(No Model.) 2 Sheets—Sheet 1

L. HANSEN & A. SMITH.

APPARATUS FOR DISTILLING WOOD.

No. 333,750. Patented Jan. 5, 1886.

Fig. 1.

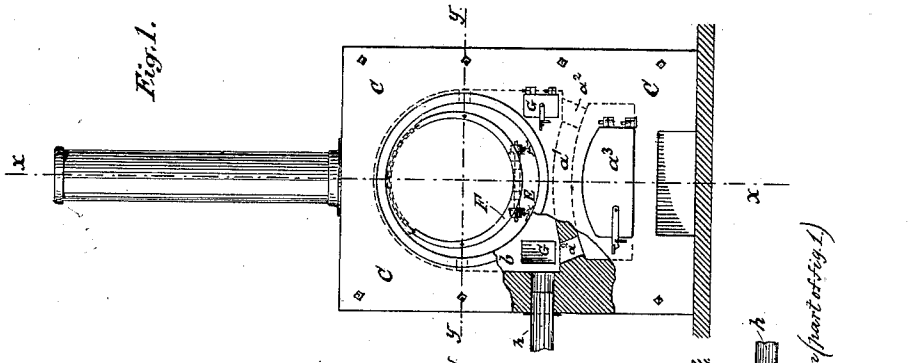
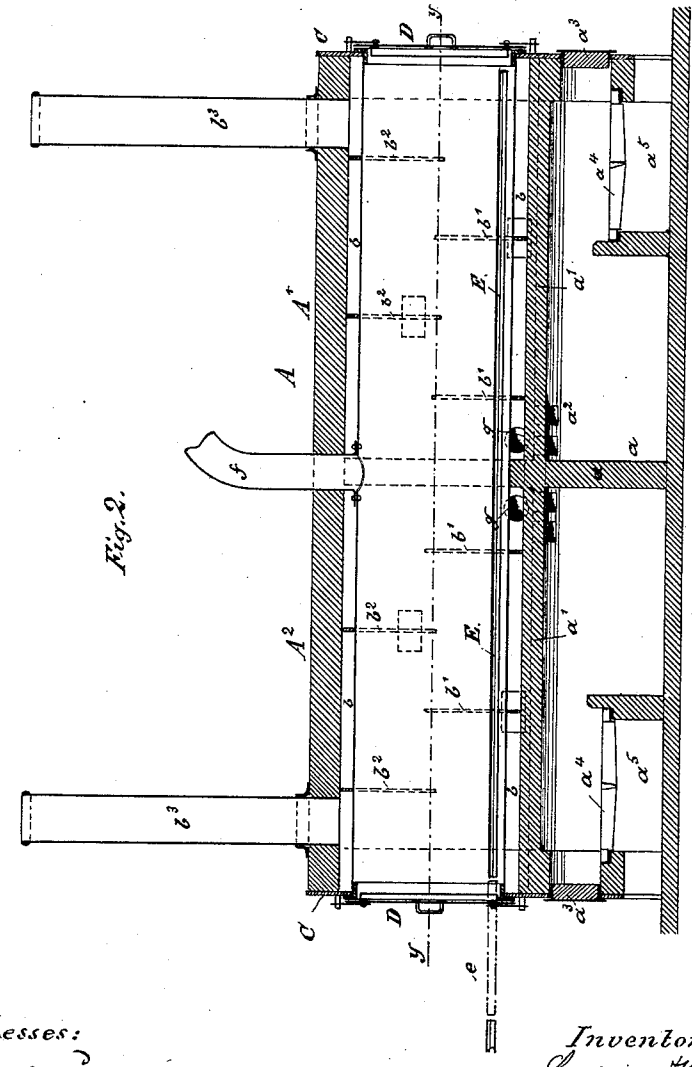
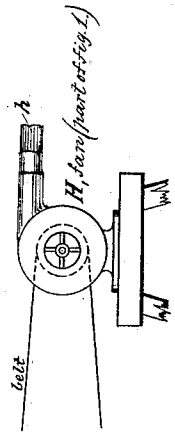


Fig. 2.





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Attorney

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

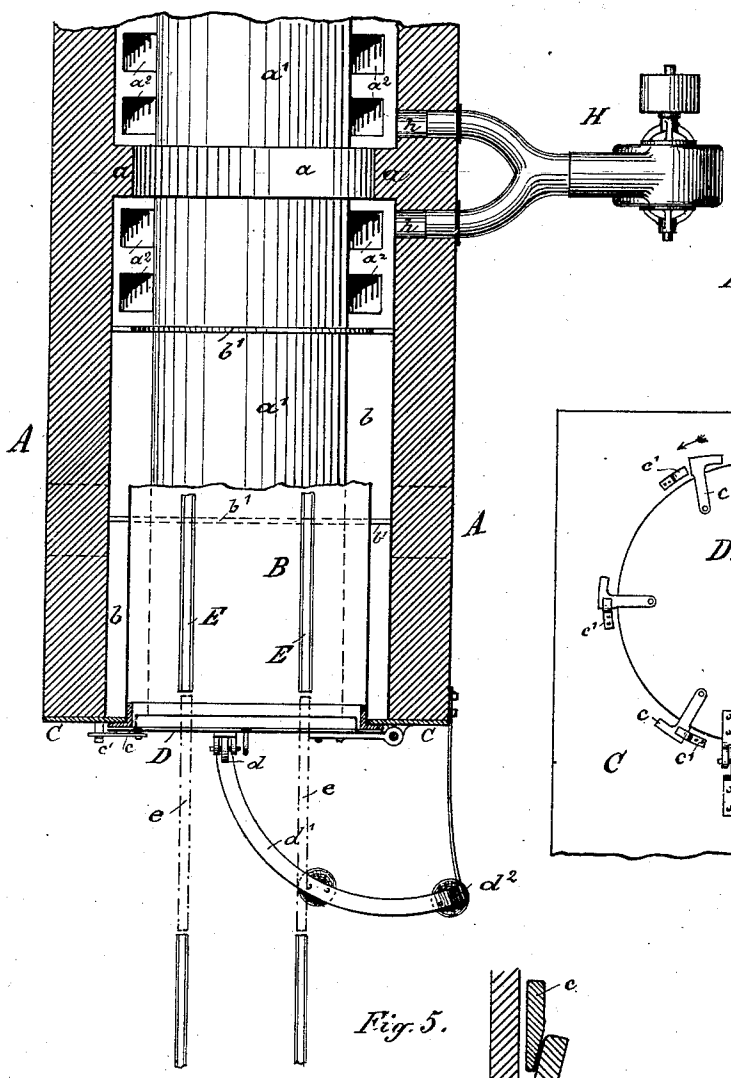


Fig. 4.

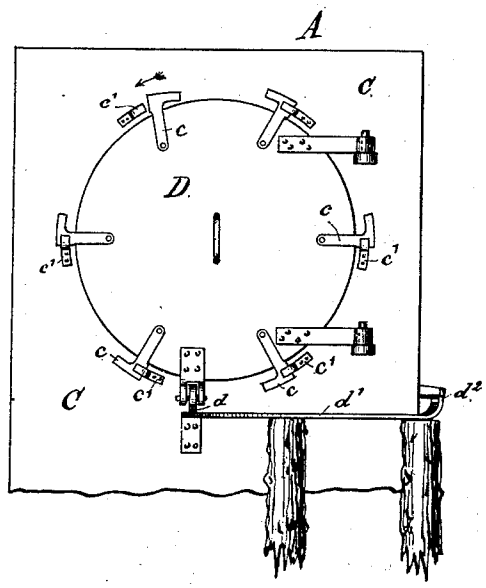
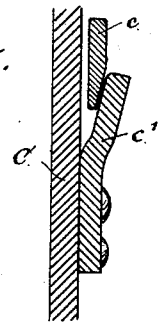


Fig. 5.



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UNITED STATES PATENT OFFICE.

LUDVIG HANSEN AND ANDREW SMITH, OF WILMINGTON, N. C.

APPARATUS FOR DISTILLING WOOD.

SPECIFICATION forming part of Letters Patent No. 333,750, dated January 5, 1886.

Application filed October 10, 1885. Serial No. 179,479. (No model.)

To all whom it may concern:

Be it known that we, LUDVIG HANSEN and ANDREW SMITH, citizens of the United States, and residents of Wilmington, in the county of New Hanover and State of North Carolina, have invented a new and useful Improvement in Retort-Furnaces for Making Wood Creosote, of which the following is a specification.

Our invention relates to an apparatus for the dry distillation of wood for abstracting the spirits, pyroligneous acid, &c., but more especially the creosote contained therein, to be utilized for the preservation of timber, and for other purposes.

The object of the invention is to provide improvements in the construction of a retort-furnace for the manufacture of creosote from wood, whereby the retort may be more rapidly heated for promoting the process, and more rapidly cooled than heretofore when it is desired to remove the old charge in order to substitute a new one.

The improvements will be hereinafter fully described, and specifically pointed out in the claims, reference being had to the accompanying two sheets of drawings, in which—

Figure 1 represents a front or end view of the apparatus, the end cover of the retort being removed and parts broken out to show the construction. Fig. 2 is a longitudinal section of the same, taken on the line *x x* of Fig. 1. Fig. 3 is a partial horizontal section taken on the line *y y* of Figs. 1 and 2. Fig. 4 is a front or end view of the furnace with the door or end cover closed. Fig. 5 is a detail showing the manner of tightening the retort-cover.

A is the masonry or brick furnace holding the retort. B is the retort, being an iron cylinder supported in the end walls of the furnace A.

Heretofore we have supported the ends of the retort directly upon and in contact with the end walls of the furnace, (sixteen inches thick,) but have found that (owing to the fact of the brick retaining its heat so much longer than the iron) that portion of the retort which is in direct contact with the brick wall will remain heated for a long time after the rest of the retort has got cold, thereby keeping the acidulous residue moist where in contact with the hot part, and rapidly deteriorating the iron. To prevent this, we cover the end walls of the furnace with iron plates or frames C, resting the ends of the retort in closely-fitting openings in the said frames C, and leaving an air-space clear around the entire retort, as shown in Figs. 2 and 3.

The retort is preferably made very long—say twenty-five or twenty-six feet—and adapted to hold conveniently six cords of wood. For rapidly heating a retort of this size, the furnace A is made double, being divided centrally by a cross-partition, *a*, in two exactly similar parts, A′ A^2, this partition, where in contact with the retort B′, being made as thin as it judiciously can be to not prolong the cooling of the retort.

The two parts A′ A^2 of the furnace being alike, the description of one will apply to the other. The fire-place is covered with a brick arch, *a′*, provided at its inner ends with flue-openings a^2, the fuel being inserted through the fire-place door a^3 in the outer end wall, a^4 being the grate, and a^5 the ash-pit. The side walls of the furnace run up vertically, and then are joined by an arch above the retort B, leaving a space, *b*, all around the retort.

In order to circulate the heat and gases of combustion, so as to heat all parts of the retort rapidly and uniformly, the space *b* is divided at proper intervals by partitions placed alternately below and above the retort and high or deep enough to surround, respectively, the lower and upper semicircle of the latter. The lower said partitions, *b′*, are preferably made of thin molded slabs of fire-clay, and the upper partitions, b^2, of iron plates. The space between the arch *a′* and the retort prevents the flame from impinging upon the latter, which would have the effect to overheat and burn some parts of the same, thereby acting also unevenly upon the wood in the retort, and the end flues, a^2, being at the side instead of in the middle of the arch, and at the inner end thereof, (see the broken-out part of Fig. 1,) the heated gases will strike the side walls first and expand in the space *b* before striking the retort. They will then pass, as indicated by the arrows in Fig. 2, to the upper part of the space *b;* then forward and down along the first partition, b^2, to the lower part of the space; then up along the second lower partition, *b′*, and again to the upper

part of the space; then down again along the second upper partition, b^2, to the lower part of the space b, and finally up to the upper part of the space and out through the stack b^3, thus successively rising and diving around all parts of the retort as many times as may be desired, and determined by the number of partitions used. It will be seen that for every time the gases move downward they become reheated, in a measure, by contact or proximity to the heated arch a', thus replacing the heat just previously imparted by them to the upper part of the retort.

D are the doors or end covers of the retort, each one being hinged to the frame C in the usual manner; and in order to relieve the weight on the hinges the door is provided underneath with a roller, d, pivoted between two lugs, which roller works upon a curved rail, d', which at its outer end is provided with a stop, d^2, to limit the movement of the door when it is sufficiently open. The door has on the inside a cylindrical pan or inward projection fitting within the retort, and of the same or a little greater depth than the thickness of the frame C at its point of contact with the retort.

In order to keep the doors air-tight against the retort ends, they are provided with latches c, whose inner ends are pivoted to the door, while the outer ends are made wedge-shaped, as shown in Figs. 4 and 5, and adapted, when the door is closed, to engage keepers or hooks c, which are either cast upon or attached to the frame C. The said keepers are beveled on the inside, as shown in Fig. 5, in order that the wedge-latch c, when hammered down or depressed in the keeper, will also force the door tighter against the retort end.

The retort is provided with an interior rail-track, E, onto which are brought from an outer track trucks F, loaded with wood, and constructed in such a manner, as shown in Fig. 1, as to keep the wood from direct contact with the retort. The outer and inner tracks are connected by loose rail-pieces e, removable, to allow of opening and closing the doors. The products of the dry distillation of the wood pass off through the pipe f to a condenser in the usual manner. The wood having been thoroughly charred and the desired products abstracted therefrom, the fires are put out and the furnace cooled, so as to enable the taking out of the charcoal and putting in a new charge of wood. In order to hasten this cooling, (which heretofore has occupied about thirty-six hours,) and thus to save considerable time, we have provided the following means: At each end of the furnace, near the corners of the space b, are arranged ventilating-doors G, and at the inner end of the said space through the side wall of the furnace are openings g, through which connection is made by pipes h with the fan-blower H.

In cooling the furnace the doors G are first opened, while the door a^3 and the ash-pit a^5 are closed, and after the first strong draft caused by the influx of the air through the doors G has subsided, the doors G are closed and the fan-blower started, thus forcing the cold air through the fire-flues in the direction of the arrows in the same path as the gases of combustion passed before to heat the retort. By these means a comparatively very rapid cooling of the furnace is effected and a great deal of time saved.

Having thus described our invention, what we claim as new in a retort-furnace for treating wood, and desire to secure by Letters Patent, is—

1. A furnace, A′, having fire-place provided with arch a' and flues a^2 at opposite sides through the inner end of said arch, and a retort or cylinder, B, set in the said furnace above said arch and surrounded by an air-space, b, in combination with transverse partitions b' b^2, dividing alternately the lower and the upper half of the said space b, for circulating the heat round the said retort, in the manner hereinbefore set forth.

2. The combination of the double furnace A, provided with the arches a' and flues a^2, with the retort B and the air-space b, surrounding the said retort and divided by alternate transverse partitions b' b^2.

3. The combination of the double furnace A, provided with the arches a' and flues a^2, with the retort B and the air-space b, surrounding the said retort and divided by alternate transverse partitions b' b^2, and having ventilating end doors, G.

4. The combination of the double furnace A, provided with the arches a' and flues a^2, with the retort B, having end doors, D, provided with latches c, and the air-space b, surrounding the said retort and divided by alternate transverse partitions b' b^2, and having ventilating end doors, G.

5. The combination, with a retort-furnace, A B, having openings g leading to its flues, of a fan or blower, H, connected to said openings to force a current of air through said flues for the rapid cooling of the retort.

6. The combination of the retort double furnace A, having around its retort air spaces or flues b, provided with ventilating end doors, G, with the fan-blower H, connected to force a current of air through the said flues at opposite sides of the partition a, dividing the said furnace.

In testimony that we claim the foregoing as our invention we have signed our names, in the presence of two witnesses, this 28th day of September, 1885.

LUDVIG HANSEN.
ANDREW SMITH.

Witnesses:
J. T. McIvor,
R. G. Heide.