(No Model.)

J. E. HEWES.

ELECTRIC FURNACE.

No. 598,318. Patented Feb. 1, 1898.

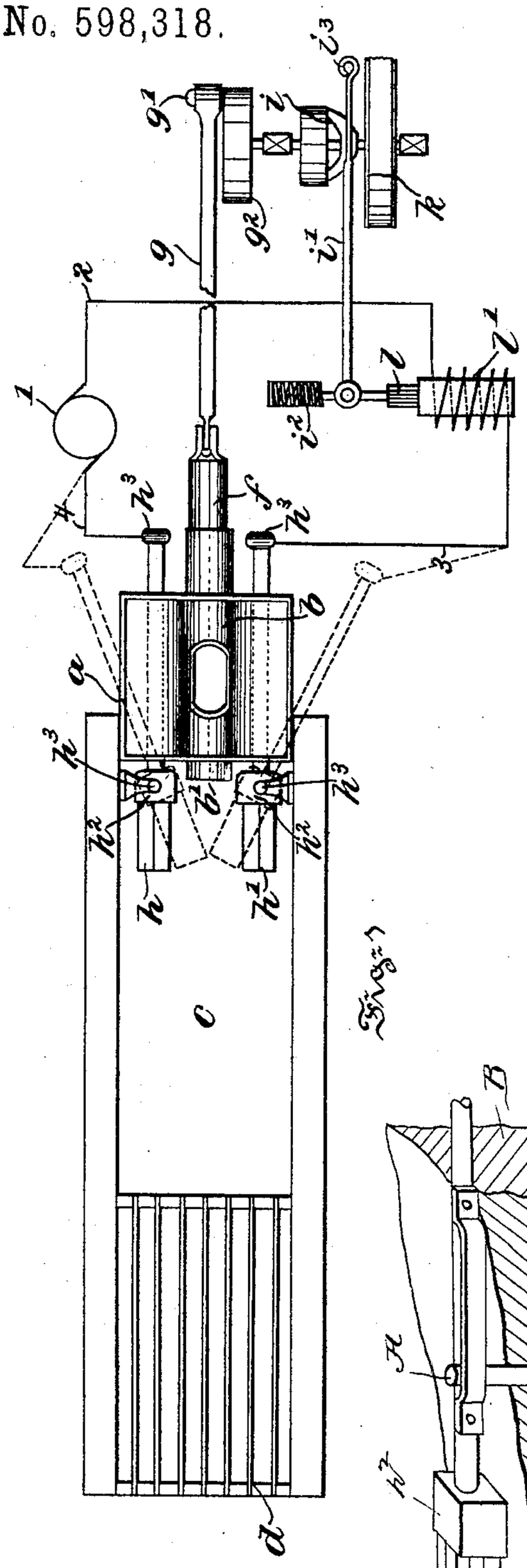

Fig. 1.

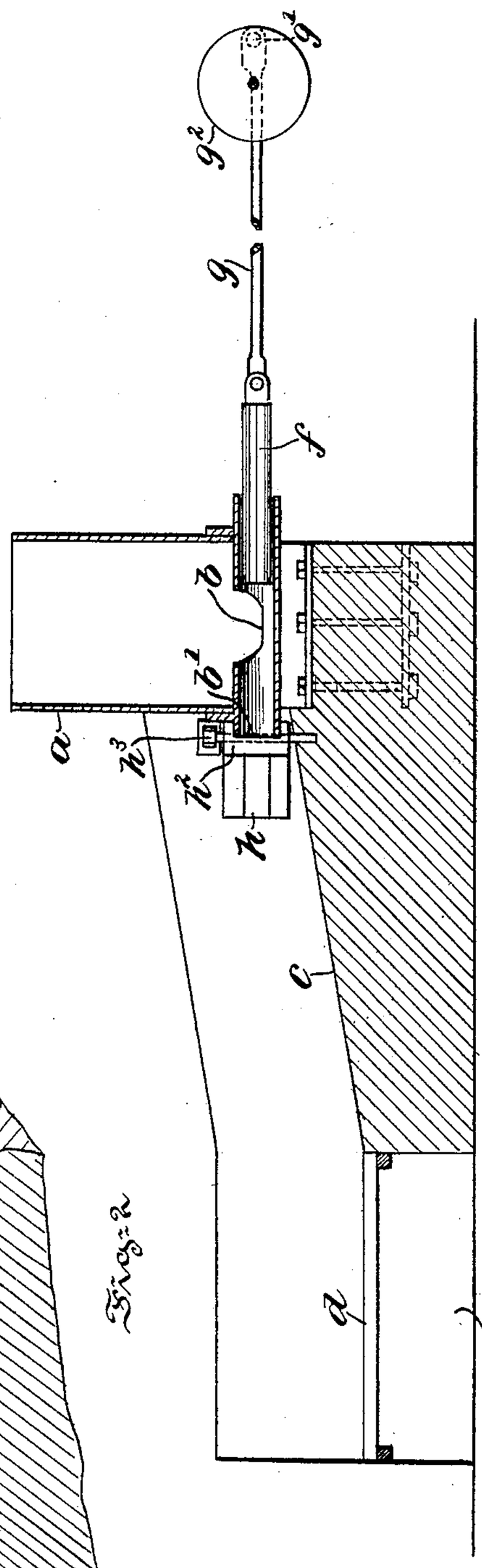

Fig. 2.

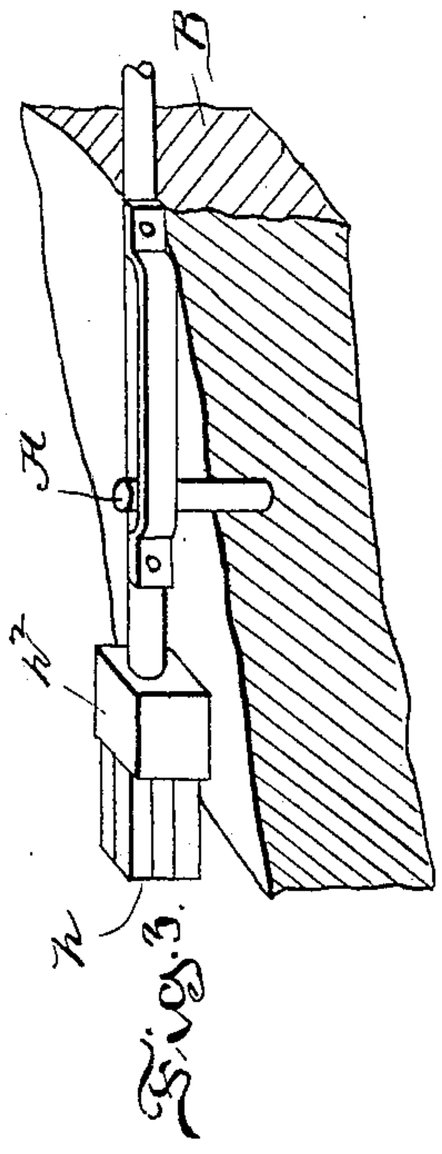

Fig. 3.

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JAMES ELLICOTT HEWES, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC FURNACE.

SPECIFICATION forming part of Letters Patent No. 598,318, dated February 1, 1898.

Application filed April 27, 1897. Serial No. 634,066. (No model.)

To all whom it may concern:

Be it known that I, JAMES ELLICOTT HEWES, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric Furnaces, of which the following is a specification.

The objects of my invention are to make the incandescent process of producing carbid of calcium continuous, to mechanically stoke the ingredients, and to automatically control or regulate the operation of the furnace.

To these ends my invention comprises the improvements hereinafter described and claimed.

The nature, characteristic features, and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a top or plan view of an electric furnace embodying features of my invention. Fig. 2 is a central sectional view of the same, parts being omitted for the sake of clearness; and Fig. 3 is a perspective view illustrating modified means that may be used in connection with my invention.

In the drawings, *a* is a hopper, of which the bottom opens into a chamber *b*, of which the inner end is open and communicates with the furnace proper. These parts may be made of cast and sheet iron. The latter is trough-shaped and is provided with an inclined floor *c*, which may be of fire-brick, protected near the pencils by carbon, and which terminates in a grate *d*, beneath which is a space or pit *e*. Within the chamber *b* is a reciprocating rammer *f*, which may be of cast-iron. As shown, this rammer *f* is connected to one end of a link *g*, the other end of which is connected to a wrist-pin *g'*, carried by a rotatable wheel g^2. Upon each side of the outlet *b'* of the chamber *b* are located electrodes or pencils *h* and *h'*, which may be of carbon. The holders h^2 of these electrodes are pivoted—as at h^3, for example—to suitable brackets or supports, as shown, and are thus mounted so as to be capable of being turned into the positions indicated by dotted lines, whereby the pencils or electrodes *h* and *h'* may be turned into proximity with each other and into positions parallel with the side walls of the furnace.

i is a friction-clutch, which serves to couple and uncouple a positively-driven pulley *k* to and from the wheel g^2.

i' is the operating-lever of the friction-clutch *i*, and its free end is connected with a spring i^2 and with the armature or core *l* of the solenoid or electromagnet *l'*. The lever *i'* is pivoted at i^3. The windings of the solenoid *l'* are arranged in series with the pencils *h h'*—that is to say, the path of the circuit is 1, 2, 1', 3, *h'*, *h*, and 4.

The mode of operation of the above-described apparatus is as follows: The insulated handles h^3 are turned so as to bring the electrodes or pencils *h h'* into proximity with each other, whereupon current is permitted to traverse the circuit, which is closed through material fed in, as will be presently described. The rammer *f* is caused to reciprocate backward and forward—for example, by means of the parts g^2 and *k*—and a mixture of powdered lime and carbon is fed into the hopper *a*, with the result that it falls into the chamber *b* and is intermittently fed out of the open end *b'* between the electrodes or pencils *h* and *h'*, which are turned into parallelism with each other and with the side walls of the furnace and are held fixed and immovable in such position. The strength of current employed is between fifteen hundred and two thousand amperes, and a voltage of substantially one hundred to one hundred and ten gives good results. The carbid formed is removed down the inclined floor *c*, upon which it cools, to the bars of the grate *d* on which it rests, while the unfused powdered material falls down out of the way into the pit *e*. From time to time fresh supplies of powdered material, as coke and lime, are placed in the hopper *a* and the finished carbid is removed from the grate *d*, the process itself being continuous. During the process if there is not sufficient carbid-producing material being fed between the terminals *h h'* the resistance between them will decrease and the current in the circuit will increase, with the result that the solenoid *l'* wlll overcome the power of the spring i^2, and will thus shift the lever *i'* and the rim of the friction-clutch *i*

into position for locking the parts k and g^2, so that the rammer will be operated. On the other hand, if too much material is being fed between the electrodes or pencils h h' then the resistance between them will rise by reason of the presence of such excess of material, and the current in the circuit will fall, thus causing the decreased attractive power of the solenoid or electromagnet l' to be overcome by the spring i^2, which draws the lever i' and rim of the clutch i into the position shown in the drawings for uncoupling the parts k and g^2, so that the rammer is not operated. During the operation the pencils h and h' lie parallel with the direction of motion of the material through the furnace, so that the motion of the material is not impeded and the corners or other parts of the pencils are not subjected to liability of breakage, as they would be if they were disposed transversely of the path of motion of the mixture.

The above-described furnace is adapted for the practice of the strictly incandescent process and not of the arc process of manufacture, and I have found that if an arc is maintained between the electrodes or pencils very little carbid is formed in comparison to what is formed when the mass passing the pencils is subjected to the action of incandescent heating.

Inasmuch as the described furnace is of the incandescent type it follows that both electrodes are completely embedded in material and protected thereby from the oxidizing influence of the air, so that their life is greatly prolonged. In this connection it may be remarked that material collects and is permitted to collect in the furnace for the purpose of covering the electrodes and also the finished product.

Instead of pivoting the pencil-holders as shown, pins A, projecting up from the walls B of the furnace, may be provided and used as fulcra for the pencil-holders, which may be advanced to take up wear at the inner ends of the pencils.

It will be obvious to those skilled in the art to which my invention appertains that modifications may be made in details without departing from the spirit thereof. Hence I do not limit myself to the precise construction and arrangement of parts hereinabove set forth, and illustrated in the accompanying drawings; but,

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination an electric furnace having a floor, electrodes supported horizontally above said floor, circuit connections for the electrodes, a chamber at one end of the floor into which material is fed, and a horizontally-reciprocating rammer working between the electrodes and crosswise of the path of the current between them, substantially as described.

2. In an electric furnace the combination of a chamber into which material is fed, a reciprocating rammer for intermittently expelling the material from the chamber, pencils or electrodes disposed above the floor of the furnace and on opposite sides of the outlet of the chamber and having their sides arranged parallel to the line of movement of the rammer, and means for permitting the electrodes to be shifted, substantially as described.

3. In an electric furnace the combination of a chamber into which the material is fed, a reciprocating rammer for expelling material from said chamber, pencil-holders pivotally supported on each side of the outlet of said chamber, and circuit connections for said pencils, substantially as described.

4. In combination an electric furnace having at one end a grate and at its middle part an inclined floor, electrodes at the other end of the furnace above said floor, circuit connections for the electrodes, and a reciprocating rammer for feeding material between said electrodes, substantially as described.

5. In combination an electric furnace, electrodes and their circuit connections, a reciprocating rammer working between said electrodes and crosswise of the path of the current between them, and electrical devices responding to changes of current and controlling the movements of the rammer, substantially as described.

6. The combination in an electric furnace, of a chamber having discharge and inlet openings, electrodes on opposite sides of the discharge-opening, circuit connections, and a reciprocating rammer working between said electrodes and having a running fit in said chamber and adapted to open and close the inlet thereto whereby material is intermittently fed, substantially as described.

In testimony whereof I have hereunto signed my name.

JAMES ELLICOTT HEWES.

In presence of—
K. M. GILLIGAN,
W. J. JACKSON.