2 Sheets—Sheet 1

M. NICHOLS

Retort for Making Gunpowder Charcoal.

No. 197,942. **Patented Dec. 11, 1877**

FIG. 2.

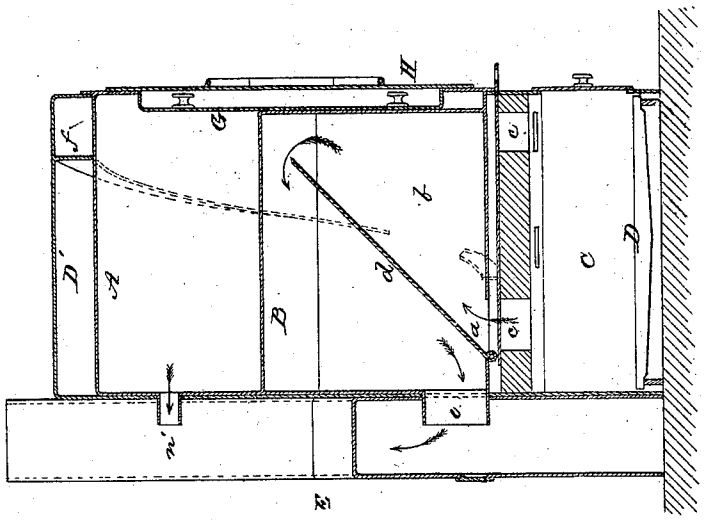
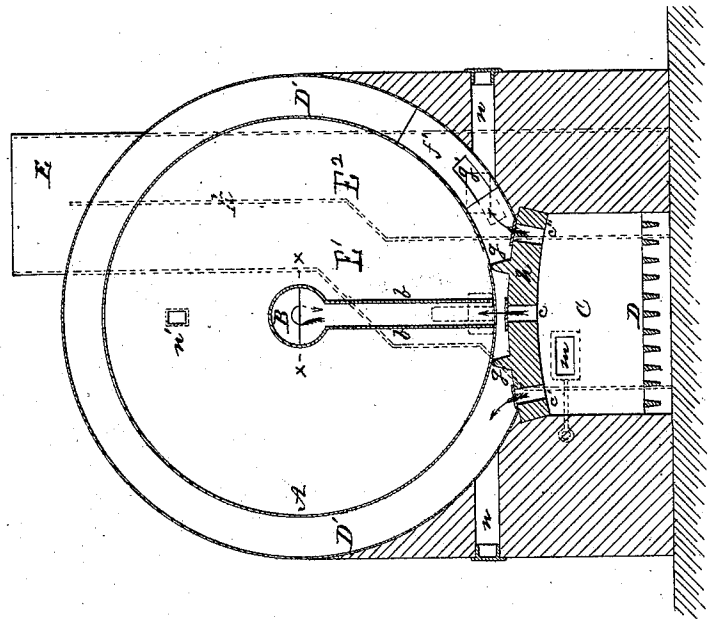


FIG. 1.



WITNESSES:

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L. Bacon

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by W. Morris Smith
Atty

INVENTOR.

2 Sheets—Sheet 2.

M. NICHOLS

Retort for Making Gunpowder Charcoal.

No. 197,942. **Patented Dec. 11, 1877**

FIG. 4.

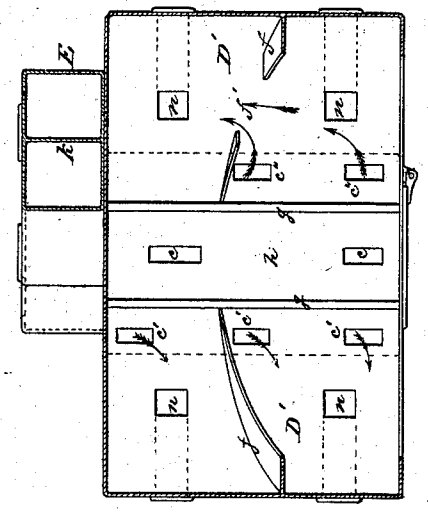
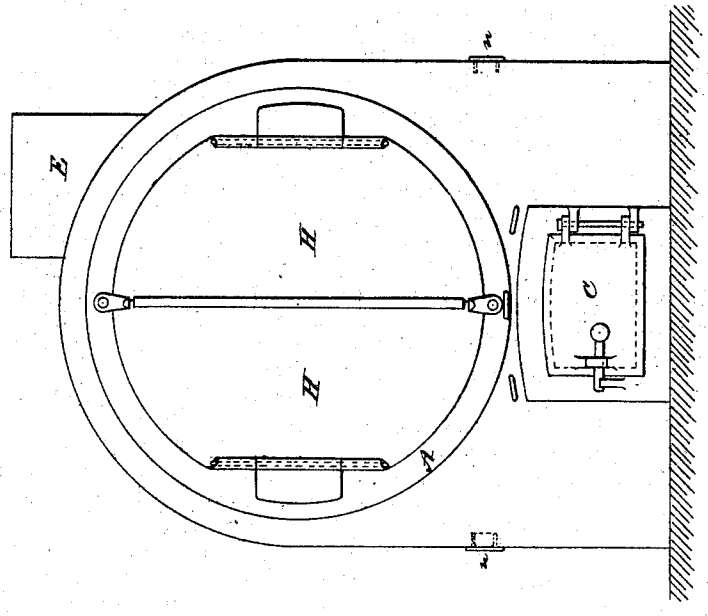


FIG. 5.

FIG. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

MOSES NICHOLS, OF NEWBURG, NEW YORK.

IMPROVEMENT IN RETORTS FOR MAKING GUNPOWDER-CHARCOAL.

Specification forming part of Letters Patent No. **197,942**, dated December 11, 1877; application filed July 26, 1877.

To all whom it may concern:

Be it known that I, MOSES NICHOLS, of Newburg, in Orange county and State of New York, have invented an Improved Retort for Making Charcoal and Extracting the Acids from Wood for Chemical Purposes, of which the following is a specification:

The object of my invention is to provide a retort and furnace for making charcoal for the manufacture of gunpowder, and for the distillation of pyroligneous acids for medicinal and chemical purposes, of more uniform quality than has hitherto been produced from retorts as ordinarily constructed, owing to the uneven application of the heat from the furnace, whereby the outer portions of the contents of the retort are generally burned too much, while the interior is not sufficiently burned, resulting in a loss of wood, and a variable quality of charcoal unfit for the particular purpose designed; and it consists in a novel arrangement of flues and diaphragms both around and within the retort; also, in provision for extracting and preserving the acids evolved during the process of burning, as will be more particularly described hereinafter by referring to the accompanying drawings, in which—

Figure 1 represents a vertical transverse section of a retort and furnace embracing my improvements. Fig. 2 is a vertical longitudinal section thereof. Fig. 3 is a front elevation of the same. Fig. 4 is a horizontal section, showing the flues, the retort being removed; and Fig. 5 is a horizontal section of the central flue, taken on the line *x x* on Fig. 1, looking downward.

The same letters appearing on the several figures indicate like parts.

A represents a cylindrical retort, which, to hold half a cord of wood, should be about four feet four inches in length, and five feet four inches in diameter, in the center of which is a tube, B, supported by walls *b*, extending down to the bottom and closed at both ends. At the bottom it connects with two apertures, *a a*, in the bottom of the retort, over the arch of the furnace C, in which are two corresponding apertures, *c c*. The space between the walls *b*, and within the upper cylindrical portion B, constitutes a flue, in which is an inclined diaphragm, *d*, terminating in a semicircular form at the center of the tube B, which causes the gases of combustion to ascend on the front of said diaphragm, passing over its upper edge in the cylinder B, and thence downward to its connection with the chimney at *e*, by which the wood in the central portion of the retort is exposed to a similar degree of heat as that near the periphery.

The furnace C, for a retort of the size above mentioned, should be about sixteen inches in width, and fourteen inches between the bars D and the crown of the arch *h*, which, with the walls of the fire-place, should be built of fire-brick. On the top of this arch I form two ribs, *g*, extending its whole length, one on either side of the apertures *c c*, on which ribs the retort rests, so as to prevent the escape of any of the gases rising through said apertures without passing through the central flue in the retort, as above described.

Above the furnace is formed a cylindrical flue, D′, slightly larger than, and concentric with, the retort. This flue is divided by an inclined partition, *f*, rising from near the back end of the arch *h*, and inclining toward the front at the top of the retort, to direct the heat to the upper front side thereof. In that side of the arch *h* farthest from the chimney are three apertures, *c′ c′ c′*, one of which is behind the partition *f*, and the other two in front of it; and in the other side of the arch are two apertures, *c″ c″*, in front of the partition *f*, which is cut away at *f′*, a little above the opening *g′*, near the bottom of the flue D′, communicating with the chimney. This partition *f* of the flue causes the gases of combustion to circulate all around the retort, distributing as nearly as possible an equal degree of heat over its entire periphery.

I furthermore construct the chimney E with a dividing-wall, *k*, forming two flues, E^1 and E^2—the one to receive the gases from the central flue of the retort, and the other those which pass around it.

In the back of the furnace is an opening, *m*, communicating with the chimney, which, when the wood in the retort is being charred, is to be closed by a damper, and when it is sufficiently burned this damper is to be withdrawn, and all the apertures in the arch *h* above the furnace closed by their respective

dampers, which will cause all the heat from the furnace to pass direct to the chimney without affecting the retort, and for the cooling of which I provide a series of flues, *n*, communicating with the main flue around the retort, which may be opened to admit cold air from the outside.

The retort is provided with an inner and outer door at the front end. The inner one, G, after the retort is charged, is put in place and sealed perfectly tight, in the usual manner, to prevent the escape of acid vapors and admission of air. The outer doors H, which are hinged at each side, are then closed over the inner one, to retain the heat while the charring is going on. I also provide an opening, *n'*, in the rear of the retort, with a tubular extension for the escape of the acid vapors of the wood, which may be conducted by a pipe to a suitable condenser, to be utilized for medicinal or chemical purposes.

What is herein claimed as new, and desired to be secured by Letters Patent, is—

1. The inner flue B, in combination with the retort A, substantially as described.

2. The central flue B in the retort, in combination with the flue E^1 in the chimney, for operation as set forth.

3. The annular flue D', surrounding the retort, and divided as described, in combination with the flue E^2 in the chimney, substantially as shown and described.

4. The arrangement of the partition *f* in the annular flue D', to direct the greater portion of the gases of combustion toward the front upper side of the retort, as shown and described.

5. The combination, in a retort, of the inner and outer doors G H, substantially as and for the purposes set forth.

6. The air-flues *n*, in combination with the annular flue D', for the purpose specified.

MOSES NICHOLS.

Witnesses:
HOWARD THORNTON,
JOHN L. SLOAT.