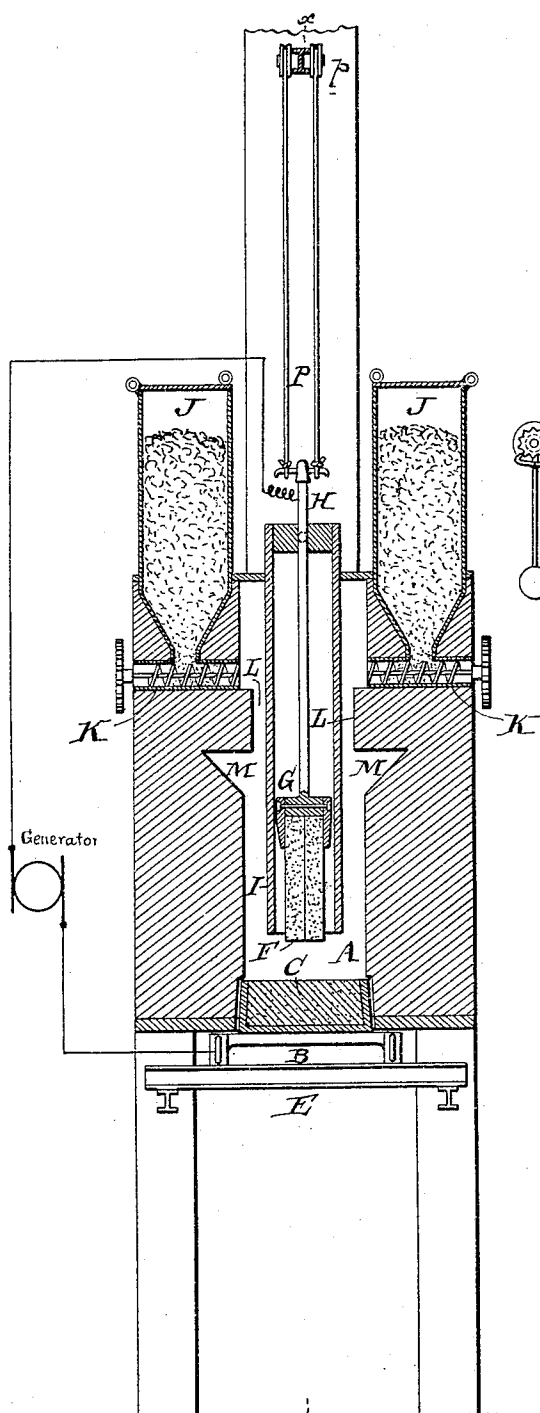


(No Model.)

J. A. VINCENT & J. E. HEWES.
ELECTRIC SMELTING FURNACE.

No. 552,341.

Patented Dec. 31, 1895.



WITNESSES:

Henry Drury
Am. L. Hewes

FIG. 2

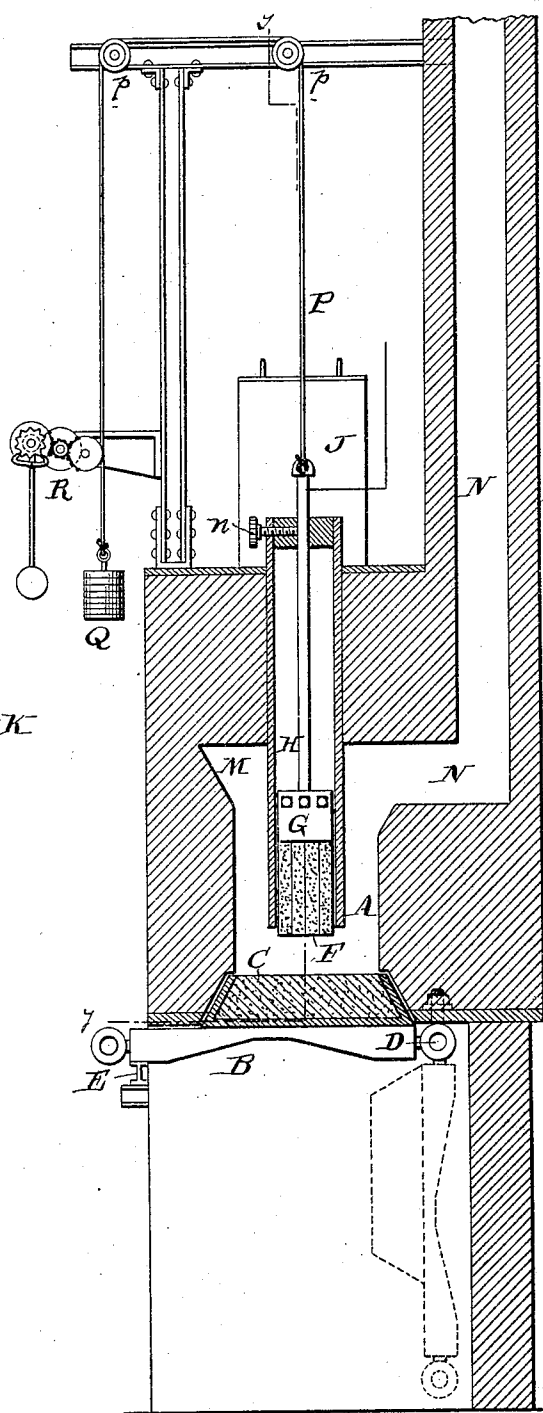


FIG. 1

INVENTORS

Jos. A. Vincent and
James E. Hewes
By their atty. *Am. L. Hewes*

UNITED STATES PATENT OFFICE.

JOSEPH A. VINCENT AND JAMES E. HEWES, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC SMELTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 552,341, dated December 31, 1895.

Application filed July 18, 1895. Serial No. 556,317. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH A. VINCENT and JAMES E. HEWES, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Electric Smelting-Furnaces, of which the following is a specification.

Our invention has reference to electric smelting-furnaces; and it consists of certain improvements, all of which are fully set forth in the following specification, and shown in the accompanying drawings.

The object of our invention is to provide a construction of electric smelting-furnaces which shall permit a rapid production of smelted product and a quick discharge of same when completed.

In carrying out our invention we provide a vertical furnace-hearth having at the bottom a removable electrode of one polarity, which substantially closes the entire bottom of the hearth, and combine therewith a vertically-adjustable electrode of the opposite polarity movable through the upper part of the furnace and preferably extended through a tube or shield of refractory material. We also provide the furnace with one or more hoppers for containing the materials to be smelted in a pulverized condition, each of which hoppers is provided with suitable feeding devices for positively delivering the said material from the hoppers into the furnace-hearth, where it is brought to a position in the zone of the arc created between the two electrodes, which insures its being quickly melted. As the product increases in bulk the upper electrode and its shield is gradually raised, and the rise is commensurate with the rate of production of the smelted product and the slight consumption of the carbon of the electrode.

We prefer to feed the electrodes relatively to each other to compensate for the above movements automatically by mechanical means, or any automatic devices which act in accordance with the requirements. We also prefer to provide the furnace with a chimney or escape-flue for carrying off the gases or vapors. These various features of construction will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation of our im-

proved furnace, taken on line *x x* of Fig. 2; and Fig. 2 is a sectional elevation of same on line *y y* of Fig. 1.

A is the hearth of the furnace.

B is a metal door hinged at D and adapted to support the electrode of one polarity C which closes the bottom of the hearth.

It is to be understood that our invention contemplates the rapid discharge of the smelted ingot by a relative movement of the bottom and walls of the hearth. It is evident that such relative movement may be secured in various ways, that shown being the preferred form.

E is a cross supporting-bar which sustains the door B when raised.

F is the upper or movable electrode of the opposite polarity. It is carried by a clamp G on the bottom of a rod H and is raised and lowered by a rope, chain or cable P passing about pulleys *p* and counterweighted at Q. This electrode F extends through a refractory tube I of terra-cotta or fire-clay, which is adjustably secured to the rod H of the electrode by a clamp *n*, or otherwise attached to the said electrode F so as to move with it. The tube I moves vertically through the furnace and fits its walls at the top sufficiently close to prevent free entrance of air.

J J are hoppers adapted to contain the materials to be smelted, in a finely-powdered condition, and are provided with feeding-screws K K for forcing the said materials into the top of the hearth and through the flues or passage-ways L down to the lower part of the hearth and into the vicinity of the active surfaces of the electrodes, to the end that it shall reach the zone of fusion of the arc and be quickly smelted. As the smelted material accumulates upon the bottom electrode C, the upper electrode and its shield or tube I are caused to rise so as to maintain the arc, and the upward movement of the said electrode substantially equals the height of the smelted material produced. This upward feeding of the electrode F may be accomplished by hand, or automatically if so desired.

In the drawings we show one form of automatic regulator for feeding the electrode F, and this consists of an escapement R moved

by the counterweight Q, and regulated by the swinging of a pendulum. By adjusting the length of the pendulum the rapidity of feeding desired may be secured to a nicety.

5 We do not confine ourselves to this form of automatic feed, as any automatic feeding device may be employed in lieu of that described.

10 Near the upper part of the hearth of the furnace and immediately below the passageways L is an enlargement M of the hearth which receives the gases and vapors and delivers them to the chimney N.

This furnace is adapted to the smelting of 15 all kinds of substances and is especially useful in the manufacture of calcium carbide. In using it for this purpose the mixture of lime and carbon is fed from the hoppers J into the hearth and subjected to the action 20 of the arc. As the carbide is formed the electrode F is raised, and when an ingot of sufficient height is secured the current is cut off and the door B dropped, permitting the ingot to move down out of the hearth. The 25 hearth is then again closed and the operation is repeated. The current fed to the electrodes C F may be continuous or alternating, as desired.

30 We do not confine ourselves to the mere details of construction, as they may be modified without departing from the spirit of our invention.

What we claim as new, and desire to secure by Letters Patent, is—

35 1. In an electric smelting furnace, the combination of the hearth, with a removable bottom constituting one of the electrodes, an adjustable electrode arranged above the bottom and movable vertically, and feeding devices 40 at the upper part of the hearth or furnace for delivering the materials to be smelted into the hearth.

2. In an electric smelting furnace, the combination of the hearth, with a removable bottom constituting one of the electrodes, an adjustable electrode arranged above the bottom and movable vertically, means to automatically regulate the adjustment of the adjustable electrode to compensate for the rise of 50 the level of the smelted product, and feeding devices at the upper part of the hearth or furnace for delivering the materials to be smelted into the hearth.

3. In an electric smelting furnace, the combination of the hearth, with a removable bottom constituting one of the electrodes, an adjustable electrode arranged above the bottom and movable vertically, and feeding devices 60 at the upper part of the hearth or furnace for delivering the materials to be smelted into the hearth, and a chimney or escape flue opening from the hearth intermediate of the electrodes and feeding devices.

4. In an electric furnace, the combination 65 of a hearth consisting of a vertical tube, a removable bottom thereto, an electrode arranged at the base or lower part of the hearth,

and removable with the removable bottom, and an upper electrode supported within the hearth at a distance above the first mentioned 70 electrode.

5. In an electric smelting furnace, the combination of a hearth open at top and bottom, an electrode to close the bottom of the hearth, an electrode projecting downward from the 75 top of the hearth, means to regulate the distance apart of the two electrodes, and means to secure a relative movement between the hearth and electrodes for permitting the ready discharge of the smelted ingot. 80

6. In an electric smelting furnace, the combination of a hearth open at top and bottom, an electrode to close the bottom of the hearth, an electrode projecting downward from the 85 top of the hearth, an inclosing nonconductive shield surrounding the sides of the upper electrode, means to regulate the distance apart of the two electrodes, and means to secure a relative movement between the hearth and electrodes relatively movable for permit- 90 ting the ready discharge of the smelted ingot.

7. In an electric furnace, the combination of the hearth A, the movable bottom B having the electrode C closing the bottom of the hearth, the vertically adjustable electrode F, 95 the inclosing shield I surrounding the electrode F, a flue L between the shield and wall of the hearth, and feeding devices for feeding the materials to be smelted into said flue L.

8. In an electric furnace, the combination of 100 the hearth A having a gas flue opening from its side walls, the movable bottom B having the electrode C closing the bottom of the hearth, the vertically adjustable electrode F, the inclosing shield I surrounding the electrode F, a flue L between the shield and wall 105 of the hearth and above the gas flue, and feeding devices for feeding the materials to be smelted into said flue L.

9. In an electric smelting furnace, the combination of an upright hearth formed of an upper rigid portion and a lower removable 110 portion, an upper electrode of substantially the sectional area of the hearth extending downwardly, a lower electrode also of substantially the sectional area of the hearth present- 115 ing an upwardly extended active surface opposed to the bottom surface of the upper electrode and removable with the lower portion of the hearth, and feeding devices for posi- 120 tively forcing the material to be smelted between the active faces of the two electrodes.

10. In an electric smelting furnace, the combination of an upright hearth formed of an upper rigid portion and a lower removable 125 portion, an upper electrode of substantially the sectional area of the hearth extending downwardly, a lower electrode also of substantially the sectional area of the hearth present- 130 ing an upwardly extended active surface opposed to the bottom surface of the upper electrode and removable with the lower portion of the hearth, automatic means for feeding the upper electrode toward the lower electrode to

compensate for the consumption thereof, and feeding devices for positively forcing the material to be smelted between the active faces of the two electrodes.

5 11. In an electric smelting furnace, the combination of an upright hearth formed of an upper rigid portion and a lower removable portion, an upper electrode of substantially the sectional area of the hearth extending
10 downwardly, a shield of non-conducting material surrounding the body of the upper electrode whereby its lower end alone is exposed to the material to be smelted, a lower electrode also of substantially the sectional area of the

hearth presenting an upwardly extended active surface opposed to the bottom surface of the upper electrode and removable with the lower portion of the hearth, and feeding devices for positively forcing the material to be smelted between the active faces of the two
15 electrodes. 20

In testimony of which invention we hereunto set our hands.

J. A. VINCENT.

JAMES E. HEWES.

Witnesses:

ERNEST HOWARD HUNTER,

R. M. HUNTER.