(No Model.) 2 Sheets—Sheet 1.

T. WALKER & J. F. CARTER.

ORE ROASTING FURNACE.

No. 516,782. Patented Mar. 20, 1894.

FIG. 2.

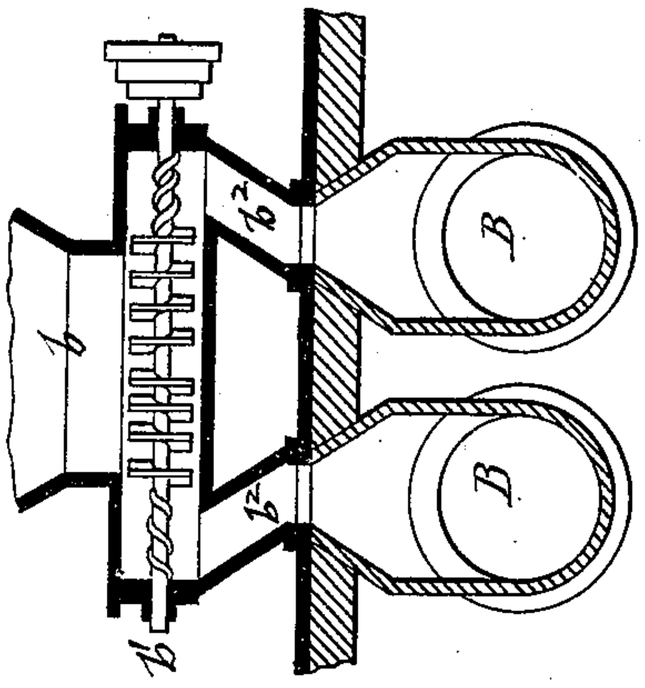

FIG. 1.

Witnesses:
Albert Popkins
Joseph H. Klein.

Inventors:
Thomas Walker & John F. Carter
by their attorneys
Howson & Howson

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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FIG. 3

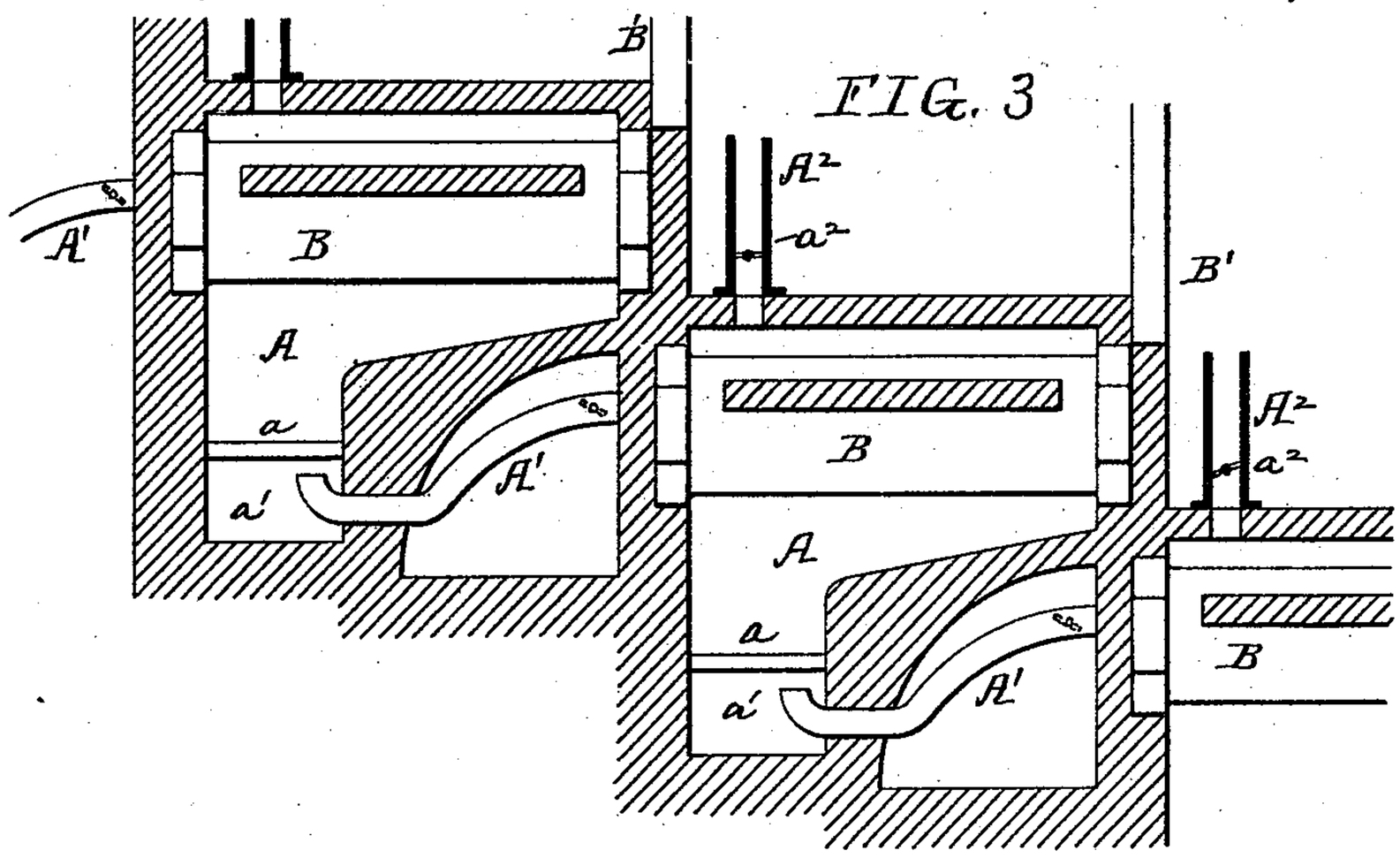


FIG. 6.

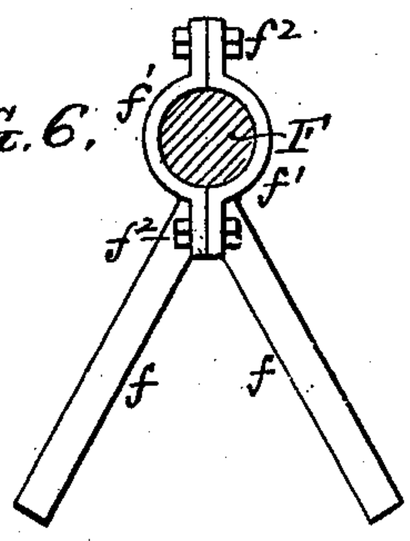


FIG. 4.

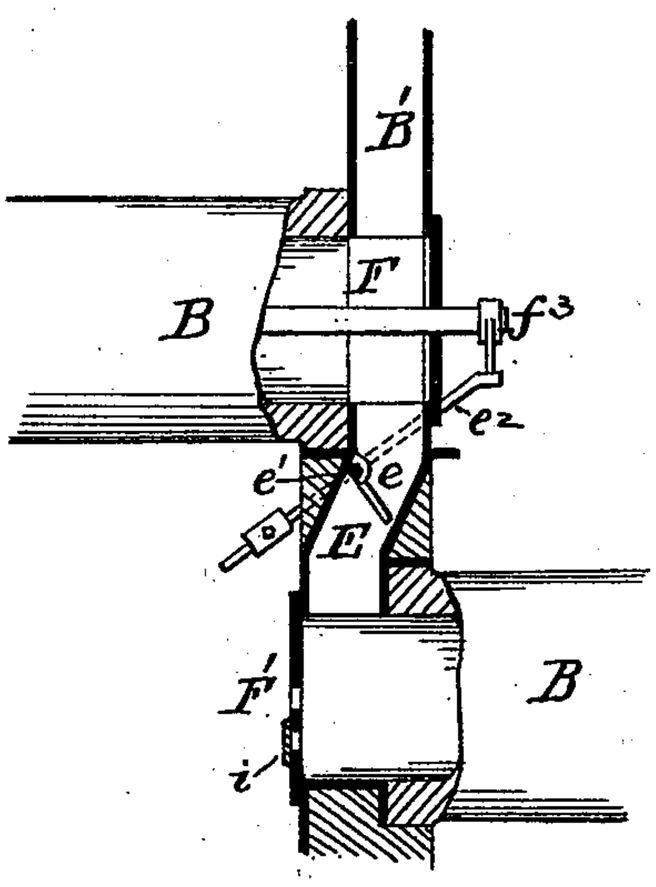
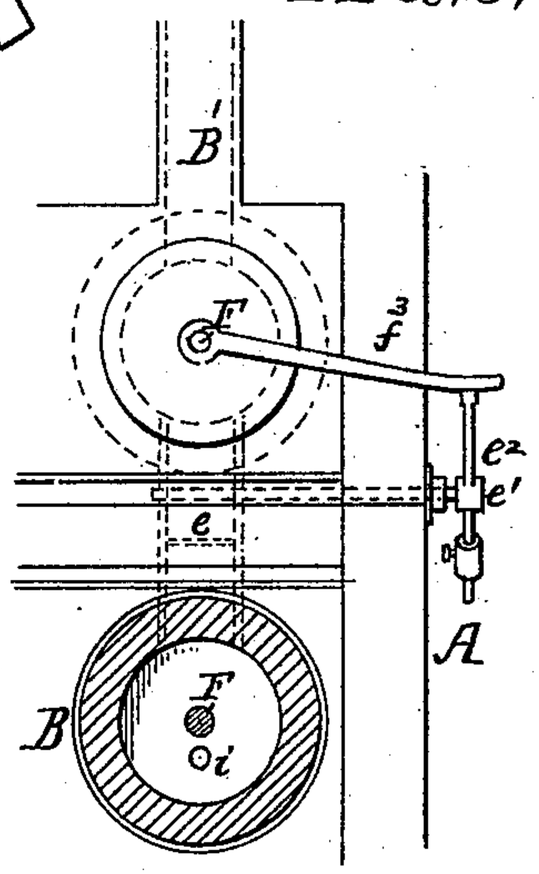


FIG. 5.



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THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS WALKER AND JOHN F. CARTER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO JOHN A. BARHAM AND JOSEPH A. VINCENT, OF SAME PLACE.

ORE-ROASTING FURNACE.

SPECIFICATION forming part of Letters Patent No. 516,782, dated March 20, 1894.

Application filed May 23, 1893. Serial No. 475,214. (No model.)

To all whom it may concern:

Be it known that we, THOMAS WALKER and JOHN F. CARTER, both citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Ore-Roasting Furnaces, of which the following is a specification.

The object of our invention is to so construct an ore roasting furnace that the ore will be traversed through the several retorts, and will be transferred from one retort to another, without passing through the fumes. This object we attain in the following manner, reference being had to the accompanying drawings, in which—

Figure 1, is a longitudinal sectional view of our improved ore roasting furnace. Fig. 2, is a view of the feeding mechanism for charging the upper retorts. Fig. 3, is a longitudinal sectional view of a portion of the apparatus, showing the arrangement of flues for the products of combustion. Fig. 4, is an enlarged view showing the passage forming communication between the retorts. Fig. 5, is a view illustrating the mechanism for operating the valve in said passage shown in Fig. 4; and Fig. 6, is a sectional view showing the blade that we prefer to use for feeding the material to the retort.

As shown in Fig. 1, we construct the furnace with a series of independent furnaces A, arranged in steps so that the retort B will discharge directly into the retort below it. Each furnace has a grate a, and ash pit a', and the retorts are so mounted in the walls of the furnaces, that they can be removed for repairs.

The communicating passages E in the walls of the furnaces, are formed in castings which are mounted in the wall but they may be formed directly in the brick work, without departing from our invention. The combustion chamber is divided by longitudinal partitions, so that the products of combustion will pass under each retort in one direction, and return over the retort, and, in the present instance, we have shown a series of pipes A′ extending from the upper portion of one combustion chamber to the ash-pit of the next above, and so on throughout the entire furnace, so that the fuel will be consumed, and we provide a stack at the upper end to carry off any smoke which may be produced in the furnaces. We also provide stacks A^2 for each furnace, so that when it is wished to operate the furnaces independently, the valves a^2 in the pipe may be turned so as to close the passage. Mounted in each retort is a shaft F having blades f, preferably of the construction shown in Fig. 6, there being two sets of blades to each shaft, and each set has a head f', which is secured to the opposite head and to the shaft by bolts f^2. If it is necessary to repair one set of blades, the structure can be readily removed, and a new set placed in position. The blades keep the ore under treatment, in motion, and feed it slowly forward through the retort. We prefer to use hollow shafts and connect the ends of the shafts with a water pipe, so that there will be a constant flow of water through the shafts thus keeping them cool. The shafts are vibrated by suitable crank or eccentric mechanism, through an arm f^4.

The space under the combustion chamber of each furnace is sufficient to allow the driving mechanism to have free movement, and to permit inspection when necessary. A fume flue B′ is situated at the discharge end of each retort, so as to carry off the fumes, and in the cap F′ of each retort is a valved opening i to admit air into the retort.

We preferably arrange the retorts in two sets, side by side, as shown in Fig. 2, and use a single hopper b, a feed screw b', carrying the ore to the inlet opening b^2 of the upper retorts.

In the passage E which communicates with the discharge end of one retort and the inlet end of another, is a valve e, (Fig. 4) which is mounted on a rod e' (Fig. 5), on which is a lever e^2, acted upon by an arm f^3, on the shaft F, so that at each vibration of the shaft, the arm f^3 will depress the lever e^2 and move the valve e, so as to allow the material to flow through the passage E into the retort below. The object of this arrangement is to prevent the fumes from escaping through the passage E, the fumes in this instance will move in the same direction as the ore, and will escape at the discharge end of each retort. It will

therefore be seen by the arrangement of the retorts shown in Fig. 1, that the ore is fed into the upper retorts, and is moved through these retorts and discharged into the passage E upon the valve *e*, and at each vibration of the shaft is discharged by the said valve to the inlet end of the retort below it, and is carried through this retort and discharged in the retort below until it reaches the outlet opening b^3, where it is discharged from the furnace.

By having independent combustion chambers the temperature of each retort can be regulated, as desired.

We claim as our invention—

1. The combination in an ore roasting furnace, of the series of furnaces arranged one above another in sets, a retort in each furnace, passages forming communication between the retorts, feeding mechanism in the retorts by which the material is carried from the receiving to the discharge end of the retort and discharged into the passage with an automatic valve in the passage, substantially as described.

2. The combination of a series of furnaces, arranged in steps one above another, a retort in each furnace, valved connecting passages between the retorts, outlet stacks at the discharge end of each retort to carry off the fumes, and mechanism for feeding the ore through the retort, substantially as described.

3. The combination in an ore roasting furnace of the series of furnaces, arranged one above another in steps, a retort in each furnace, passages communicating with the discharge end of one retort and the inlet end of the retort below it, a valve in said passage, a fume outlet for each retort, feeding mechanism for feeding the ore through the retorts, and mechanism for intermittently actuating the valve so as to discharge the ore under treatment at intervals, substantially as described.

4. The combination of a series of furnaces arranged in steps, retorts in each furnace, with tubes or flues extending from the combustion chamber of one furnace to the ash pit of the furnace above, and an outlet for the products of combustion, communicating with the upper combustion chambers, substantially as described.

5. The combination of the furnaces arranged in steps one above another, retorts in each furnace, one or more passages forming communication between the retorts, a shaft in each retort, blades on said shaft, mechanism for vibrating said shaft, a valve in the communicating passage, a lever on said valve, and an arm on the shaft actuating the lever, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THOMAS WALKER.
JOHN F. CARTER.

Witnesses to the signature of Thomas Walker:

HENRY JUNKIN,
R. CAMPION.

Witnesses to the signature of John F. Carter:

JOSEPH H. KLEIN,
HENRY HOWSON.