

(No Model.)

2 Sheets—Sheet 1.

D. & J. S. HILL.
DRYING KILN.

No. 579,709.

Patented Mar. 30, 1897.

Fig. 1

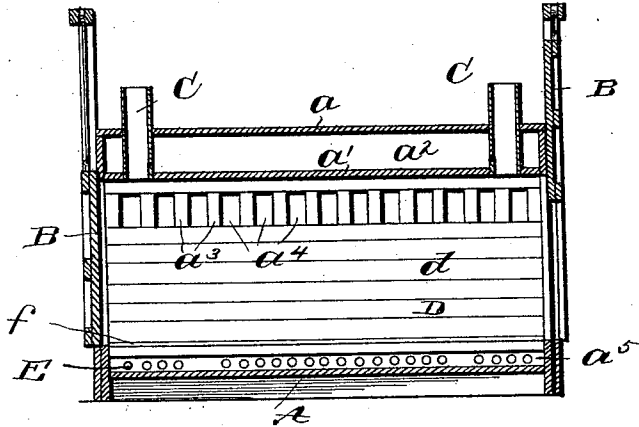


Fig. 2

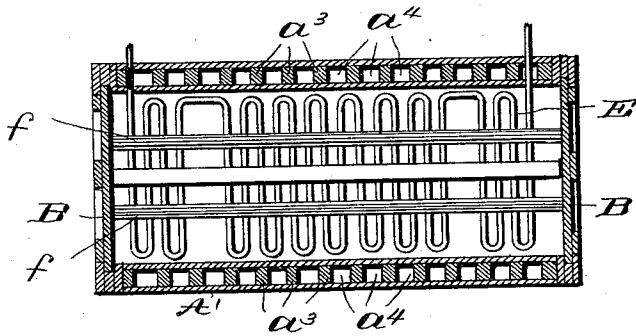
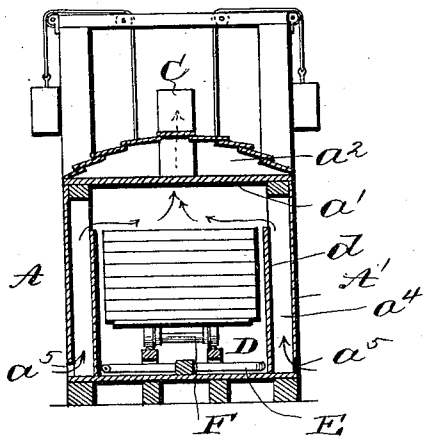


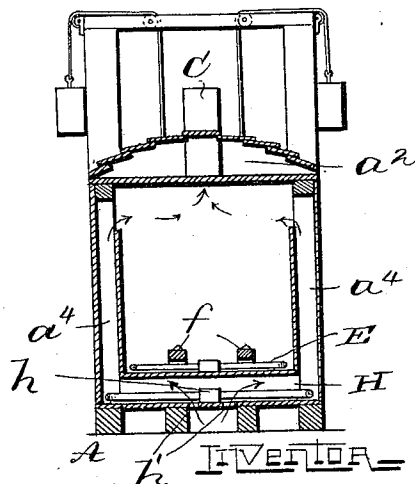
Fig. 3



Witnesses—

GA. Rauberschnitt,
J. D. Kungberg

Fig. 4



David Hill and James S. Hill
By *White & Black*
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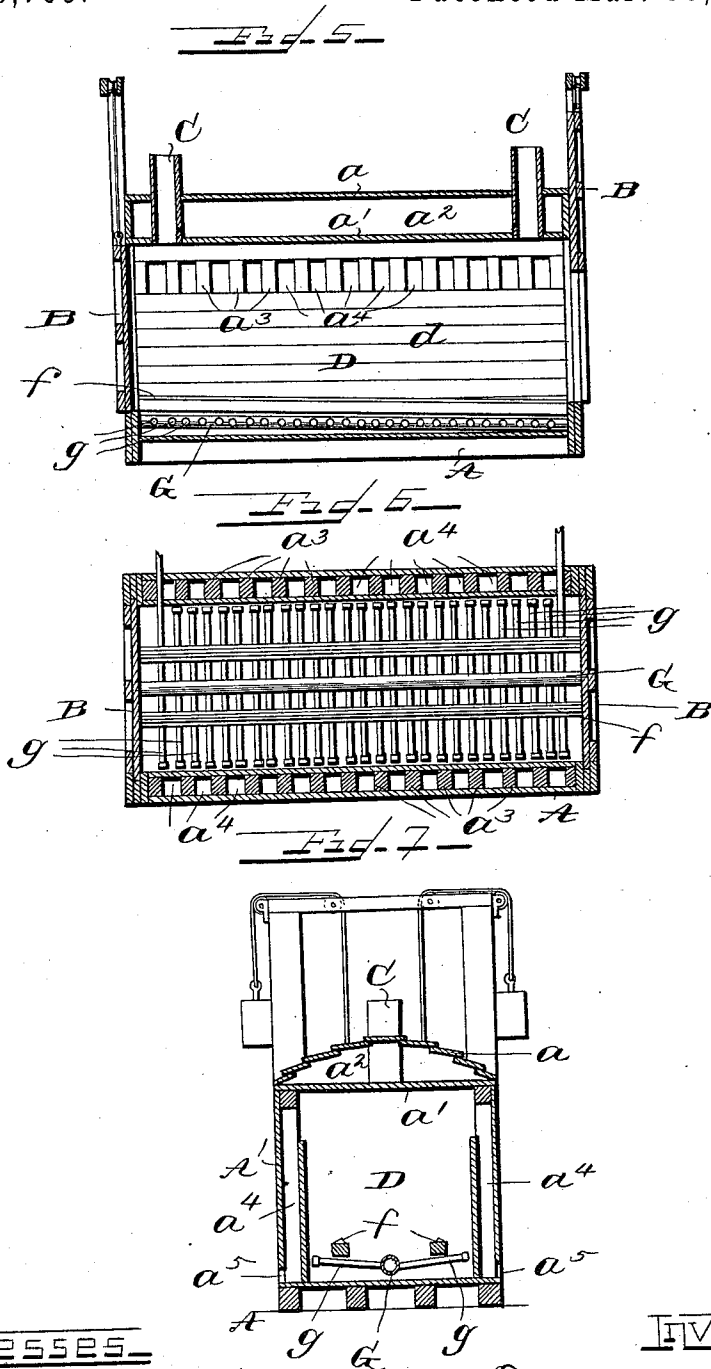
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WITNESSES—

G. A. Rauberschnitt,
J. D. Kingsbury

INVENTOR—

David Hill & James S. Hill
By Whitaker & Brewster
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UNITED STATES PATENT OFFICE.

DAVID HILL AND JAMES S. HILL, OF WASHINGTON, NORTH CAROLINA.

DRYING-KILN.

SPECIFICATION forming part of Letters Patent No. 579,709, dated March 30, 1897.

Application filed September 23, 1896. Serial No. 606,701. (No model.)

To all whom it may concern:

Be it known that we, DAVID HILL and JAMES S. HILL, citizens of the United States, residing at Washington, in the county of Beaufort and State of North Carolina, have invented certain new and useful Improvements in Drying-Kilns; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention is an improvement in drying-kilns adapted particularly for drying lumber; and it consists in the novel features herein-
after described, reference being had to the accompanying drawings, which illustrate our invention, and it is fully disclosed in the following description and claims.

Referring to the drawings, Figure 1 represents a longitudinal sectional view of a kiln embodying our invention. Fig. 2 represents a horizontal sectional view of the same. Fig. 3 is a vertical transverse sectional view. Fig. 4 is a view similar to Fig. 3, showing a slightly-modified construction. Figs. 5, 6, and 7 are views similar, respectively, to Figs. 1, 2, and 3, showing a different arrangement of the heating-pipes and truck-supporting rails.

A represents the house or kiln proper, which is preferably of elongated rectangular shape and is provided at each end with a sliding door B and at the top with one, two, or more stacks or flues C C. We prefer to form the roof *a* of the kiln in the ordinary angular or curved form and to provide a ceiling *a'* beneath it, thereby forming an air-chamber *a''* between said ceiling and the roof to prevent radiation and loss of heat from the interior, and the stacks C will therefore extend down through said air-space and having the lower ends register with the openings in the ceiling *a'*, as shown.

Within the kiln is an inner chamber D of less width than the kiln proper and extending throughout its length, closed hermetically at its bottom and sides, but open at the top, as shown; the sides or walls *d* of the inner chamber being set a short distance from the outer walls of the kiln and providing air-passages between the two walls. We find it convenient in building the kiln to arrange a series of vertical supports or studs *a'''* along

the sides of the structure and to secure the outer walls of the kiln to the outside of said studs and the walls of the inner chamber to the inner walls of the studs, thus separating the two walls and providing vertical air-spaces *a'''* between the studs, as shown in the drawings. The exterior wall A' of the kiln is provided adjacent to its bottom with openings communicating with the vertical air-passages *a'''* between the walls, so that air is free to enter said openings, pass upwardly through said passages, and enter the kiln over the top of the inner or drying chamber D, as will be readily seen in Fig. 3. These openings can be conveniently provided by leaving off the bottom strip of the weather-boarding which forms the outer wall of the kiln, as will be readily understood, and as indicated at *a''''* in the drawings.

Within the drying-chamber D and adjacent to the bottom thereof we provide a horizontal steam heating-coil E, which extends the entire length of the chamber and is connected with a suitable steam-supply. (Not shown.) Above the steam heating-coil we provide means for supporting the lumber to be dried. In this instance we have shown the drying-chamber provided with suitable rails *ff* to support a truck F, upon which the lumber is piled and run into the kiln. Horizontal rails are shown in Figs. 1 to 4, but the rails may be inclined, as shown in Figs. 5 to 7, if desired. In Figs. 1 to 4 we have shown an ordinary horizontal steam-coil. In Figs. 5 to 7 we have shown a different form of coil, in which G represents a longitudinal central pipe extending throughout the drying-chamber in an inclined position like the rails *ff*. From the central pipe G numerous lateral branch pipes *g* extend to the sides of the chamber, and these pipes incline upwardly from the pipe G. As a result of this construction the water of condensation will flow from all the pipes *g g* into the main pipe G and all the water of condensation in pipe G will flow toward its lower end, where it will be conducted back to the boiler. This operation will be facilitated by having the live steam enter the coil at its higher end.

The operation of the kiln is as follows, reference being had particularly to Fig. 3: The lumber being placed in the inner or drying

chamber and steam admitted to the heating-coil, the heat given off from said coil produces a steady and even evaporation of the moisture from the lumber. The moisture in the form of vapor ascends to the space above the lumber. A current of normal dry air will enter the kiln adjacent to its bottom and pass up the passages a^4 between the two walls, the heat from the inner wall being sufficient to produce an upward current, and these currents of dry air are discharged directly into the space above the lumber, where they absorb the vapor in said space and pass out through the stacks, thus positively removing the moisture from the kiln as rapidly as it is removed from the lumber. The operation can be conducted with a low steam-pressure, it is even and regular, and the danger of cracking, warping, or bluing the lumber is avoided. A high degree of heat can be maintained in the drying-chamber with a low steam-pressure, as there are no currents of cold air passing upward through the drying-chamber, as in many kilns, to lower the temperature by extracting heat during their passage through the chamber.

In some cases it may be found advantageous to heat the incoming currents of air before passing them into the kiln to facilitate the removal of the vapor from the kiln without losing heat, and in Fig. 5 we have shown a construction adapted for this purpose. In this construction the kiln proper is provided with a supplemental heating-chamber H beneath the drying-chamber, provided with a steam heating-coil h , said chamber being directly connected with the vertical passage or passages between the drying-chamber and the outer walls of the kiln, as shown. Air is admitted to the drying-chamber by means of suitable openings or ports h' beneath the steam-coil h and becoming heated and expanded passes up through the vertical passages before referred to and is discharged into the space above the lumber, where it readily absorbs the aqueous vapors and carries them out through the stacks.

What we claim, and desire to secure by Letters Patent, is—

1. In a drying-kiln, the combination with a drying-chamber, sealed at its bottom and sides and having a discharge-passage communicating with the top of said chamber, of means for admitting currents of air through

said drying-chamber adjacent to its top, and a heating device in said drying-chamber adjacent to its bottom, substantially as described.

2. In a drying-chamber, the combination with an inclosing casing provided adjacent to its top with a discharge-passage, a drying-chamber within said casing sealed at its bottom and sides but communicating at its upper end with said discharge-passage, vertical air-passages at each side of said drying-chamber communicating with the outer air at their lower ends, and at their upper ends discharging into said casing above the top of the drying-chamber and a heater in said drying-chamber adjacent to its bottom, substantially as described.

3. In a drying-kiln, the combination with a drying-chamber sealed at its bottom and sides and having a discharge-passage communicating with the top of said chamber, of means for admitting air to said chamber adjacent to its top, a heating device for said air, and a heating device located in the bottom of said drying-chamber, substantially as described.

4. In a drying-kiln, the combination with a drying-chamber sealed at its bottom and sides and having a discharge-passage communicating with its upper end and a heater in the bottom of said chamber, of an auxiliary heating-chamber, passages extending from said chamber to the top of said drying-chamber, a heater in said heating-chamber and means for admitting air to said heating-chamber, substantially as described.

5. In a drying-kiln, the combination with the drying-chamber, of a heating device therefor consisting of a central supply-pipe, inclined to discharge the water of condensation and a plurality of lateral branch pipes connected directly with said central pipe, extending therefrom on opposite sides and inclined upwardly from said central pipe, the only openings in said pipes being at their points of communication with said central pipe, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

DAVID HILL.
JAMES S. HILL.

Witnesses:

JOSEPH G. CHAMY,
GEO. W. BAKER.