(No Model.) 2 Sheets—Sheet 1.

J. HILL.

CELLULAR FURNACE FOR BAKING CARBONS.

No. 359,866. Patented Mar. 22, 1887.

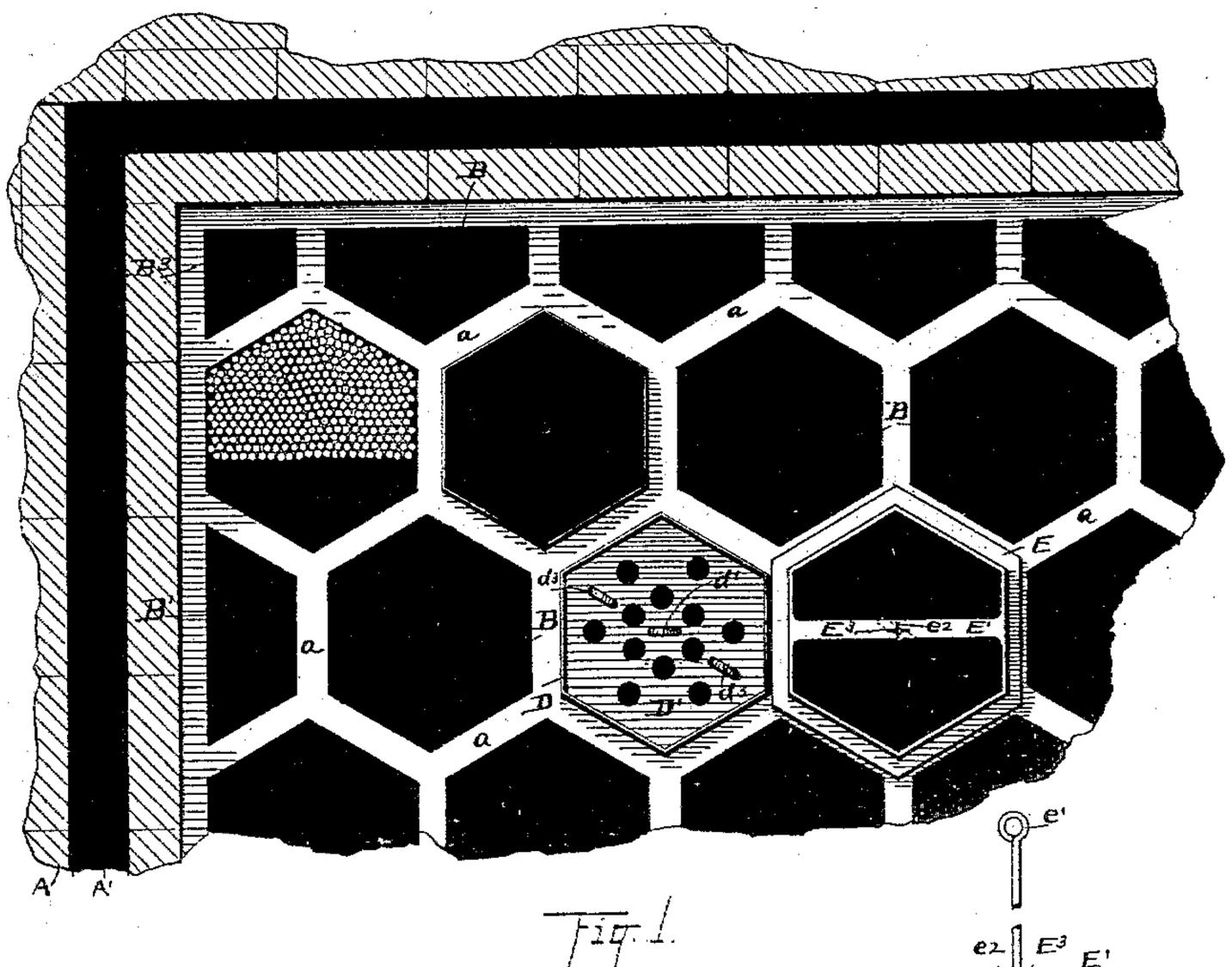

Fig. 1.

Fig. 2

WITNESSES

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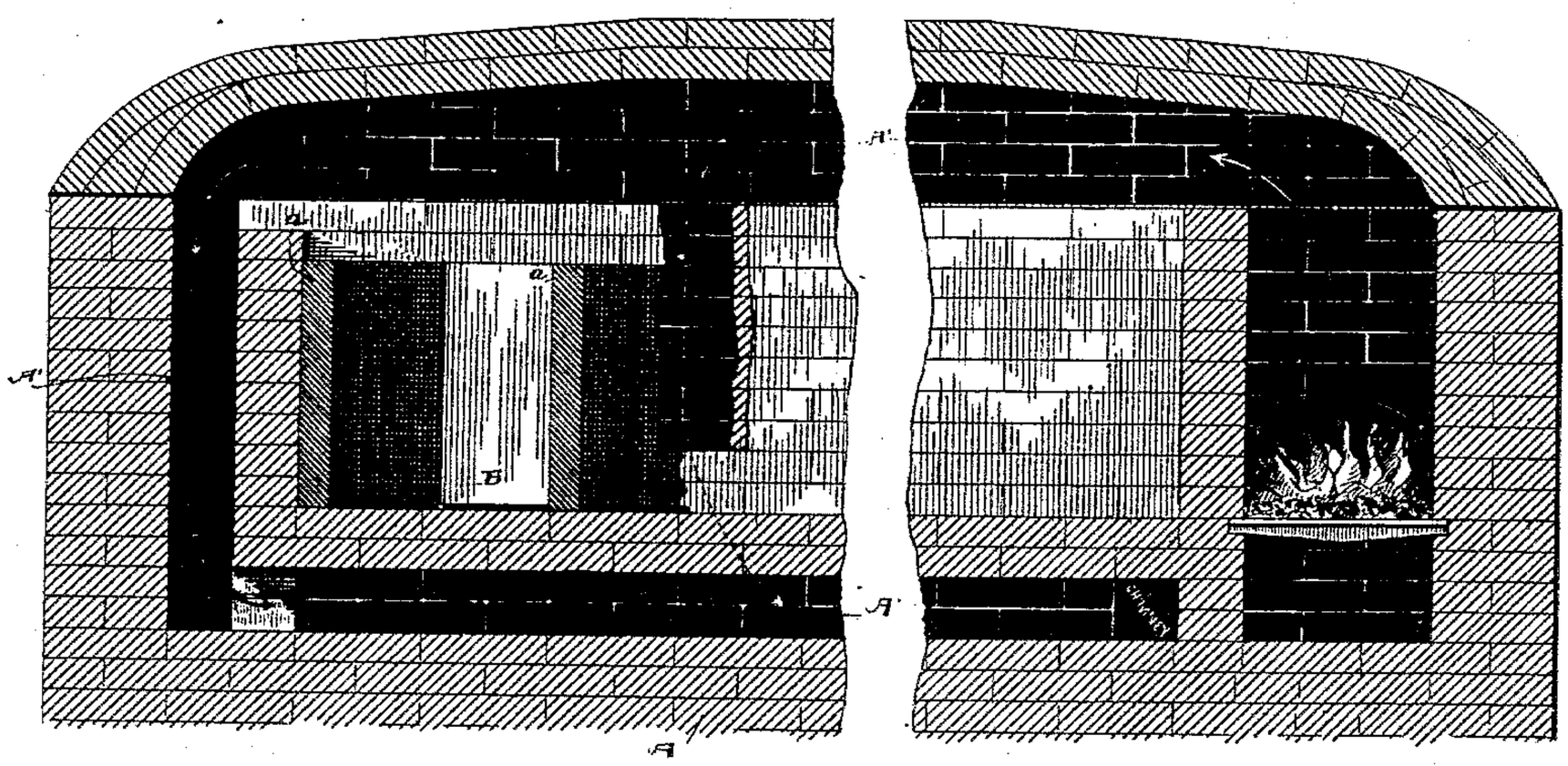

Fig. 3.

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UNITED STATES PATENT OFFICE.

JAMES HILL, OF CLEVELAND, OHIO.

CELLULAR FURNACE FOR BAKING CARBONS.

SPECIFICATION forming part of Letters Patent No. 359,866, dated March 22, 1887.

Application filed March 24, 1886. Serial No. 196,430. (No model.)

To all whom it may concern:

Be it known that I, JAMES HILL, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Carbon-Drying Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in carbon-drying furnaces and in mechanism for handling the carbons and placing them in the furnace; and it consists in certain features of construction, and in combination of parts hereinafter described, and pointed out in the claims.

Heretofore, of the various contrivances used for drying carbons in furnaces, more commonly metal boxes have been employed, in which the carbons were packed, after which the boxes and contents were set in a furnace for drying, or what would be more properly called "baking." Such boxes were expensive to make, and large numbers of them were required. The boxes were perishable, being soon injured and eventually rendered worthless by reason of the excessive heat to which they were exposed in the furnace. In place of these metal boxes, I have devised a lining for the furnace, and the latter being divided into cells in which the carbons are held during the drying or baking process. I have also devised suitable mechanism for packing the carbons and transferring them to the furnace-cells.

In the accompanying drawings, Figure 1 is a plan view of a portion of a furnace embodying my invention. Fig. 2 is an elevation in section, and Fig. 3 is a view in vertical section through the furnace.

A furnace of the reverberatory variety is usually employed for this work—such, for instance, as the furnace A, having hot-air spaces A'. The body or floor-space of the furnace, by means of the lining *a*, is divided into a series or system of cells, B, of uniform size, together with such other fractional cells B' B^2, &c., as may be necessary in filling out the floor-space. The cells in cross-section are preferably hexagonal, as shown in Fig. 1, although other forms—such as square, rectangular, &c.—might be used; but with the hexagonal form the division-walls are shorter between the angles, and therefore support each other better, and are consequently more durable, than with the other forms mentioned. The objection to circular cell is that there is lost space between the cells. These cells are constructed in the following manner: Formers of any suitable material, but usually of wood, in shape, respectively, to form the inside of the cell, are placed at suitable intervals on the floor of the furnace. These formers, for convenience, should in length correspond with the depth of the cells to be made. Suitable refractory material—such, for instance, as pulverized fire-brick—is mixed with some suitable binder—for instance, a small quantity of fire-clay—and the mass, after being properly tempered, is stamped into the interstices between the aforesaid forms, to form the division-walls or lining *a* of the cells. Such division-walls need not be made more than an inch or two in thickness, more or less, according to the size of the cells. I have found that cells about twelve inches in diameter, with division-walls about from an inch and a half to two inches thick, are preferable. This lining should have about the same thickness outside of the cells next the furnace-walls; or, if made somewhat thicker around the outside in order to fill out the space, the extra thickness will do no harm, and it would only require extra material. The formers are removed, after which the walls C had better be dried or baked before introducing the carbons, although, if great care is used, carbons may be placed in the cells, and the walls thereof, with the carbons, dried at one operation. The carbons, in handling them before they are baked and during the baking process, if they are not properly arranged and supported, are easily bent, and any material bending renders them worthless, except for old material to be reground and worked over.

For handling the carbons and placing them in the cells, I provide boxes D. The rim of the box is made of thin sheet metal, preferably of steel, and made to fit nicely but easily inside the cell. A perforated head, D', is permanently secured to the rim, and a removable head, D^2, is provided, the latter being usually

of cast-iron. The box, with the head D^2 removed, is laid on its side and the carbons are packed therein, the box being a trifle longer in size than the length of the carbons. A rod, *d*, with a handle, *d'*, and a screw-threaded end, d^2, is inserted in the box through a hole centrally located in the head D'. The rod, of course, pushes out the center carbons. Next the head D^2 is placed in position in the mouth of the box, and is secured by the rod *d*, the head D^2 having a threaded hole for engaging the screw-threaded end of the rod. The box of carbons, by means of handles d^3, attached to the head D', may be placed in one of the cells. The rod *d* is unscrewed and removed and a carbon is inserted in its place. Next fine dry sand is poured in through the perforations of the head D'. The sand runs freely and fills the interstices between the carbons, and serves as a packing to hold the latter in place.

While the sand is being poured in, the box is raised from time to time a little to allow the sand to fill the space occupied by the rim of the box. The box is finally removed, after which more sand is added, so as to leave a layer of sand over the top of the carbon. Of course the cast-iron head D^2 is left at the bottom of the cell, and is not removed until after the carbons are baked and removed.

The metal boxes D are somewhat expensive to make, and in place thereof wooden boxes E may be employed, that in cross-section internally correspond with the cells. The box E has a head or cross-bar, E', whichever may be preferred, that is rigidly secured to the shell, and a removable metal head, E^2, that fits inside the box and also fits the shell. The head, when placed in position in the box, after the box is filled with carbon, is left projecting a part of its thickness beyond the box, and forms a guide for placing the box over the cell, the projecting part of the head entering the cell. The boxes are filled with carbons in the manner already described, and are set over instead of into a cell. The rods *e* being sufficiently long, the head E', with the carbons following it, is let down into the cell until the head rests upon the bottom thereof. The rod is unscrewed, and it, together with the box, removed. A carbon is placed in the center, and sand is filled in, as before. The cross-bar or head E' may have a slot, E^3, and the rod *e* has a laterally-projecting pin, e^2, that, when the head E^2 is in position, may be turned crosswise of the slot to hold the head E^2 securely while handling the box. When the cells have been filled, the furnace is fired and the carbons are baked in the usual manner. The carbons, being held in place by the walls of the cell and by the sand packing, are kept straight and in good condition during the baking process.

When any portions of the walls C become broken, they may be mended while inserting the aforesaid formers in the cells having the damaged walls. The fractures of the broken edges are moistened, and new material, tempered as aforesaid, is cramped to fill the broken places of the walls. At any time when, from the damaged condition of the walls generally, it is desired to rebuild the lining, the latter is broken and removed, and a new lining is built in the manner aforesaid, in which case the old material may be pulverized and used again.

What I claim is—

1. In a carbon-furnace, a lining made of suitable refractory material and divided into cells, the latter having closed bottoms, substantially as set forth.

2. The combination, with a furnace, of a lining made of suitable refractory material, said lining being arranged with outer walls and cross-walls forming cells, the latter being closed at the bottom and open at the top, substantially as set forth.

3. The combination, with carbon-furnace, preferably of the reverberatory variety, of a lining arranged with an outer wall and cross-walls forming a series of cells on the floor-space of the furnace, substantially as set forth.

4. The combination, with a furnace and lining forming cells, substantially as indicated, of boxes corresponding in section with the cells, and a movable head for lowering the carbons into the cells, the parts being arranged substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 6th day of March, 1886.

JAMES HILL.

Witnesses:
CHAS. H. DORER,
ALBERT E. LYNCH.