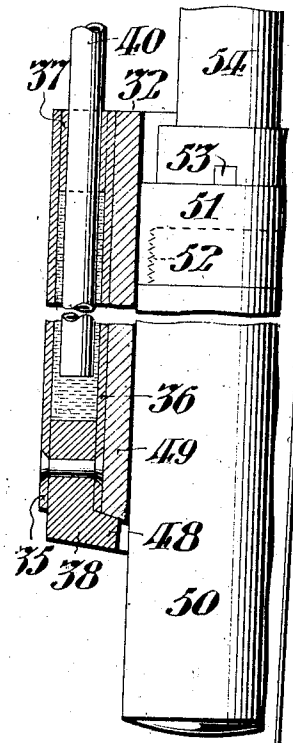
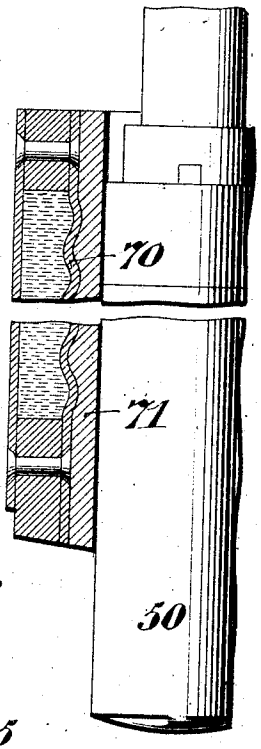


FIG. IV.



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UNITED STATES PATENT OFFICE.

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ELECTRIC FURNACE.

1,018,727. Specification of Letters Patent. Patented Feb. 27, 1912.

Application filed June 2, 1909. Serial No. 499,711.

To all whom it may concern:

Be it known that I, MARCUS RUTHENBURG, of London, England, have invented a certain new and useful Improvement in Electric Furnaces, whereof the following is a specification, reference being had to the accompanying drawings.

My improvement may be advantageously employed in a furnace comprising a stationary casing having a removable hearth arranged to form a floor in said casing, and comprising a receptacle in which molten material may be received and transported from said furnace.

My improvement relates particularly to the arrangement of the electrodes which are vertically adjustable in said furnace casing with respect to said removable hearth.

I found that the carbon electrodes which I employed without any protecting means in furnaces of the type above contemplated were burned away by the action of the hot gases rising from the arcs at the lower ends of the electrodes, and consequently, it was necessary to renew the electrodes much more frequently than would be the case if the combustion were confined to the ends of the electrodes at the arcs. Therefore, I provided such electrodes with water jackets, but found such an arrangement objectionable because the electrodes frequently break and arcs are formed between the broken portions of the electrodes which burn the jackets and allow the liquid refrigerant therein to enter the furnace. Therefore, as hereinafter described, I provide the electrodes not only with water jackets but provide the latter with a lining of insulating and preferably refractory material extending between the jackets and the electrodes. Such a lining may be conveniently made of fire clay or of a mixture of fire clay and asbestos, means being provided to retain the lining in stationary position with respect to the water jacket, permitting the electrodes to be vertically adjusted through the latter.

My invention comprises the various novel features of construction and arrangement hereinafter more definitely specified and claimed.

In the drawings, Figure I, is a plan view of a furnace conveniently embodying my invention. Fig. II, is a vertical sectional view of said furnace taken on the line II, II in Fig. I. Fig. III, is a fragmentary view partly in vertical section showing the construction and arrangement of one of the jackets indicated in Fig. II. Fig. IV is a fragmentary view similar to Fig. III, but showing a modified form of jacket.

Referring to Fig. I, three vertical columns 1, conveniently formed of channel iron or steel, connected at their tops by girders 2, have respective brackets 3, rigidly connected with and suspending the cylindrical furnace casing including the outer metallic shell 5, having angle flanges 6 and 7, respectively at the top and bottom thereof, and a lining of refractory material 8. The floor of said casing is formed by the removable hearth comprising the outer metallic shell 10, having the angle flange 11, at its upper edge and refractory lining 12. A series of swing bolts 13, are pivoted in brackets 14, extending from said flange 11, and, being fitted in corresponding notches in said flanges 11 and 7, are provided with nuts 15, resting upon said flange 7, to normally hold said hearth in the position shown in Fig. II. However, said hearth is provided with a truck frame 17, and four supporting wheels 18, which register with tracks 20, so that said hearth may be raised and lowered, conveniently by the vertical plunger 21, in the stationary casing 22, and may be progressed to and from said furnace to receive and discharge from the latter the molten material 23, produced by the operation of the furnace. Said hearth is conveniently provided with a clevis 24, by which it may be tilted upon the axle 25, of the front wheels 18, when the latter are stopped by the abutments 27, formed by the upturned ends of the tracks 20. Said columns 1, are respectively provided with the brackets 28, having caps 29, adjustably and detachably connected therewith by bolts 30, and nuts 31, whereby the respective water jackets 32, may be rigidly secured in any desired position of vertical adjustment with respect to the furnace casing, although insulated from the latter by the linings 33 of said brackets.

As shown in Fig. III, each water jacket 32, includes respectively outer and inner metallic walls 35 and 36, connected by respectively upper and lower rings 37 and 38, to which they are conveniently riveted, and water is introduced to the space between said walls 35, and 36, through a pipe 40, extending to the lower portion of said space.

and in communication with the cold water supply main 41. The heated water is discharged from said jackets through the pipes 43, leading to the discharge main 45.

As shown in Fig. III, the lower ring 38, of the jacket 32, is provided with the flange 48, which serves to retain the lining of insulating and preferably refractory material 49, which covers the inner wall 36, of the jacket 32, and insulates the latter from the cylindrical electrode 50. Said electrodes 50 are preferably formed of carbon fitted in metallic holders 51, with which they are rigidly but detachably connected by any convenient means; for instance, by screw threads 52. Said holders 51, are rigidly but detachably connected, conveniently by the cotters 53, with the stems 54, by which said electrodes 50, may be lowered through the jackets 32, until consumed as far as practicable. Said electrodes 50, are conveniently raised and lowered by the respective flexible connectors 56, which are attached to the pivoted insulating links 57, at the upper ends of said stems 54. Said connectors 56, extend over sheaves 60, suspended from the cross frame 61, supported by said girders 2, and the sheaves 62, at the tops of the respective columns 1, and are operatively connected to the respective winches 63, attached to the respective columns. It is to be understood that the arrangement above described is such that said electrodes 50, may be vertically adjusted independently of each other by manipulation of the respective winches 63, to which they are operatively connected as above described. Said electrodes 50, are operatively connected with a generator by leads 64 and 65.

Although I find that the flange 48, shown in Fig. III, affords an efficient support for the insulating lining 49, without any other connecting or attaching means, it is to be understood that I do not desire to limit myself to such construction, as the lining may be connected with the water jacket in any convenient manner, or by any means permitting the necessary vertical adjustment of the electrode with respect to the lining. For instance, as shown in Fig. IV, the inner wall 70, of the water jacket may be recessed or ridged to engage the insulating lining 71, and retain the latter without any metallic flange at the lower end thereof.

I do not desire to limit myself to the precise details of construction and arrangement above described, as various modifications may be made therein without departing from the essential features of my invention as defined in the appended claims.

I claim:—

1. In a furnace, the combination with three vertical columns; of means connecting said columns in rigid relation; a cylindrical casing; brackets connecting the respective columns with said casing supporting the latter with a space beneath it; a removable hearth forming a floor in said casing; means at the junction of said casing and hearth arranged to adjustably retain the latter and comprising swing bolts pivotally connected with said hearth; means arranged to raise and lower said hearth, comprising a vertical reciprocatory plunger; brackets extending from the respective columns overhanging said casing and provided with means adjustable to fit water jackets; water jackets adjustably fitted in connection with the respective overhanging brackets and including linings fitted in the respective water jackets; electrodes fitted to reciprocate through said linings and water jackets; means arranged to support said electrodes independently of said water jackets, comprising flexible connectors; means arranged to raise and lower said electrodes including rotary drums in operative relation with said connectors; and, means arranged to support said drums upon the respective columns.

2. In a furnace, the combination with a stationary casing; of a cylindrical water jacket depending within said casing; means supporting said water jacket in adjustable relation with said casing; an insulating lining fitted in said water jacket; and, an electrode arranged to reciprocate through said lining within said casing.

3. In an electric furnace, the combination with a stationary casing; of a vertical tubular water jacket depending within said casing; means arranged to support said jacket in rigid relation with said casing; an insulating lining in said water jacket; an electrode arranged to reciprocate through said lining within said casing; and, means arranged to reciprocate said electrode.

4. In an electric furnace, the combination with a stationary casing; of a water jacket; means supporting said jacket in rigid relation with said casing; a solid tubular insulating lining in said water jacket; an electrode extending through said lining in reciprocatory relation therewith; and, means whereby said electrode may be reciprocated through said lining without moving the latter.

5. In an electric furnace, the combination with a stationary casing; of a tubular water jacket, having its inner wall ridged to engage an insulating lining; a tubular insulating lining engaged with the ridged wall of said jacket; and, an electrode fitted in said lining in longitudinally adjustable relation therewith.

6. In an electric furnace, the combination with a casing; of a water jacket having a projecting member arranged to engage an insulating lining; a solid tubular insulating lining fitted in said water jacket and re-

tained by said projecting members; and, an electrode fitted in said lining.

7. In a furnace, the combination with a stationary casing; of a water jacket depending within said casing; means supporting said water jacket in adjustable relation with said casing; an insulating lining fitted in said water jacket; and, an electrode arranged to reciprocate through said lining within said casing.

8. In a furnace, the combination with a casing; of means supporting said casing with a space beneath it; a removable hearth forming a floor in said casing; a water jacket depending within said casing; means supporting said water jacket in adjustable relation with said casing; an insulating lining fitted in said water jacket; and, an electrode arranged to reciprocate through said lining within said casing.

9. In a furnace, the combination with a casing; of means supporting said casing with a space beneath it; a removable hearth forming a floor in said casing; a water jacket depending within said casing; means supporting said water jacket in adjustable relation with said casing; and, an electrode arranged to reciprocate through said jacket within said casing.

In testimony whereof, I have hereunto signed my name at London, England, this 12 of May 1909.

MARCUS RUTHENBURG.

Witnesses:

HERBERT D. JAMESON,

F. L. RAND.