2 Sheets—Sheet 1.

# G. D. DAVIS.

## Retort and Furnace for Calcining Bones.

**No. 221,725.** **Patented Nov. 18, 1879.**

*Fig. 1.*

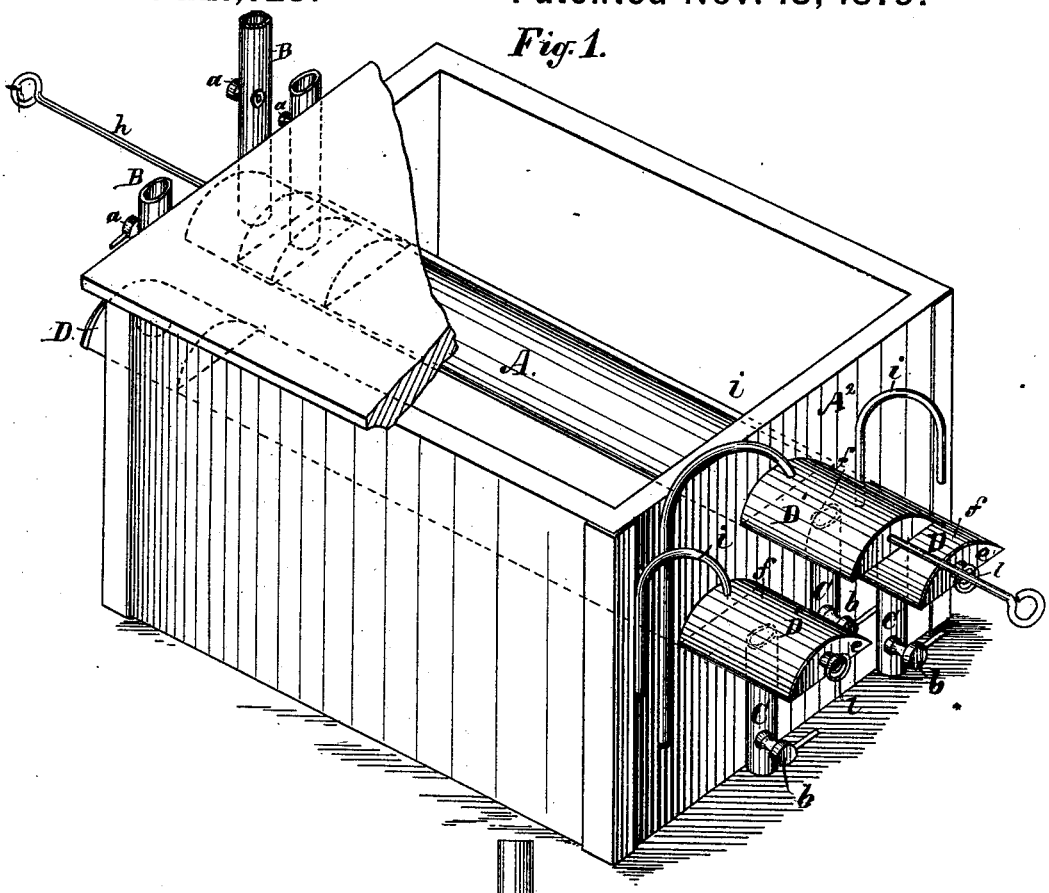
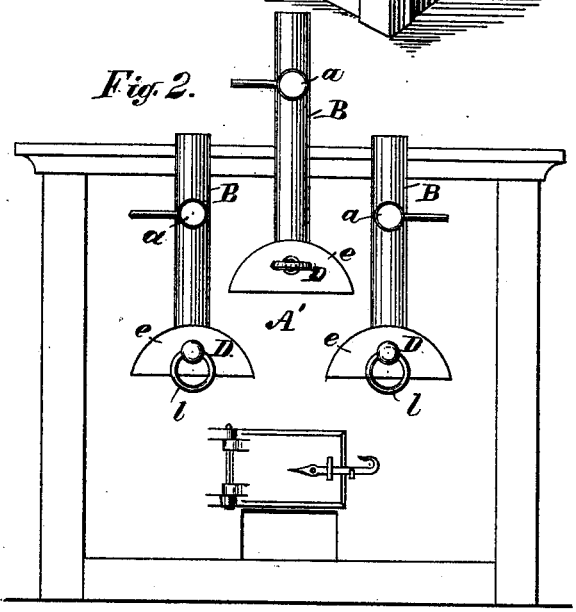



*Fig. 2.*

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2 Sheets—Sheet 2.

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## Retort and Furnace for Calcining Bones.

**No. 221,725.** **Patented Nov. 18, 1879.**

Fig. 3.

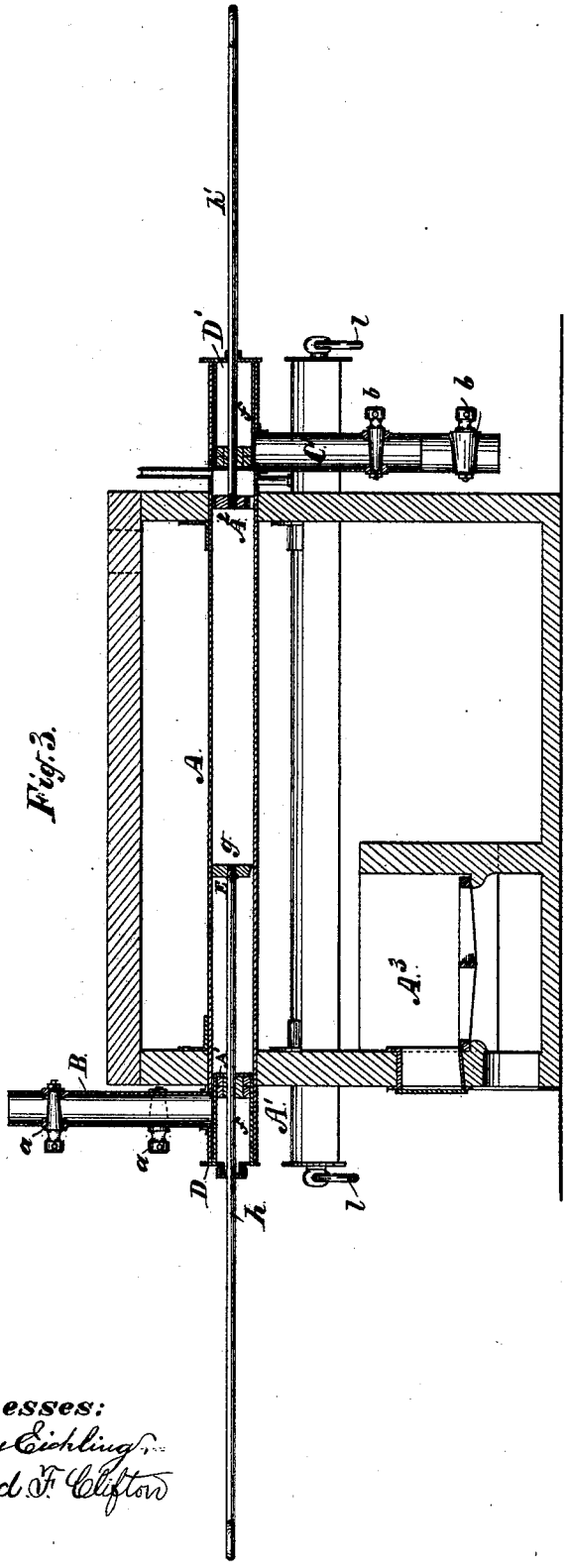



Fig. 4.

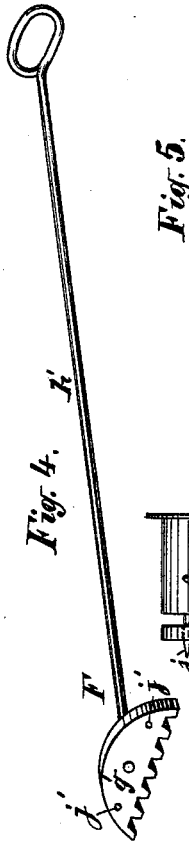
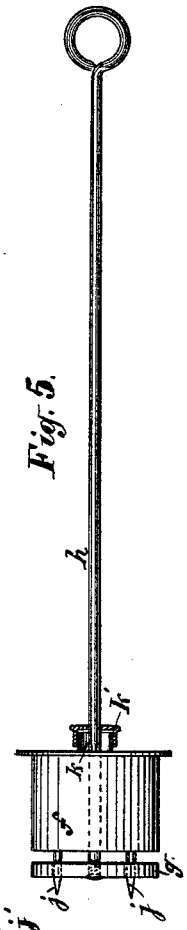



Fig. 5.

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# UNITED STATES PATENT OFFICE.

GEORGE D. DAVIS, OF JERSEY CITY, NEW JERSEY.

## IMPROVEMENT IN RETORTS AND FURNACES FOR CALCINING BONES.

Specification forming part of Letters Patent No. **221,725**, dated November 18, 1879; application filed April 9, 1879.

*To all whom it may concern:*

Be it known that I, GEORGE D. DAVIS, of Jersey City, in the State of New Jersey, have invented a new and useful Improvement in Retorts and Furnaces for Calcining Bones and earthy substances, of which the following is a specification, reference being had to the accompanying drawings, forming part of the same.

Figure 1 is a perspective view of three retorts, properly set in a fire-arch, each of which contains my invention. Fig. 2 is a front view of the end of Fig. 1. Fig. 3 is a central longitudinal section of one of the said retorts. Fig. 4 is a view of the rake or distributer, used in the retort to distribute the contents evenly over the bottom of it; and Fig. 5 is a top view of one of the bonnets removed from the retort with the scraper, hereinafter described, connected therewith.

The retorts themselves, in their form, and in the material of which they are composed, need not differ essentially from the ordinary gas-retort. Their dimensions will be adapted to the quantity of material which it is desired to operate upon at one time. The common gas-retort is of a suitable size.

My invention consists in the combination with such retort of certain attachments hereinafter particularly described, whereby the material to be operated upon may be introduced into the retort, and, when calcined, removed therefrom without reducing the heat of the retort or admitting cold air into it.

I will proceed to describe a retort with the attachments referred to combined therewith.

A is the retort, open at both ends, and designed to be set in a fire-arch in a horizontal position, as shown. B is a hollow cylinder or pipe, which rises from the upper side of the end A′ of the retort and opening into it. This pipe is furnished with a valve, *a*, at or near the outer end, that may be opened and closed by the attendant at pleasure. C is a pipe or cylinder similar to B, opening into and extending downward from the under side of the opposite end, $A^2$, of the retort. It is provided with a valve, *b*, similar to *a* in pipe B.

The ends of the retort are closed by bonnets D D′, each formed of a plate, *e*, from which projects a tubular body, *f*, preferably closed at the inner end, made to fit accurately into the end of the retort, and to cover and close the inner ends, respectively, of pipes B and C, when pushed into the retort, so that the plate *e* is in contact with the end of the retort. The arrangement is such that when the bonnets are partially withdrawn, the inner ends of the said pipes will be opened, respectively, and when the tubular parts are pushed entirely into the retorts the said pipes will be closed.

E is a scraper, composed of a head, *g*, and handle *h*, screwed into it. The head is intended to remain at all times within the retort, and the handle runs through a hole in the head-plate *e* of the bonnet D, the handle being long enough to enable the operator to slide the head back and forth over the bottom of the retort its entire length.

The rake F is similar to the scraper, except that its head *g′* is furnished with teeth or projections in its lower edge, as represented in Fig. 4. It is arranged to operate from the end $A^2$ of the retort, the handle running through a hole in the plate *e* of the bonnet D′. From the inner ends of each of the bonnets project two short pointed rods, *j*; and the scraper and rake-heads may each be provided with two holes, *j′*, so arranged that when the said heads are drawn into contact with the inner ends of the bonnets the said rods will pass through the said holes, as seen in Fig. 5. When this is done the handles *h h′* may be detached from the heads by simply unscrewing the same, leaving the heads suspended on the rods *j*.

The holes through the outer ends of the bonnets may be made somewhat larger than the scraper and rake handles, and provided with short tubes *k*, Fig. 5, projecting outward from the bonnets, and on these tubes may be placed caps *k′*, provided with holes just large enough to permit the handles to slide in them. The purpose of such construction and arrangement of parts is to permit a view to be obtained of the interior of the retort while heated without removing the bonnet, which may be done, as is evident, by merely drawing the scraper-head up onto the parts *j*, detaching and withdrawing the handle and removing the cap *k′*.

*i* is a pipe leading from the upper side of

the retort down into water, which may be contained in any convenient receptacle. It serves the purpose of permitting the ready escape of vapor or gas that may be generated or liberated in the process of calcination. The water into which the end of the pipe dips seals the same against the admission of air into the retort.

Any suitable number of these retorts may be set in an arch in connection with a fireplace. In Fig. 1 three are represented as thus set, and arranged to be heated from the fireplace $A^3$.

The pipes B and C should each have capacity to contain between its valve and the retort a quantity of the material to be calcined sufficient to constitute a single charge of the retort. This retort is specially adapted to calcine bones or any earthy matter.

The operation of this apparatus is as follows: The lower end of the pipe B being closed by the bonnet D, the valve *a* is opened and the pipe is filled with the charge of material to be calcined, which must, of course, be broken into pieces of suitable size to pass into and through the pipe. The valve *a* is then closed and the bonnet D is withdrawn sufficiently to open the lower end of the pipe, when the material will descend into the retort. Then with the scraper E, the pipe C being closed by the bonnet D′, the charge is pushed to the opposite end of the retort, or partially distributed over its bottom, and the equal distribution is completed with the rake F. When the calcination is completed the bonnet D′ is withdrawn so as to open the pipe C, the valve *b* being closed, and with the scraper the contents of the retort are pushed to the end $A^2$, and caused to fall down into said pipe. Then the upper end of pipe is closed by replacing the bonnet D′, and valve *b* is opened, allowing said contents to be discharged from the pipe. Thus repeated charges of material may be introduced into and discharged from the retort without the admission of air into the latter or the reduction of its heat otherwise.

The bonnets D D′ may be furnished with handles or rings *l* secured on their outer ends, or they may be slid back and forth in the ends of the retort by any suitable mechanical device, such as a screw connected to the head of the bonnet by a loose joint, permitting the screw to revolve and working in a nut in a bracket or yoke extending across the front of the bonnet at a suitable distance from it.

I am aware that retorts have been provided with scrapers for distributing and for removing the contents of the retorts, having handles that work in holes in the plates forming the fronts of the covers.

I do not claim such scrapers, broadly, but only the combination herein described, of which a scraper is one of the elements.

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

1. The combination, with the retort A, of a pipe opening into and extending from the retort, and provided with a valve, *a*, at or near its outer end, and the bonnet D for the purpose of opening and closing the inner end of said pipe, as and for the purpose described.

2. The combination, with the rake described, of the retort A, pipe B, valve *a*, and bonnet D, wherein the rake may be moved back and forth over the bottom of the retort, its handle passing through a hole in the head of said bonnet, as and for the purpose described.

3. The combination, with the retort A, of the pipe B, opening into and rising upward from the upper side of said retort, at or near one end thereof, the pipe C, opening into and extending downward from the lower side of said retort at or near its opposite end, provided, respectively, with valves *a* and *b*, and the bonnets D D′, for the purpose of opening and closing, respectively, the inner ends of said pipes, as and for the purpose described.

GEORGE D. DAVIS.

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B. S. CLARK.