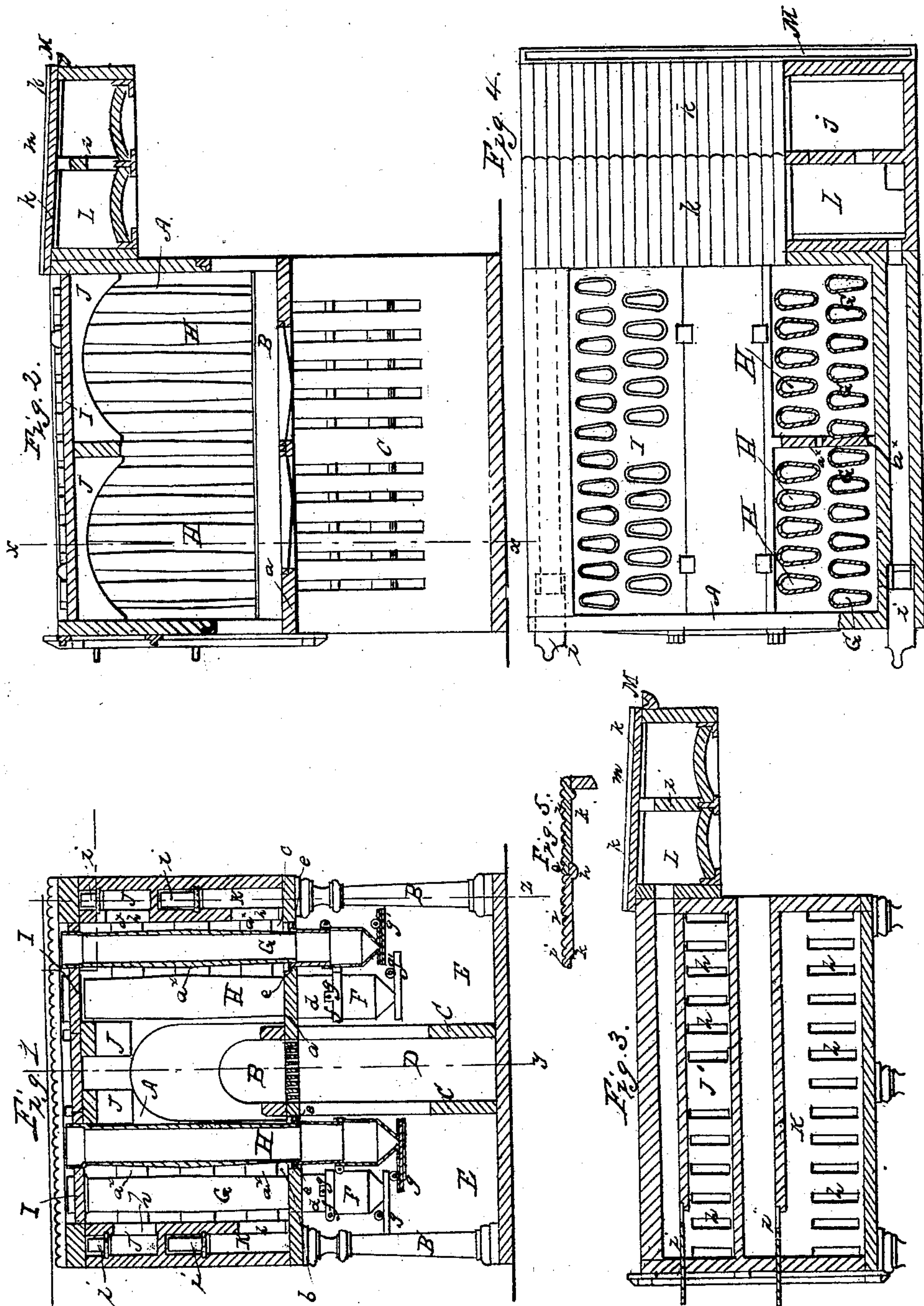


W. MITCHELL.

Retort for Burning Bone Black.

No. 27,462.

Patented March 13, 1860.



Witnesses
 John Hughes
 B. Grout

Inventor
 William Mitchell.

UNITED STATES PATENT OFFICE.

WILLIAM MITCHELL, OF NEW YORK, N. Y.

IMPROVEMENT IN APPARATUS FOR REVIVIFYING BONE-BLACK.

Specification forming part of Letters Patent No. 27,462, dated March 13, 1860.

To all whom it may concern:

Be it known that I, WILLIAM MITCHELL, of the city, county, and State of New York, have invented certain new and useful Improvements in Retorts for Burning Bone-Black for the Refining of Sugar; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a vertical section of my invention, taken in the line $x x$, Fig. 2; Fig. 2, a vertical section of the same, taken in the line $y y$, Fig. 1; Fig. 3, a vertical section of the same, taken in the line $z z$, Fig. 1; Fig. 4, a horizontal section of the same, taken in the line $z' z'$, Fig. 1; Fig. 5, a detached end view of two of the plates which form the drying-floor.

Similar letters of reference indicate corresponding parts in the several figures.

The object of this invention is to obviate the difficulty hitherto attending the warping of the metal plates which retain in proper position the upper parts of the cast-metal chambers or tubes in which the bone-black is burned.

The invention also has for its object economy in fuel, the parts of the retort being so arranged that the charged chambers or tubes will be exposed in the most advantageous manner to the fire and the contents of all the chambers or tubes simultaneously burned.

The invention has further for its object the perfect controlling of the fire, so that the chambers or tubes may be uniformly heated and no part of their contents injured by too intense a heat, and so forming the chambers or tubes as to resist the action of the heat, the parts most exposed being thicker than the other parts.

The invention has, lastly, for its object a more facile mode than usual of connecting the coolers to the chambers or tubes, so that the former may be readily attached to and detached from the latter, and also in an improved mode of drying the bone-black after it has been used, so that the same may be deprived of the moisture it contains both by evaporation and draining, thereby greatly expediting the drying process and rapidly pre-

paring the bone-black for the chambers or tubes.

To enable those skilled in the art to fully understand and construct my invention, I will proceed to describe it.

A represents a rectangular chamber the walls of which are of masonry, and B is a fire-chamber, which runs longitudinally and centrally through the chamber. This chamber A is supported by suitable piers or pillars, B', and walls C C, the space between which forms the ash-pit D, a passage-way, E, being allowed between the walls and pillars, the use of which will be presently shown.

The bottom of the chamber A is a cast-metal plate, a , which has two series or rows of holes, $b c$, in it at each side of the fire-chamber, said rows being inclined parallel with the fire-chamber. In these holes $b c$ cast-metal tubes d are fitted and suspended by shoulders e , which catch over the edges of the holes. The tubes d project below the bottom plate, a , of the chamber A, and to the lower part of each tube d a sheet-metal tube or cooler, F, is attached by means of perforated ears or lugs f , which are fitted on hooks or pins g , one at each side of each tube d . This will be fully understood by referring to Fig. 1, in which the ears and pins at one side of two of the coolers and tubes are shown. Each cooler F is provided with a slide, g' , at its bottom.

In the upper end of the tubes d the lower ends of chambers or tubes G H are fitted. These chambers or tubes are transversely of oval form, or they may be described as being of egg form, for they are larger at one of their shorter curved sides than at the other, as shown clearly in Fig. 4, and it will also be seen by referring to this figure that the outermost rows of chambers or tubes, G G, are somewhat smaller than the innermost rows, H; those nearest the fire-chamber B, and it will further be seen by reference to this figure that the larger of the shorter curved sides of the chambers or tubes G H—that is to say, those nearest the fire-chamber B—are considerably thicker than at any other part. There is also another peculiarity pertaining to the chambers or tubes G H, and that is, that they gradually increase in thickness from their upper

and lower ends toward their centers. The diameter of each chamber or tube is equal throughout. It is the thickness of the metal only that varies. The form of the chambers or tubes is shown clearly in Figs. 1 and 2.

The upper ends of the chambers G H are retained in proper position by cast-metal plates I I, which have holes in them to allow the upper ends of the chambers or tubes to pass through. The holes in one of these plates are plainly shown in Fig. 4, and in Fig. 5 the chambers or tubes nearest the eye are shown projecting up through both plates I I.

The plates I I rest on arches J, formed of masonry within the chamber A. There are five arches, two longitudinal ones at each side of the fire-chamber B, and one transverse one about at the center of the chamber. These five arches support the plates I I, so that they cannot sink inward or be warped by the heat of the fire-chamber, a contingency of common occurrence in the usual retorts for burning bone-black. The brick partition of the transverse arch J is perforated at each side of the fire-chamber, as shown at a^x , in order that it may not interrupt the draft.

In two opposite side walls of the chamber A the walls that are parallel with the fire-chamber, flues J' K are formed, two flues in each wall. These flues each communicate with the chamber A by openings h . Each flue is provided with a damper, i , so that either or both flues at each side of the chamber may be used as desired.

The short tubes d , which project through the bottom plate, a , of chamber A, and into which tubes d the lower ends of the chambers or tubes G H are fitted, correspond transversely in form to the tubes G H, and so, also, do their short metal tubes or coolers F.

The flues J' in the walls of the chamber A communicate with a chamber, L, which is at the back side of the upper part of the chamber A. This chamber L also has its walls of masonry, and it is provided with a longitudinal perforated partition, j . This chamber L communicates with the smoke-stack, and all the products of combustion from the fire-chamber B pass through said chamber. The top of the chamber L is formed of cast-metal plates k , which have their upper surfaces fluted, so as to leave valleys or gutters l , as shown plainly in Fig. 5. The plates k rest on the walls and partition of the chamber L, and they have a slightly-inclined position, as shown clearly in Figs. 2 and 3. The edges of the plates k , where they overlap, have their edges beveled, as shown at m , Figs. 2 and 3, and the sides of the plates are provided with lips n and recesses e , (see Fig. 5,) in order to form a connection between the several plates. At the outer side of the chamber L, at the lower or depressed end of its top, there is a gutter, M.

The operation of the device is as follows: A fire is kindled in the fire-chamber B, both

flues J' K at each side of the chamber A being opened so as to admit of a strong draft and insure a speedy kindling of the fire. When the fire is properly under way, the chambers or tubes G H are charged with bone-black in a proper dry state. This bone-black is purchased by sugar-refiners in a burned or calcined state and is again burned by the refiners each time after it is used in order to rid it of impurities. The chambers or tubes G H are exposed to the action of the fire, the products of combustion passing between them into the flues J' K, either or both, and the bone-black in the outermost row of chambers or tubes G will be burned equally as quick as that in the innermost rows, H, for the reason that the former chambers or tubes are smaller than the latter and are placed in line with the centers of the spaces between the chambers or tubes H. The bone-black in each chamber or tube G H will also be equally burned all around at the same time because the parts most exposed to the fire present a larger surface to it than the opposite parts, one of the shorter curved sides of each chamber or tube having a greater area than the other, as previously described. By this arrangement therefore the bone-black in both rows of chambers or tubes and also all the bone-black in each individual tube within the direct action of the fire will be burned simultaneously. The bone-black is taken from the chambers or tubes through the coolers F as usual, the contents of the coolers only being taken at each discharge and the bone-black above settling down into the coolers as that below is withdrawn. The coolers F, being thin or sheet metal, admit of the ready cooling of the bone-black before it is withdrawn and without the admission of oxygen. The chambers or tubes are supplied with fresh bone-black to be burned as the burned material is removed from the coolers, so that the chambers or tubes will be kept fully charged while the retort is in operation. By having the chambers or tubes gradually increase in thickness from their upper and lower ends toward their centers they are rendered capable of better resisting the heat and the burning of the bone-black within them is rendered nearly uniform. A uniform heating or burning of the bone-black, however, is fully insured by the two flues J' K in the side walls of the chamber A, for the operator or attendant, by adjusting the dampers i of said flues, may direct the heat at a greater or less height against the chambers or tubes G H, as occasion may require, and thereby prevent said chambers or tubes from heating beyond the proper temperature—a red heat. In consequence of having the coolers attached to the tubes d , as described, they may be readily adjusted to and detached therefrom.

In burning bone-black for the refining of sugar it is essential that it be thoroughly dried before it is placed in the retorts or chambers G H. If this drying process be not attended

to, the chambers will be ruptured by the expansive force of the steam; and as the bone-black, after being used by the refiners, contains considerable moisture it is important that some convenient and expeditious drying device be connected with the retort, in order that the moisture may be expelled from the bone-black with a degree of celerity commensurate with that of the burning process. This end is attained by the plates *k* of the chamber *L*. The bone-black to be dried preparatory to burning is strown on the plates *k*, the heat in the chamber *L* warms the plates, and the expelling of the moisture will commence by evaporation, as usual, while at the same time a portion will settle in the valleys or gutters *l*, and pass down by its gravity into the eavestrough or gutter *M*. Thus the drying process is accelerated in consequence of combining the evaporating and draining of the moisture from the bone-black.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. Placing the cast-metal plates *I I* on the five arches *J*, arranged as shown, to wit, two being placed longitudinally in the chamber *A* and the other transversely in a perforated partition for the purpose of properly sustaining the plates *I I*, and at the same time permitting of a proper draft.

2. The employment or use of two series or

rows of chambers or tubes, *G H*, placed at one or both sides of the fire-chamber, when said chambers or tubes are placed in the position as shown, and the outermost rows made of smaller capacity than the innermost one, for the purpose specified.

3. Having the chambers or tubes *G H* made transversely of egg form, or of greater dimensions at one of their shorter curved sides than at the opposite ones, and also made longitudinally and transversely of varying thickness, substantially as and for the purpose set forth.

4. The arrangement of the flues *J' K* in connection with the chambers or tubes *G H*, as and for the purpose described.

5. The connecting of the coolers *F* to the tubes *d* of the chambers *G H* by means of the ears or lugs *f* and hooks or pins *g*, as set forth.

6. Forming the plates *k* with fluted surfaces, so as to produce valleys or gutters *l*, and placing said plates in an inclined position on the top of the chamber *L*, for the purpose herein set forth.

7. Connecting the chamber *L* with the flues *J' K*, in the manner substantially as shown and described, so that the burning and drying processes may be performed simultaneously with one and the same source of heat.

WILLIAM MITCHELL.

Witnesses:

B. GIRONEL,
MICHL. HUGHES.