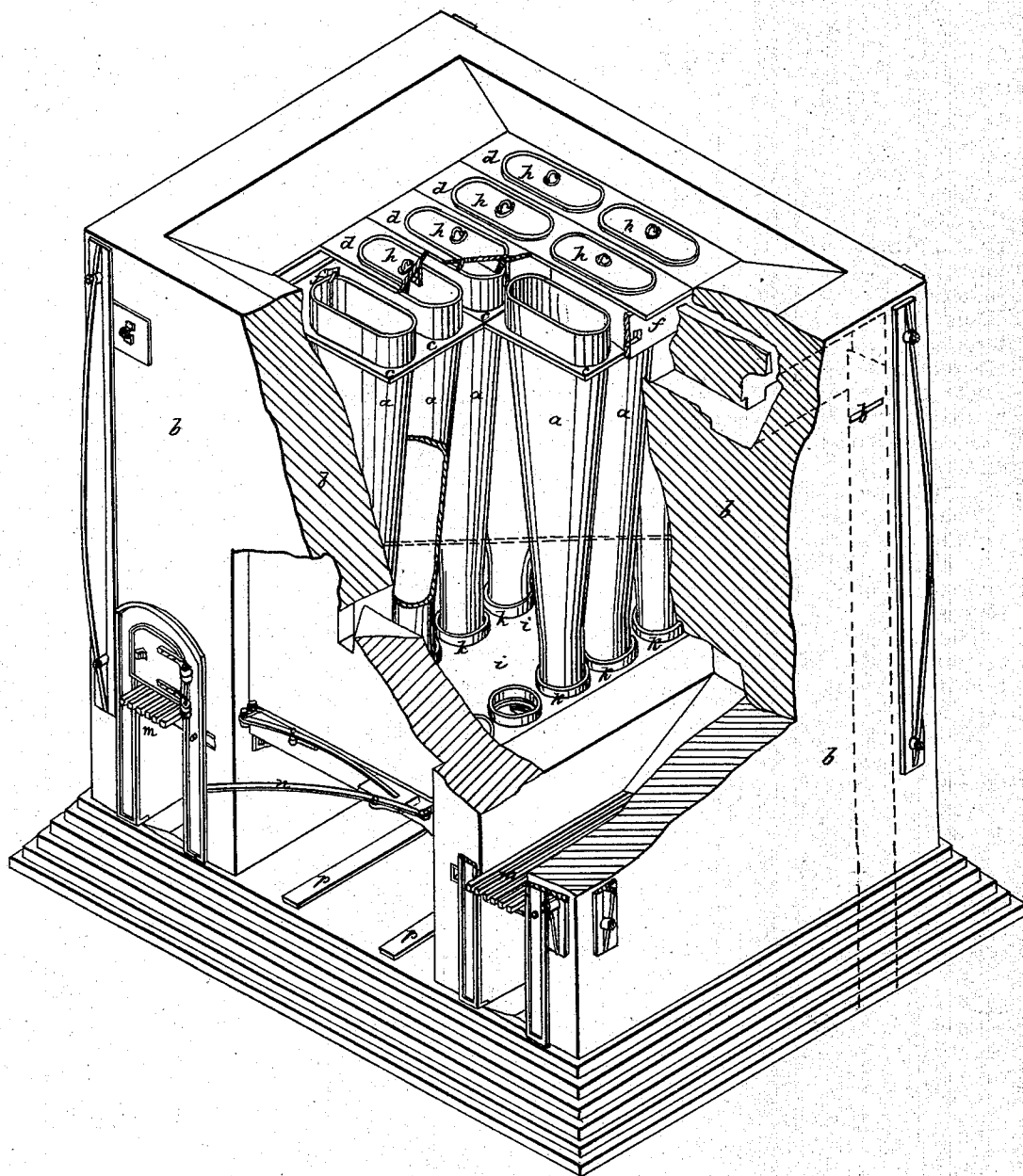


W. BELLOWS.
Bone-Black Furnace.

No. 26,457.

Patented Dec. 13, 1859.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM BELLOWS, OF CINCINNATI, OHIO, ASSIGNOR TO HIMSELF AND CHARLES W. SMITH, OF SAME PLACE.

IMPROVEMENT IN REVIVIFYING BONE-BLACK.

Specification forming part of Letters Patent No. 26,457, dated December 13, 1859.

To all whom it may concern:

Be it known that I, WILLIAM BELLOWS, of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in the Construction of Apparatus for Revivifying Bone-Black; and I do hereby declare the following to be a full and exact description of the same, reference being made to the accompanying drawing, and to the letters of reference marked thereon.

To enable others skilled in the art to make and use my improved apparatus, I will proceed to describe the same.

The object of my improved bone-black revivifier is to reburn bone-black in the cheapest, most expeditious, and thorough manner, and to consume the gases generated in the process.

The nature of my improvements consist in certain new mechanical details of construction in the furnace and fixtures for reburning the bone-black.

In the process of refining sugar or freeing it from the impurities which it contains it is necessary to use charred bone, through which the crude sugar (in the form of sirup) is made to pass. While the sirup is passing through the bone-black (which is placed in vessels for that purpose) the bone-black retains the impurities of the sugar-sirup which, in a now purified state, is discharged therefrom; but after the operation just specified the bone-black itself must in turn be purified in order to be used again for the same purpose. This is termed "revivifying" the bone-black and is required to be done after each purification of the sugar-sirup. To effect this revivification of the bone-black (which is accomplished mainly by the agency of heat) in the most advantageous way is the sole purpose of my invention.

The nature of my apparatus consists in a new arrangement of the heating-retorts required, together with certain important details of furnace construction, all of which may be clearly seen by reference to the accompanying drawing.

Figure 1 is a plan view of my improved apparatus and is represented in perspective. A portion, however, of the brick-work or in-

closing-wall is withdrawn in order to show the several parts of my improvement and to facilitate their description.

a a a are the retorts, into which the bone-black is placed to be reburned or revivified.

b b b is the inclosing-wall, built a few inches higher than the level of the top of retorts.

c c c are flanges cast upon the outside of the retorts about seven inches below the top of the same. These flanges are made to fit squarely and closely together.

d d d are the cover-plates, each one covering two retorts. They have suitable openings immediately over the retorts which they cover to provide for the reception of bone-black into the retorts. On the under side of said openings taper flanges *e e e* are cast, fitting loosely in the top of each retort. The cover-plates do not rest upon the retorts, but are sustained by the side pieces, *f f*, built in the furnace-wall, and thus allowance of space sufficient is made for the expansion of the retorts when heated. The flanges *c c c*, together with the cover-plates *d d d* and side pieces, *f f*, form a chamber into which pass the offensive gases from the several retorts. The tapering flanges *e e e*, fitting loosely in the top of the retorts, allows the gases to escape from the retorts during an operation of reburning the bone-black, which gases thus escape out into the chamber just mentioned, and from thence they find egress through the openings *g g*, after which they mix with the smoke from the furnaces, and are finally carried off through the smoke-stack. The flanges *c c*, being in a red heat, consume a portion of these gases before they can escape.

h h h are the caps over the retorts, and are made to fit snugly on the cover-plates.

i i i is the bottom plate, on which suitable sockets, *k k k*, are cast for the reception of the bottoms of all the retorts.

l is a damper for regulating the draft of the furnace. A damper is also placed in the opposite side of the furnace-wall for the same purpose.

m m are the two furnaces. If double the number of retorts shown in the drawings are required, four furnaces may be used, two in front and two in the rear.

p p is a railway for carrying buckets to and

fro underneath the retorts, said buckets receiving the revived bone-black.

The bottoms of all the retorts are made flaring, which eases the delivery of the bone-black when ready to be discharged.

Fire-clay is placed on the bottom plate, *i i*, and packed in around the retorts up to about one-third their height. This serves to throw the heat from the furnaces upon the central and upper parts of the outside of all the retorts, where the most heat is required. The fire-clay thus placed performs another important service in gradually cooling the bone-black after being reburned and before it is taken out of the bottoms of the retorts. There is but a limited quantity of bone-black taken out of any one retort at a time, as but a small portion of it is sufficiently cool to admit of its exposure to the air. Bone-black at a red heat is reduced to ashes if brought in contact with the air, and also, if exposed to intense heat, is burned into lime. A gradual heating and slow cooling process is arrived at by the apparatus herein described. The height of the fire-clay is indicated by the two parallel rows of dotted lines intersecting the retorts.

In order to discharge the bone-black after it is sufficiently purified and cooled after reburning, two sliding plates are provided, with openings corresponding to the bottoms of the retorts. These sliding plates are worked backward and forward by means of the lever *n* on one side and lever *o* on the other side, thus covering or leaving vacant the bottoms of all the retorts on either side simultaneously, as may be desired.

The result of using the flaring bottom of the retort which I employ in my revivifying apparatus is as follows: While discharging the purified bone-black from the bottoms of the retorts that portion which finds egress first are the particles in the center, which is in consequence of the flaring shape before mentioned. The bone-black above and in the central part of each retort immediately follows this central movement. Then the lumps from the sides of the retorts naturally follow to fill the vacancy thus made a second time, and in this way the particles of bone-black are constantly changing their relative positions in each retort. Thus every part of the bone-black is equally exposed to the heat while reburning and equally cooled previous to their final discharge from the retorts.

The operation of my revivifying apparatus is as follows: Fire is applied to the fuel in the furnaces before any bone-black is placed in the retorts. When the retorts are at red heat, they are filled with the bone-black which needs reburning. This is only partially reburned, after which it is taken out entirely and again placed in the retorts, when it is thoroughly revived. As the bone-black is

taken out of the retorts for reusing, more impure bone-black is added at the top of the retorts, and this is repeated without cessation as long as it is required for use by the sugar-refiner. In this revivifier the smoke and gas are carried out into the smoke-stack by means of two suitable chimneys made in the inclosing-wall, which chimneys lead downward and then off, so as to connect with the stack. This chimney is indicated by dotted lines on the brick-work, as shown in the drawing.

The above-described bone-black revivifier differs in the essential features, as well as in its operation, from any plan heretofore devised or used. Its advantages are as follows: First, it is more expeditious than others in use; second, burns more equal and perfect; third, will last with care five times as long as the common furnaces now used; fourth, the parts are made detachable, so that replacements can be made conveniently; fifth, it carries off and consumes its own gases; sixth, throws the flames and heat where they are most serviceable and economizes fuel; seventh, the lower portions of retorts are a cooling agent; eighth, the flaring bottoms of retorts aid to equally burn and equally cool the bone-black by the changing of the particles from one location to another in each retort; ninth, the flanges *c c* are made a part of the heating-surface; tenth, the chamber between the flanges and cover-plates a non-conductor of heat; eleventh, involves no waste of bone-black from overheating or sudden cooling; twelfth, the different parts are made so as to allow for expansion by heat, thus no warping or displacement occurs.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An improved apparatus for revivifying bone-black, arranged and constructed as described.

2. The flaring bottoms of the retorts *a a*, when arranged and combined with the herein-described apparatus for the purpose specified.

3. The flanges *c c*, in combination with the retorts *a a*, for the purpose of allowing for expansion and contraction and replacing of retorts, as well as protecting internal heating-surface, substantially as described.

4. The chamber between flanges *c c* and lower plates, *d d*, when for the purpose of preventing undue radiation of heat and for the purpose of passing off the offensive gases arising from retorts when said chamber is combined with flanges *c c* and cover-plates *d d*, for the purpose described.

In testimony of my invention I have hereunto set my hand this 2d day of June, 1859.

WM. BELLOWS.

Witnesses:

J. O. JOYCE,

C. C. CHAMPLIN.