(No Model.) 2 Sheets—Sheet 1.

A. C. HARRISON.

RETORT FOR CALCINING BONE BLACK.

No. 345,968. Patented July 20, 1886.

Fig. 1.

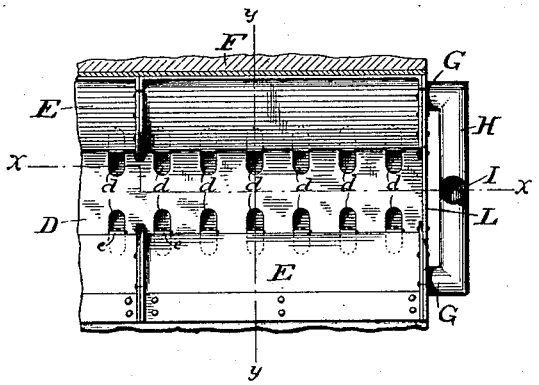


Fig. 2.

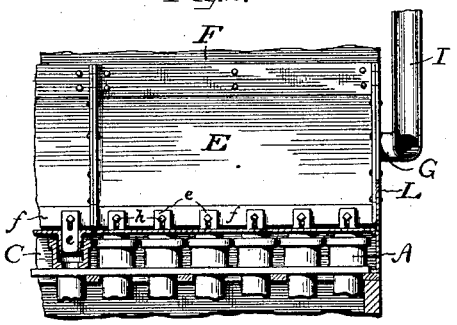
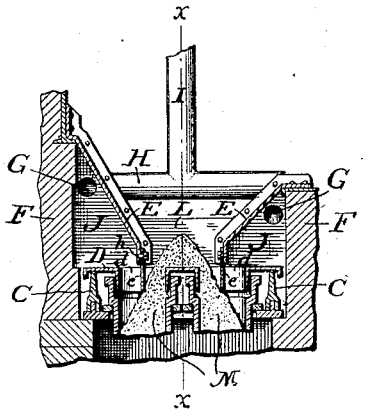


Fig. 3.



WITNESSES:
Forrest W. West
Henry N. Paul Jr.

INVENTOR
Alfred C. Harrison
by his Attorneys
Hollingsworth & Fraley

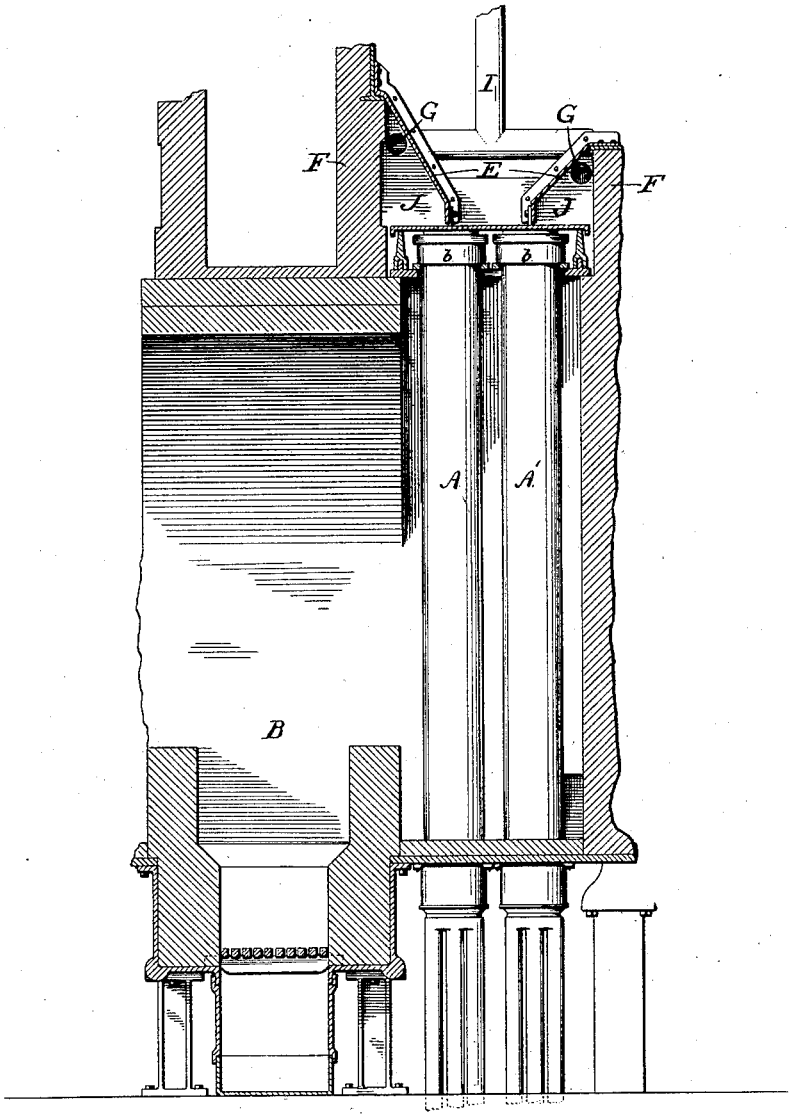
(No Model.) 2 Sheets—Sheet 2.

A. C. HARRISON.

RETORT FOR CALCINING BONE BLACK.

No. 345,968. Patented July 20, 1886.

Fig. 4.



WITNESSES:
Forrest W. Wood
Henry M. Paul Jr.

INVENTOR.
Alfred C. Harrison
by his attorneys
Williamson & Haley

UNITED STATES PATENT OFFICE.

ALFRED C. HARRISON, OF PHILADELPHIA, PENNSYLVANIA.

RETORT FOR CALCINING BONE-BLACK.

SPECIFICATION forming part of Letters Patent No. 345,968, dated July 20, 1886.

Application filed March 8, 1886. Serial No. 194,402. (No model.)

To all whom it may concern:

Be it known that I, ALFRED C. HARRISON, of the city of Philadelphia and the State of Pennsylvania, have invented certain new and useful Improvements in Retorts for Calcining Bone-Black, whereof the following is a specification, reference being had to the accompanying drawings.

As heretofore constructed, kilns for revivifying bone-black have usually been provided with a preliminary drying apparatus in which the material in a damp condition from the filters, &c., was exposed to hot air until a portion of the moisture had been driven off from it, after which it was delivered into the retorts proper and calcined. As only a portion of the moisture was driven off in the preliminary drying, the material in the retorts had to part with the remainder of its moisture before calcination took place, the aqueous vapors in such case pressing out at the top or mouth of the retort through which the material was introduced. The retorts, which consist of vertical pipes open at their upper ends, were arranged beneath open receptacles, into which a quantity of the bone-black was fed and permitted to descend into the retort, as the drawing off from below of the calcined bone-black gave room therefor. The only escape for the aqueous vapors being at the mouth of the retort, such vapors were driven off into and through the mass of bone-black lying in the hopper, and a large portion of the vapor was absorbed by the mass of bone-black and had to be again driven off on the descent thereof into the retort; hence this method has involved the continuous redistilling of a large portion of the moisture contained in the bone-black, and the efficiency of the retorts was much reduced by the loss of heat and waste of time due to this continued re-evaporation of the moisture.

The object of my present invention is to provide a means whereby the bone-black may be heaped up in a hopper and fed to the retort therefrom without, however, being exposed to the aqueous and other vapors which issue from the retorts, and I have found that by the use of my improvements the preliminary drying of the bone-black may be to a great extent, and perhaps entirely, dispensed with.

In the accompanying drawings, Figure 1 represents a top or plan view of the hopper as applied to a series of retorts arranged in the usual manner within a furnace. Fig. 2 is a longitudinal vertical section of the hopper on the line *x x* of Fig. 1. Fig. 3 is a transverse vertical section thereof on the line *y y* of Fig. 1; and Fig. 4 is a sectional view through a furnace, showing the method of arranging the retorts beneath the hopper.

The retorts A A′ are arranged in two parallel rows, and are provided at the bottom with the usual discharging devices, which are not here shown, as their construction is well understood.

Over the tops of the retorts A A′, I arrange a horizontal plate, D, which is supported by longitudinal girders C, placed on each side of the rows of retorts. Over the mouth of each retort an oblong opening, *d*, is formed in the plate D, these openings corresponding in size and shape with the cross-section of the retort proper, and having downwardly-depending flanges, (see Fig. 3,) which extend into and fit snugly within the bell-mouths *b* of the retorts. This plate D forms the bottom of the hopper. The ends of the hopper L L are perpendicular, but its sides E converge downwardly, as shown. These sides E are formed of plates which have a flange or rim, *f*, along their bottom edges, resting upon the plate D, and the lines of contact between the flanges *f* and the plate D bisect each set of openings *d*, as indicated in Fig. 1. The brick-work F, which surrounds the hopper, is vertical, and incloses an angular space, J, along each side thereof. (See Figs. 3 and 4.) One half of each opening *d* is thus inside and the other half outside the hopper, so that the mouths of the retorts A A′ communicate both with the interior of the hopper and with the exterior space, J, on each side thereof. From the spaces J flues G G lead to a branch, H, and a vertical flue, I, which communicates with the chimney or the open air.

Upon the flanges *f* of the hopper I attach in each opening *d* a downwardly-depending strip or finger, *e*, which extends entirely across the width of the retort-mouth and down some distance therein. These strips *e* are secured to the flanges *f* by means of screws *h* passing

through slots in the strips, so that the latter may be adjusted at various heights.

The operation of the device is as follows: The fires being started in the furnace B, a quantity of bone-black is charged into the hopper, whence it descends through those portions of the openings *d* which are in the bottom of said hopper into each of the retorts A A′ until the latter are filled. The heat in the first instance drives off the moisture from that portion of the bone-black which is nearest the bottom of the retorts, where the temperature is highest, and the aqueous vapor ascending through the retorts arrives at the mouths thereof. Instead, however, of passing out through those portions of the openings *d* which are within the hopper, and consequently resaturating the mass waiting to be fed into the retorts, it finds an exit through that portion of each of the openings *d* which is outside of the finger or strip *e*, whence the moisture, &c., is drawn off through the flues G, H, and I, and is discharged. The purpose of the fingers or strips *e* is to insure an outlet for the vapors into the space J.

The descent of the material is illustrated in Fig. 3 by the irregular pyramidal mass M, whose sloping sides extend for some distance below the mouth of the retorts, the strip *e* preserving a free space therein for the exit of the moisture. The only limit to the downward extent of this free space within the retorts is determined by the degree of heat therein. If air be permitted to come in contact with the bone-black while the latter is at a high heat, oxidation is liable to take place, and the bone-black will be spoiled. Should the fingers or strips *e* descend, therefore, to such a distance within the retort that the open space which they preserve upon one side thereof is within the range of high heat in the retort, the bone-black at this point would be exposed to whatever air might find its way into said space, and hence would be liable to destruction.

Experience will readily determine at what point to adjust the fingers or strips *e*, as soon as the operator has become acquainted with the working of his furnaces, it being only necessary that the inclined sides of the charge descending from the hopper should not extend so low in the retort as to be within the limits of white or bright-red heat.

In the foregoing specification I have described the most convenient form known to me for embodiment of my invention; but I do not desire to limit myself to the exact structure specified, as the results may be obtained to a degree by other methods of construction.

I claim—

1. The combination, with a bone-black retort, of a hopper arranged above the same and communicating therewith across a limited portion of the area of the retort's mouth, and a chamber exterior to said hopper, which communicates with the remaining area of the retort's mouth, said chamber being provided with a draft-producing apparatus, substantially in the manner and for the purposes set forth.

2. The combination, with a retort which has its upper end or mouth divided into two passage-ways, of a hopper discharging into one of said passage-ways, said chamber being provided with a draft-producing apparatus, substantially as set forth.

3. The combination, with a series of retorts, A A′, of the plate D, having openings *d*, which correspond with the mouths of the retorts, a hopper having inclined sides E E, whose lower edges bisect said openings, and downwardly-depending fingers *e*, extending into the retorts, and chambers J, communicating with the said retorts and provided with suitable draft-producing devices, substantially as set forth.

4. In combination with a retort having a hopper which communicates with a limited portion of its mouth, and a draft-chamber which communicates with the remaining portion of its mouth, an adjustable dividing-strip extending into the retort's mouth between the hopper and the draft-chamber, substantially as and for the purposes set forth.

ALFRED C. HARRISON.

Witnesses:
F. W. WEST,
HENRY Y. PAUL, Jr.