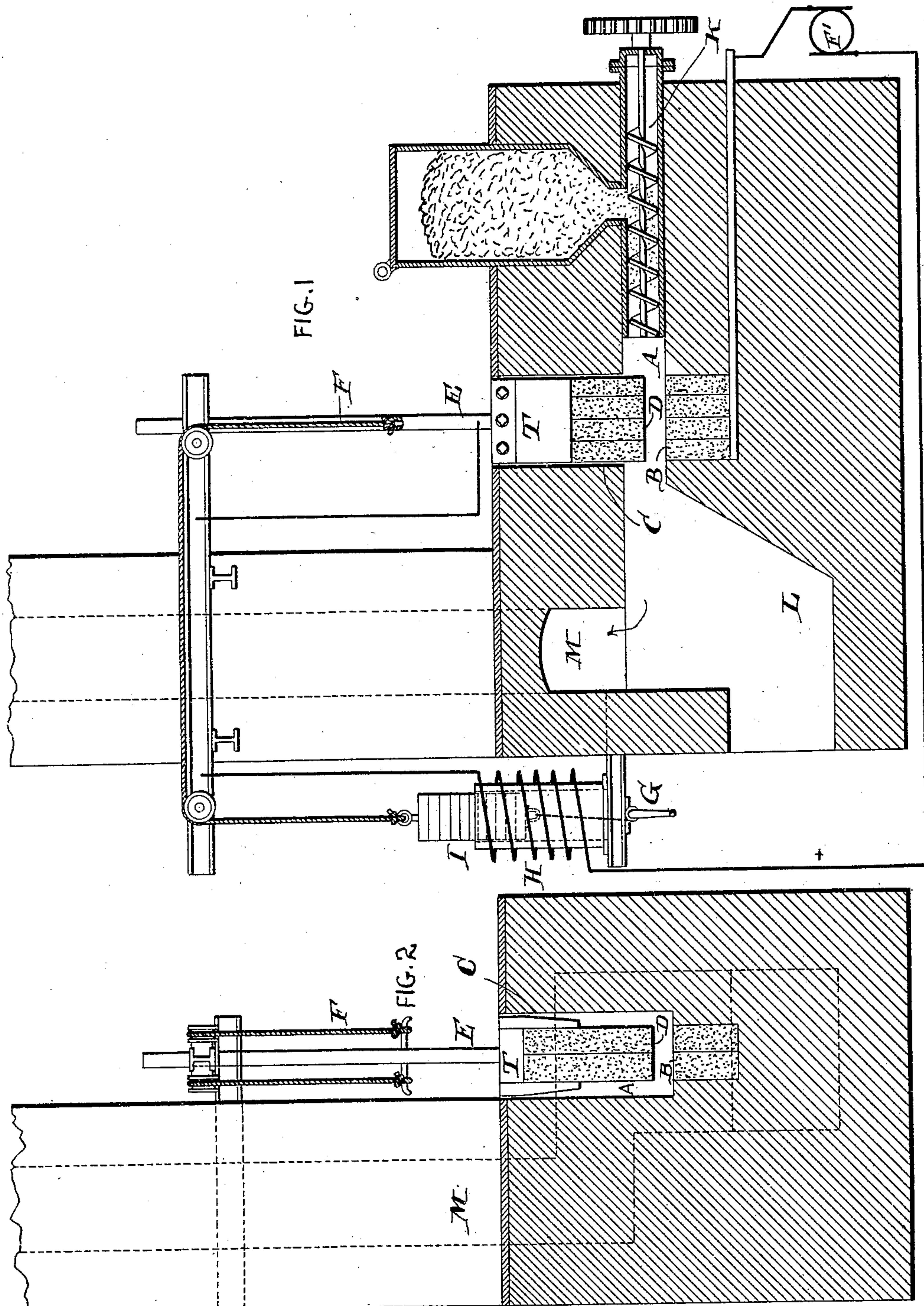


(No Model.)

J. A. VINCENT.  
ELECTRIC SMELTING FURNACE.

No. 551,014.

Patented Dec. 10, 1895.



WITNESSES:

Henry Dunning  
Thos. L. Beane

INVENTOR:

Jos. A. Vincent  
By his atty *[Signature]*



# UNITED STATES PATENT OFFICE.

JOSEPH A. VINCENT, OF PHILADELPHIA, PENNSYLVANIA.

## ELECTRIC SMELTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 551,014, dated December 10, 1895.

Application filed July 18, 1895. Serial No. 556,316. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH A. VINCENT, 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.

My 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.

My invention comprehends certain improvements in electric smelting-furnaces, and more particularly consists in providing two electrodes with a channel-way between them, through which the materials or ores to be treated are fed, to the end that the operation may be a continuous one. The electrodes may be fed, relatively toward each other to compensate for consumption thereof, and the feeding may be accomplished by automatic means, such as an electrical or mechanical regulator. The channel-way is preferably horizontal, and the ores or materials to be smelted are fed into one end under the action of a screw or other suitable feeding device and the smelted product discharged into a pit at the other end. The use of a horizontal channel-way supports the materials to be smelted and prevents them moving, except under the action of a positive force. Hence in using the words "horizontal" or "substantially horizontal" I have used them to designate such a position to the channel-way as will not cause the materials to move under the action of gravity.

In carrying out my process I propose to cause the movement of the materials to be smelted between the electrodes to be a positive and regular movement mechanically produced.

These improvements will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a sectional side elevation of an electric smelting-furnace embodying my invention, taken on line *xx* of Fig. 2; and Fig. 2 is a transverse section of same on line *yy* of Fig. 1.

A is a horizontal channel-way having a bed or bottom B of carbon, which is stationary and acts as one of the electrodes.

C is a vertical or transverse opening extending into the channel-way, and in this is arranged the other or positive electrode D, it consisting of rectangular or suitably-shaped carbon-blocks held in a metal clamp T, which is raised and lowered by a rod E, chains or ropes F, and windlass G. As the carbon D is consumed, the electrode is bodily lowered, so as to approximately keep the two electrodes at the same or uniform distance apart to maintain an arc consuming substantially a constant current and voltage.

As it is more desirable to make the feeding of the movable or positive electrode automatic, I may accomplish it by providing a helix or solenoid H in series with the electrodes B and D, in which a magnetic core I moves. This core I is connected to the chains or ropes F and by them raises or lowers the electrode D in accordance with the requirements. When this electrode-regulator is used, the connection with the windlass G is only used in setting the electrode in position. It is desirable that the clamp T substantially close the vertical opening C, so that little or no air can enter to abnormally consume the carbon of the electrodes.

The ore or material to be treated is finely pulverized and placed in a hopper J, from which it is received by the feeding-screw K, which forces it into the channel-way between the electrodes. As the smelted product is formed, the incoming unsmelted material forces it into the pit L, where it is collected and kept in a hot atmosphere until ready to be removed. It is evident that any suitable kind of barrow or truck may be placed in the pit to receive the smelted product to reduce the labor of handling; but this is immaterial to my invention.

M is the stack for the escape of gases generated by the smelting operation or process and opens laterally from the channel-way at its discharge end, it being desirable to have the channel-way continuous and uniform in cross-section throughout its length, especially where it receives the electrodes B and D.

In place of an electric regulator for the electrode D any desirable mechanical regulator may be used.

My improved furnace is suitable for electrosmelting of all kinds, and is especially



adapted for the rapid and cheap production of calcium carbide. In carrying out the process for producing said carbide I mix together lime and carbon in a state of fine subdivision and place it in the hopper J, from which it is continuously fed by the feeding-screw into the zone of the arc between the electrodes B and D. This carbide thus formed is pushed through the channel-way into the pit by the advancing mixture of lime and carbon. It will thus be seen that the process is a continuous one.

The current used between the electrodes B and D is preferably a continuous current of constant potential, but may be an alternating current, if so desired. The generator of electricity is indicated at F'.

I do not confine myself to the mere details of construction shown, as they may be varied without departing from the spirit of my invention.

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

1. In an electric furnace, the combination of a substantially horizontal channel way for supporting the material to be smelted, two electrodes of different polarity arranged transversely to said channel way, a positively acting feeding device arranged to force the material to be treated into the channel way at one end and between the electrodes, and a discharging pit arranged at the opposite end of the channel way and opening into it.

2. In an electric smelting furnace, the combination of a substantially horizontal channel way for supporting the material to be smelted, two electrodes arranged in said channel way, means to positively feed the electrodes relatively one to the other to compensate for the consumption thereof and maintain them as boundary walls of the channel way, a feeding device for positively forcing the materials to be smelted through the channel way and between the electrodes, a discharge opening from the channel way, and a chimney flue to carry off the products of combustion and vaporization.

3. In an electric smelting furnace, the combination of a substantially horizontal channel way for supporting the material to be smelted, two electrodes arranged in said channel way and constituting a part of the walls thereof, means to feed the electrodes relatively one to the other to compensate for con-

sumption thereof and maintain them as boundary walls of the channel way, a positively acting feeding device consisting of a screw for forcing the materials to be smelted through the channel way and positively between the electrodes, a hopper for containing said materials and delivering them to the feeding screw, a discharge opening from the channel way, and a chimney flue to carry off the products of combustion and vaporization from the discharge end of the channel way.

4. In an electric smelting furnace, the combination of a substantially horizontal channel way for supporting the material to be smelted, two electrodes arranged in said channel way and constituting a part of the walls thereof, means to feed the electrodes relatively one to the other to compensate for consumption thereof and maintain them as boundary walls of the channel way, a positively acting feeding device consisting of a screw for feeding the materials to be smelted through the channel way and between the electrodes, a hopper for containing said materials and delivering them to the feeding screw, a discharge opening from the channel way, a chimney flue to carry off the products of combustion and vaporization, and automatic electrically controlled devices for regulating the means for feeding the electrodes relatively one to the other.

5. An electric furnace for continuous smelting consisting of the combination of a substantially horizontal channel way for supporting the material to be smelted, with mechanical devices for positively feeding the materials to be smelted and smelted product through the channel way in a continuous or practically continuous manner, and two electrodes of different polarity having their active surfaces extended into the channel way and in the path of the moving material and constituting a part of the walls of the channel way, whereby the materials are required to pass slowly and regularly between the said electrodes during the maintenance of the arc independently of the action of gravity upon said materials.

In testimony of which invention I hereunto set my hand.

J. A. VINCENT.

Witnesses:

ERNEST HOWARD HUNTER,  
R. M. HUNTER.