(No Model.) 2 Sheets—Sheet 1.

D. & J. S. HILL.

DRYING KILN.

No. 589,895. Patented Sept. 14, 1897.

Fig. 1.

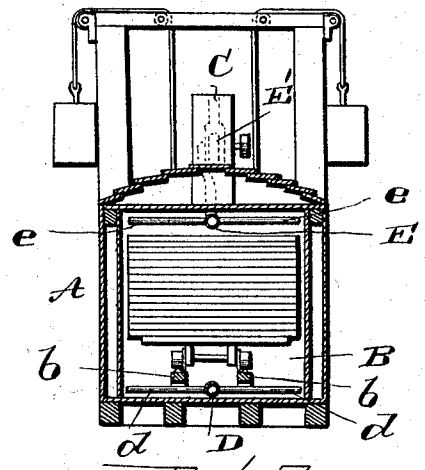


Fig. 2.

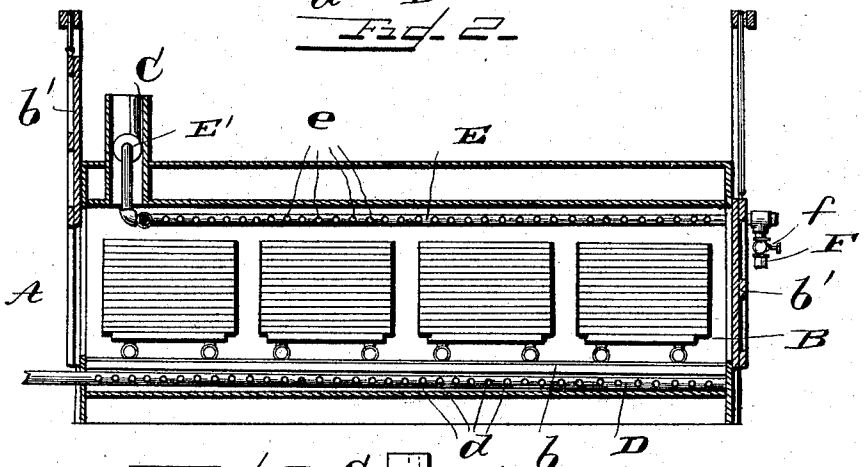


Fig. 3.

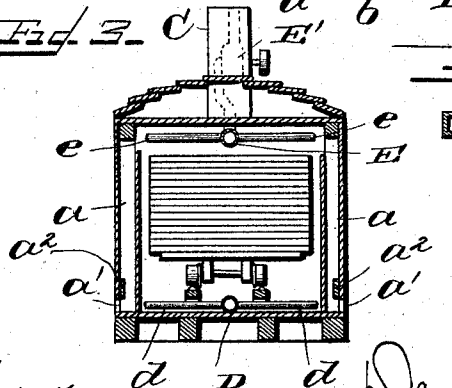
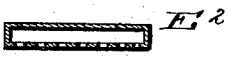


Fig. 3a.



Witnesses.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

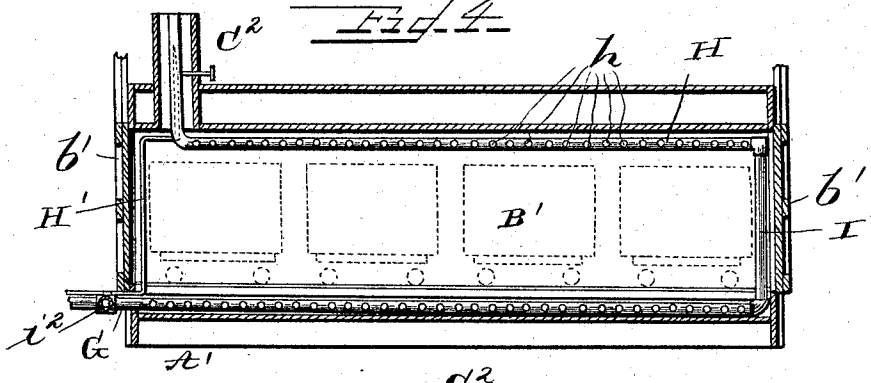


Fig. 5.

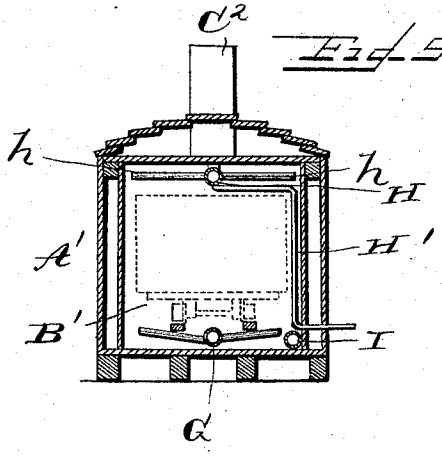


Fig. 6.

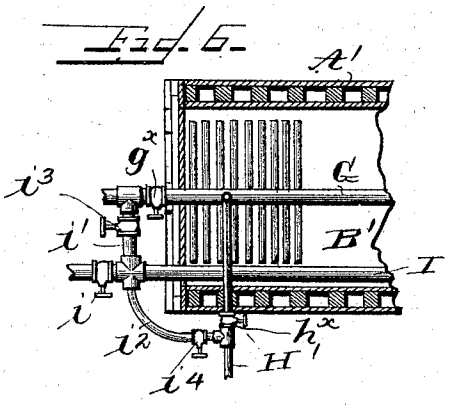
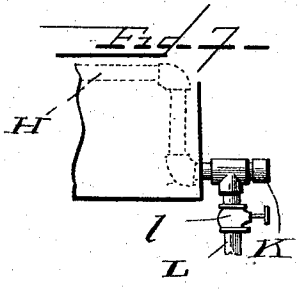


Fig. 7.



Witnesses.

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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. 589,895, dated September 14, 1897.

Application filed December 16, 1896. Serial No. 615,921. (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 especially for drying lumber; and it consists in the novel features hereinafter described, reference being had to the accompanying drawings, which illustrate our invention, and said invention is fully disclosed in the following description and claims.

Referring to the said drawings, Figure 1 represents a transverse vertical sectional view of a kiln embodying our invention. Fig. 2 is a longitudinal vertical sectional view of the same. Fig. 3 is a view similar to Fig. 1, showing a slight modification. Fig. 3^a is a transverse sectional view of a form of eduction-tube which we may employ. Fig. 4 is a longitudinal sectional view similar to Fig. 2, showing a slightly-modified form of kiln. Fig. 5 is a transverse sectional view of the same. Fig. 6 is a horizontal sectional view of a portion of the same. Fig. 7 is a horizontal sectional view of another portion of the kiln.

In the form of our invention shown in Figs. 1 and 2, A represents the kiln provided with a drying-chamber B, which is hermetically sealed at the bottom and sides and at the top is provided with one or more exit-flues or chimneys C, one being shown. The drying-chamber B is provided with the usual inclined track *b*, upon which trucks carrying the lumber can be rolled into and out of the kiln, which is closed at each end by a sliding door *b'* of any usual or preferred construction. In the bottom of the drying-chamber is a heating-coil consisting in this instance of a central pipe D, provided with lateral branches *d d*, through which steam is passed for heating the drying-chamber and the lumber. We provide means for removing from the drying-chamber the moisture which is driven out by the heating device in the form of vapor. In these figures we have shown an eduction-pipe E extending along the top of the drying-chamber above the lumber for the entire length of the kiln and provided with lateral branch pipes *e e* on each side. The main pipe E and the branches *e e* are all provided with perforations or holes to admit the vapor into the pipes, and at one end the main tube E is conducted up the flue C, where it is provided with a suitable exhaust. In this instance we show the tube E formed with an exhaust-fan E', but other forms of exhausting devices may be used, if preferred.

The operation of the kiln is as follows: The green lumber is placed in the kiln, the doors closed, and steam admitted to the steam-coil. The heat in the drying-chamber causes the moisture in the lumber to slowly vaporize and pass to the top of the drying-chamber. The exhausting device (operated by a belt from any suitable source of power) will suck the vapor into the eduction-pipe E and its branches and discharge it through the top of the stack or flue C. In this way the moisture is removed from the drying-chamber as rapidly as it is driven out of the lumber and there is no opportunity for it to get back again. The lumber cannot mildew or blue, and there is very little heat lost from the drying-chamber. Hence it is a very economical kiln to operate.

In Fig. 3 we have shown a slight modification of this form of kiln, in which vertical air-passages *a a* are provided at each side of the drying-chamber, which communicate therewith at the top of said chamber. In this instance a series of inlet-apertures *a' a'* are provided adjacent to the bottom of the kiln to admit air between the outer wall of the kiln and the wall of the drying-chamber. These apertures are controlled by suitable valves a^2 a^2, so that they can be closed, if desired. When they are open, the air enters through apertures *a' a'*, ascends the vertical passages *a a*, and passes over the top of the lumber, where it absorbs the moisture and is sucked or forced out through the eduction-pipe E. In Fig. 3^a we show another form of eduction-pipe which may be employed, the same consisting of a box E^2, polygonal in construction, having its bottom provided with perforations through which the moist vapor or the air and vapor is drawn.

We provide this form of kiln (shown in Figs. 1, 2, and 3) with means for resisting fire, which consists in this instance of a water-pipe F, connected to the end of the eduction-pipe farthest from the exhaust and provided with a valve *f*. In case of fire the exhaust is stopped and the valve *f* is turned on, thus filling the pipe E and branches with water, which flows in a shower through the apertures therein and floods the lumber, thus putting out the fire. The danger of fire is, however, very slight, as the drying-chamber when in operation contains very little air to support combustion and the moist vapor above the lumber would tend to prevent a flame from starting.

In Figs. 4 to 7, inclusive, we have shown another slightly-modified form of kiln embodying our invention. In these figures, A′ represents the kiln; B′, the drying-chamber, sealed at bottom and sides, as previously described, and communicating with the stack C^2 at the top. G represents the heating-coil, constructed as previously described. H represents the eduction-pipe, with branches *h*, as previously described, and H′ represents a steam-pipe which passes up through and discharges vertically in the portion of the pipe in the stack C^2, so as to serve as an exhaust in place of a fan to draw out the moisture from the top of the drying-chamber. This pipe H we preferably connect with the exhaust of a steam-engine; but it may be operated with live steam, if preferred, or a fan may be substituted for it, as in Figs. 1, 2, and 3. I represents an air-pipe which preferably passes longitudinally through the kiln at the bottom adjacent to the heating-coil and then passes upwardly and communicates with the eduction-pipe at the end farthest from the exhaust. The effect of the exhaust is therefore to draw in air through the air-pipe I, which is warmed by reason of its nearness to the heating-pipes and draws the warm air into the eduction-pipe, where it absorbs the moist vapor, also drawn into the eduction-pipes, and the whole is then discharged through the stack. In order to regulate the air-supply, we provide the pipe I with a cock *i* outside of the kiln. We prefer to connect the air-pipe I with both the steam-pipe *g* for the steam-coil and the exhaust-pipe H′ by means of pipes i' and i^2, provided with valves i^3 i^4, the said steam and exhaust pipes being provided with cut-off valves $g^\times$ and $h^\times$, respectively. By this means we can close the valves $g^\times$ and $h^\times$ and open valves i^3 i^4 and flood the entire kiln with live steam in case of fire. We may also run a branch pipe K from the rear end of the eduction-pipe H outside the kiln and connect with it a water-supply pipe L, provided with a cock *l*, as shown in Fig. 7, so that the lumber can be flooded with water should it become necessary.

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 a heating device in said chamber, and means for positively removing aqueous vapor from said chamber through said discharge-passage, substantially as described.

2. 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 a heating device adjacent to the bottom of said chamber and an exhausting device communicating with said discharge-passage, substantially as described.

3. In a drying-kiln, the combination with the drying-chamber sealed at its bottom and sides, of a heating device adjacent to the bottom of said chamber, means for admitting air to said chamber adjacent to its top, and an air-exhausting device for removing air from said chamber adjacent to its top, substantially as described.

4. In a drying-kiln, the combination with the drying-chamber, sealed at its bottom and sides, of a heating device adjacent to the bottom of said chamber, an eduction-pipe provided with a series of apertures adjacent to the top of the chamber, an exhausting device connected with said eduction-pipe, and a water-pipe connected with said eduction-pipe, and provided with a controlling-valve, whereby the contents of the drying-chamber may be flooded in case of fire, substantially as described.

5. In a drying-kiln, the combination with the drying-chamber, sealed at its bottom and sides, of a heating device located in said chamber adjacent to its bottom, an eduction-pipe adjacent to the top of said chamber having a series of apertures communicating therewith, an exhausting device connected with said eduction-pipe, and an air-pipe connected with said eduction-pipe and having a portion lying adjacent to said heating device, substantially as described.

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

DAVID HILL.
JAMES S. HILL.

Witnesses:
WILLIAM E. PEARCE,
JOHN W. DIXON.