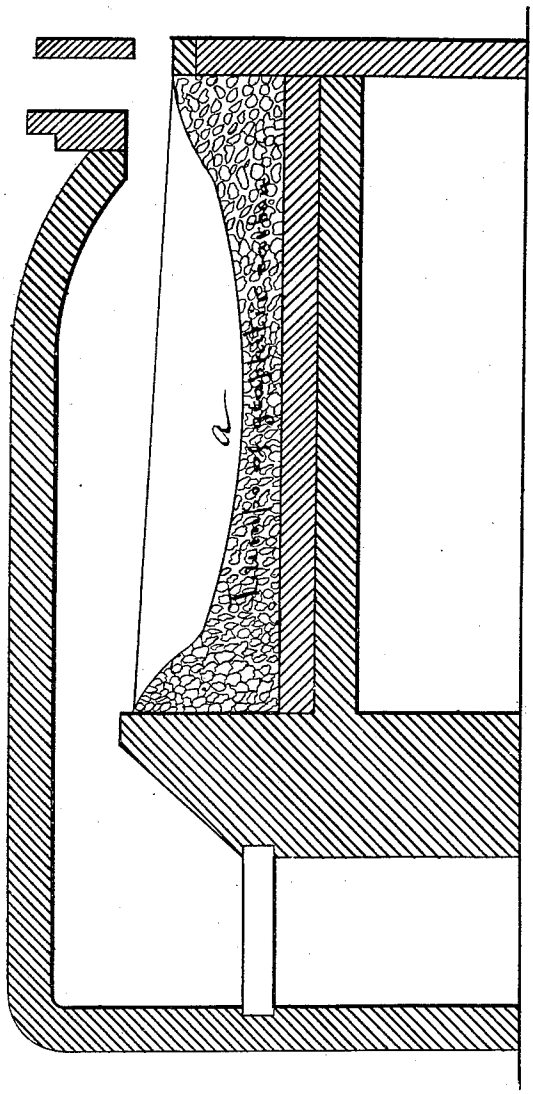
(No Model.)

C. J. EAMES.

HEARTH AND LINING OF GRAPHITE FOR METALLURGIC FURNACES.

No. 318,554. Patented May 26, 1885.



Witnesses—
G. A. Tauberschmidt
F. P. Max Dean

Inventor—
Charles J. Eames
by F. W. Ritter & Co. Atty

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

CHARLES J. EAMES, OF NEW YORK, N. Y., ASSIGNOR TO THE CARBON IRON COMPANY, OF SAME PLACE.

HEARTH AND LINING OF GRAPHITE FOR METALLURGIC FURNACES.

SPECIFICATION forming part of Letters Patent No. 318,554, dated May 26, 1885.

Application filed December 9, 1884. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. EAMES, a citizen of the United States, residing at New York city, in the State of New York, have invented certain new and useful Improvements in Hearths and Linings of Graphite for Metallurgic Furnaces; and I hereby declare the following to be a full, clear, and exact description of the same, such as will enable others to apply the invention.

My invention has for its object the provision of a friable graphitic hearth or lining for furnaces employed in the deoxidation of ore in the manufacture of iron sponge, which hearth shall be of a character to gradually and readily yield its carbon to the ore, shall yet so preserve its form as to fully protect the sole-plate and walls of the furnace, and shall be capable of being easily repaired from time to time without cooling off or losing the working-heat of the furnace, with consequent delay.

To this end the invention, broadly stated, may be said to consist in forming the bed or hearth of ore-reducing furnaces of graphite or plumbago in lump form.

Heretofore plumbago or graphite, when employed for furnace-linings or containing vessels in the various metallurgic processes, has been employed in the solid form or mass, either in slabs cut to the desired form, or in slabs, bricks, or crucibles formed by compounding the fine graphite or plumbago with fire-clay, bauxite, and like binder, and then firing or burning the article to give it a solid character. Such a lining or containing vessel does not readily yield its constituent carbon unless the mass is cut away by the molten metal or slag, so that it is only fully available where a rabbling or puddling process and high heats are employed. For this reason cementation and deoxidation processes have heretofore been generally conducted (either on hearths of the character before specified or on silicious hearths) by mingling or intermixing charcoal, coke, or the fine plumbago of commerce with the broken or pulverized ore for deoxidation, or embedding the metal in charcoal or fine plumbago for cementation purposes. Such a procedure has its objectionable features—viz., charcoal and similar soft carbons must be used in large quantities and add to the expense of manufacture, while the graphite or plumbago of commerce, if added to the lump ore, is drifted by the currents in the furnace, rendering the process uncertain and the loss considerable, while if the ore is powdered (as is very commonly practiced) not only is the cost of manufacture increased, but the packing of the fine ore and graphite prevents the passage of heated gases, retards the process, and renders the formation of slaggy or deteriorated sponge more liable to result from any accidental or temporary excess in the temperature of the furnace.

I have discovered that for the above purposes of deoxidation, cementation, &c., excellent results can be obtained in the treatment of the ore, &c., if the same be treated on a friable graphitic bed or hearth, the ore being preferably protected by a covering of fusible slag, as heretofore practiced, or preferably by a layer of graphitic lumps, and these features have been made the subject-matter of applications heretofore filed—viz., Serial No. 144,152, filed September 27, 1884, Serial Nos. 149,683 and 149,684, filed December 6, 1884, while the present application is confined to the hearth or bed.

I will now proceed to describe the invention more specifically, so that others may apply the same.

The active ingredient composing the hearth or lining is graphite, either in the well-known form of "plumbago," so termed in commerce, or preferably the much cheaper, less pure, less commonly known "graphitic carbon" of trade, such as is obtained from Cranston, Rhode Island, and other known localities. The manner of forming the bed is indicated at *a'* of the annexed drawing, which is a longitudinal vertical section of a reverberatory furnace. The bed or hearth I form of lumps, preferably of about the size of a walnut or hen's egg, as such sizes can be packed and leveled conveniently and yet present innumerable angles and surfaces from which the fine carbon is readily worn off. These lumps are charged upon the sole of the furnace, so as to cover the same

from a depth of six (6) to twelve (12) inches—six inches will do, but ten or twelve is better—and are spread out, so as to protect the fire-bridge, flue-bridge, and side walls, and form a shallow basin for the reception of the ore to be treated. The ore to be deoxidized and reduced to sponge is charged on this bed to the depth of several inches, is covered with a protecting-covering of slag or graphitic lumps, and deoxidized in suitable manner. When the sponge is balled and removed, the bed of graphitic lumps will be found to have become more or less compact, and to have sunk several inches. It can be immediately restored to its former depth by a top dressing of fresh lumps, and the next charge of ore introduced without losing the heat of the furnace.

I have heretofore spoken generally of graphitic lumps, as such is the scope of the invention, which may be attained in many well-known ways. For instance, plumbago of commerce, or the graphitic carbon above referred to, (pulverized,) can be mixed with a small per cent. of fire-clay, the mass compressed into lumps of suitable size (preferably having angular projections) and kiln-dried, so as to form friable lumps, and the bed formed of such lumps, as hereinbefore specified; or, as I prefer, the graphitic carbon, such as is found at Cranston, Rhode Island, and other places in this country, and which can be obtained at five (5) or six (6) dollars per ton, can be taken in lump form, substantially as it is mined, and applied in the formation of the hearth or bed, as hereinbefore set forth.

I wish it distinctly understood that I do not herein claim a process for the deoxidation of ores and the formation of sponge; neither do I claim, broadly, the use of fine plumbago or plumbago in solid mass, such as crucibles or slabs and bricks for hearths and linings; but,

Having thus fully set forth the nature and advantages of my invention, what I claim, and desire to secure by Letters Patent, is—

A hearth or bed for deoxidizing or ore-reducing furnaces, composed of graphitic lumps, substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 9th day of December, 1884.

CHARLES J. EAMES.

Witnesses:
F. W. RITTER, Jr.,
C. J. EAMES, Jr.