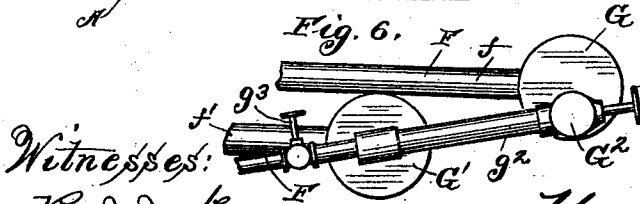
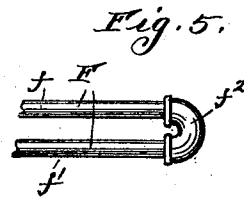
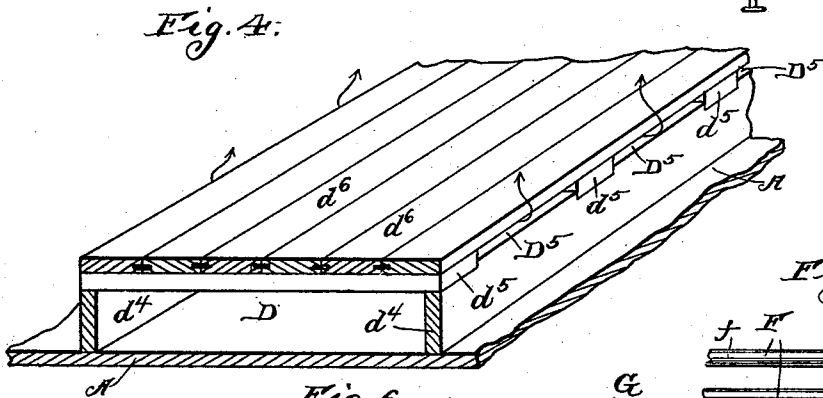
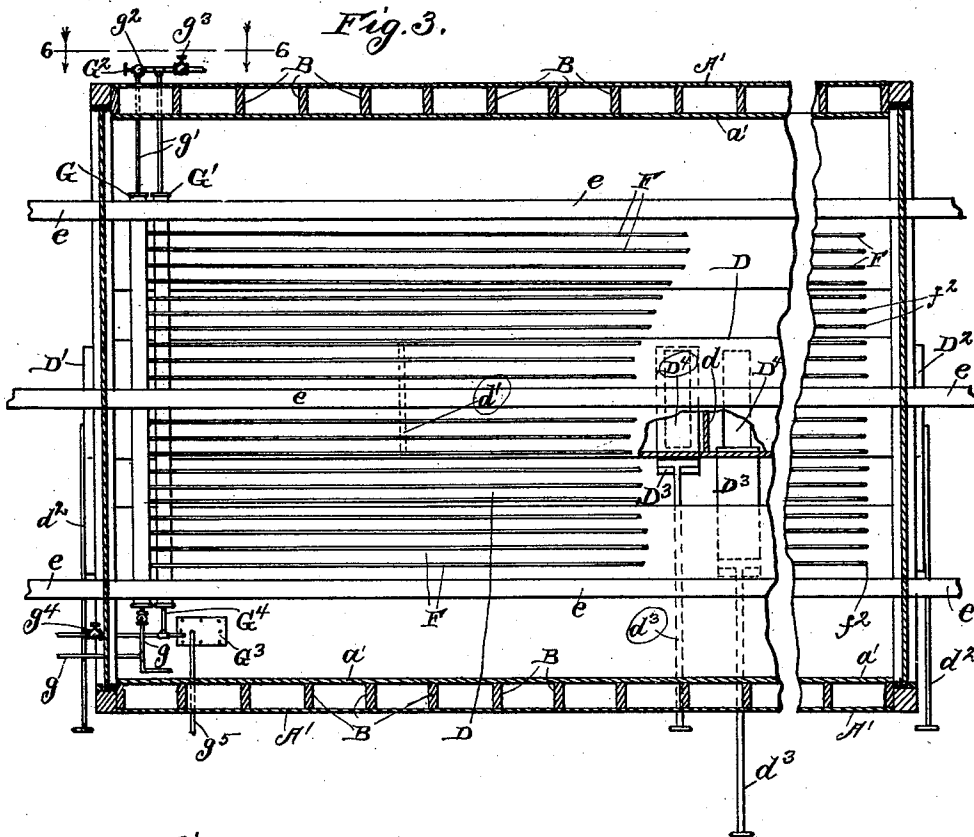


H. J. MORTON.
LUMBER DRIER.

No. 572,210.

Patented Dec. 1, 1896.



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UNITED STATES PATENT OFFICE.

HORACE J. MORTON, OF CHICAGO, ILLINOIS.

LUMBER-DRIER.

SPECIFICATION forming part of Letters Patent No. 572,210, dated December 1, 1896.

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To all whom it may concern:

Be it known that I, HORACE J. MORTON, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Lumber-Driers, of which the following, when taken in connection with the drawings accompanying and forming a part hereof, is a full and complete specification.

10 This invention relates to the class of lumber-driers or drying-kilns in which the heated and moistened air from the drier or kiln is brought into contact with cooling and condensing surfaces and then returned to the
15 drier or kiln to be again heated and moistened; and the object of this invention is to obtain a lumber-drier of the kind named wherein fresh air can be admitted when and where desired, wherein air can be released
20 from the drying room or kiln when desired and from below the top of the lumber being dried therein, and wherein the fresh air admitted to the kiln and the heated and moistened air released therefrom can be so controlled and regulated that however the atmosphere may be disturbed, as by winds or storms, the working of the kiln will not be affected thereby, and lumber will not be checked while being dried therein.

30 A further object of the invention is to obtain a steam heating apparatus for a lumber-drier wherein complete circulation of steam is obtained, water of condensation is delivered from the system, and perfect control of the apparatus secured.

35 In the drawings referred to, Figure 1 is a vertical sectional view of a lumber-drier embodying my invention on line 1 1 of Fig. 2, viewed in the direction indicated by the arrows; Fig. 2, a longitudinal sectional view of the lumber-drier; Fig. 3, a horizontal sectional view on line 3 3 of Fig. 2, viewed in the direction indicated by the arrows; Fig. 4, a perspective view of one end of the air-supply conduit or duct of the lumber-drier; Fig. 5, an elevation, on an enlarged scale, of the return-joint of the steam heating apparatus of the lumber-drier with short sections of the steam-pipes fitting thereinto; and Fig. 6, an end elevation, on an enlarged scale, of the steam-headers of the steam heating apparatus, of the connection between the head-
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45
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ers, and of a short section of steam-pipe in the headers. Fig. 7 is a sectional view of a modified construction of the side wall of the
55 lumber-drier on the same line as is Fig. 1, and Fig. 8 a perspective view of a short section of the side wall illustrated in Fig. 7.

A reference-letter applied to a given part is used to designate such part throughout the
60 several figures of the drawings wherever the same appears.

X X X are foundation-piers of the lumber-drier.

A is the floor of the lumber-drier, and *a* the
65 false floor thereof. The false floor *a* extends from the side walls *a' a'* toward the center of the lumber-drier and to underneath the steam heating coils or pipes F F.

A' A' are the outer walls of the lumber-
70 drier, and *a' a'* are the inner walls thereof.

B B are the studding of the side walls of the lumber-drier, and *b b* are pieces of studding laid on the floor A, on which the false flooring *a* is laid.
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C C are openings through inner walls *a' a'*, through which openings heated and moistened air can pass from the lumber-drier into the space between walls *a' a'* and A' A', and from thence through the conduits obtained
80 by studding B B and *b b'* to the bottom of the lumber-drier and delivered through openings C' C' back into the lumber-drier. By reference to Fig. 1 it will be seen that the apertures C C in walls *a' a'* are below the top of
85 the pile of lumber, (indicated by the broken lines Y Y in the lumber-drier.)

C² C² are openings in walls A' A', through which air may escape from the conduits between the walls *a' A'* when the covers C³ C³
90 are opened, respectively.

C⁴ is a deflecting-board designed to protect openings C² C², respectively, from the direct action of the wind, when required.

D is a fresh-air conduit extending longitudinally the entire length of the lumber-drier.
95 Conduit D is divided into several compartments by partitions extending transversely across it, as at *d* and *d'*, Fig. 2, and dotted line *d'*, Fig. 3. Air is admitted to the end
100 compartments of the conduit D by withdrawing slides D' D², respectively, by means of handles *d*² *d*², and air is admitted to the central compartments by withdrawing slides D³

D^3 (by means of handles $d^3 d^3$, respectively) from over holes $D^4 D^4$, respectively. The manner in which fresh air contained in all or any of the compartments of conduit D is delivered into the lumber-drier is well illustrated in Fig. 4, where $d^4 d^4$ are the side walls of conduit D , $d^5 d^5$ cross-planks, and $d^6 d^6$ the matched and planed boards or planks forming the top of the conduit.

$D^5 D^5$ are the apertures formed by laying plank or boards $d^6 d^6$ on cross-pieces $d^5 d^5$, as illustrated in Fig. 4, and through such apertures $D^5 D^5$ the air is delivered from conduit D in thin sheets to the lumber-drier underneath the steam heating pipes or coils $F F$, hereinafter described, and against the air delivered from apertures $C' C'$ in a manner to mix therewith.

$E E$ are standards supporting the longitudinally-extending track-stringers $e e e$, on which are placed the rails for the trucks or cars of the lumber-drier, and $E' E'$ are cross-pieces from standards $E E$. Steam-coils or steam-pipes $F F$ rest on cross-pieces $E' E'$. Steam-coils $F F$ consist of pipes $f f'$, extending outward from headers $G G'$, respectively, and into the return-bends f^2 , pipe g connecting header G with the steam supply; pipes $g' g'$ connecting the headers $G G'$; valve G^2 in pipe g^2 and blow-off cock g^3 ; steam-trap G^3 ; pipe G^4 from header G' to steam-trap G^3 , and blow-off cock g^4 to pipe G^4 .

g^5 is the discharge-pipe from steam-trap G^3 . Headers $G G'$ are connected when valve G^2 is opened, as at such time steam entering header G from the steam supply (through pipe g) can pass from header G through pipes $g' g^2 g'$ into header G' , as well as from header G into pipes $f f$, and from header G' into pipes $f' f'$. Water of condensation flowing into header G from pipes $f f$ may flow from such header G through pipes $g' g^2 g'$ into header G' , and water of condensation in header G' (flowing thereinto from pipes $f' f'$ and $g' g^2 g'$) may flow therefrom through pipe G^4 into steam-trap G^3 .

$H H'$ may be metal plates acting as condensation-plates.

In the modification illustrated in Figs. 7 and 8 the openings $C C^2$ are made alternately between every other two of studding $B B$, and openings $B^3 B^3$ are made through every other one of such studding $B B$. Hence heated and moistened air extending from the lumber-drier through aperture C will extend downward between the walls $A' a'$, and a portion thereof passing through openings B^3 will pass into the next adjacent space and some thereof will then extend up and out of apertures C^2 . The air passing through aperture C in this construction (as well as in the first-described constructions) will pass down between walls $A' a'$, thence along between floor A and false floor a , and out of aperture C' into the drier.

The operation of the drier is: When lumber, green or air-dried, has been properly

piled on cars run into the lumber drier or kiln and the doors closed and steam is admitted to header G from the steam supply, blow-off cock g^4 is opened and steam in header G will extend therefrom through pipes $f f$ and $f' f'$ into header G' , the air in such pipes and headers escaping through blow-off cock g^3 or g^4 , or through both. After the headers $G G'$ and pipes $f f'$ have been filled with steam the blow-off cocks g^3 and g^4 are closed and valve G^2 is opened. Steam from header G will then extend through pipes $g' g^2 g'$ into header G' , and from headers $G G'$ into pipes $f f f'$, respectively. Water of condensation forming in pipes $f f f'$ will flow therefrom into header G , and from such header through pipes $g' g^2 g'$ into header G' . Water of condensation in pipes $f' f' f'$ will flow therefrom into header G' . Water of condensation in header G' will flow therefrom through pipes G^4 into steam-trap G^3 . Thus when the steam heating apparatus is first started steam and air are blown from header G through pipes $f f f$ and $f' f' f'$ to header G' , and from thence through pipe G^4 and blow-off cock g^4 , and after the air is blown from the apparatus steam is admitted to the respective pipes $f f f$ and $f' f' f'$ from the headers $G G'$, respectively. Connecting-pipe g^2 thus has two very important functions: first, to connect headers $G G'$ so that both such headers will be filled with live steam, which will extend therefrom into pipes $F F$, connected thereto, respectively, and thus practically reduce the length of such pipes one-half relative to the travel of steam from the headers, and, secondly, to connect such headers so that water of condensation flowing into header G from the pipes $F F$, extending out therefrom, may flow from such header G into header G' , and from thence, together with the water of condensation in header G' from the pipes $F F$, extending out therefrom, may flow to trap G^3 through pipe G^4 . By having valve G^2 in the pipe connecting the headers steam may, when desired, be made to extend from one header, G , through the entire length of pipes $F F$ into the other header, G' , and this is done when the heating-coils are started to drive the air in the header G and pipes $F F$ into header G' , from which it can escape through pipe G into steam-trap G^3 and out of pipe g^5 or through valve g^4 in pipe G^4 , as preferred. After the air has been driven from the header G' the valve g^4 should be closed and valve G^2 opened. Without valve G^2 the air in the headers would be forced into the header G and into the upper ends of the pipes $F F$ (the ends of such pipes farthest from the headers) and would have to be removed therefrom by air-vent cocks in the usual way.

I prefer to provide means for forcing the air ahead of the steam into one header G and out therefrom (through valve g^4 or steam-trap G^3 , as described) rather than to leave headers $G G'$ at all times connected, (as in the case when valve G^2 is omitted;) but the

use of an ordinary air-vent cock in the headers G G', or either of them, or in pipes F, or any of them, whether valve G² be used or not, is permissible.

5 When the steam heating apparatus is properly adjusted, fresh air is admitted through conduit D either through one or all of the compartments thereof, and heated and moistened air is permitted to escape through
10 some or all of the apertures or openings C² C².

In the operation of the lumber-drier heated and moistened air will pass down between walls A' a', thence along between the floor A and false floor a, and through apertures C' C' into the lumber-drier underneath heating-coils F F. Such air delivered into the drier through the apertures C' C' is brought against and mixed with the fresh air delivered through apertures D⁵ D⁵, and such air is then
20 heated by coils F F and circulation thereof thus maintained. Where a wind is blowing toward the headers and the fresh-air inlets (that is, the compartment) at the header end of the drier are opened, with the remaining
25 fresh-air inlets closed and at the same time the air-outlets C² C² at the other end of the drier are opened, there will be a movement or circulation of air from the header end of the drier (termed the "dry" end) toward the
30 other end, (termed the "green" end.)

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of headers, steam-pipes
35 extending outward from the headers and joined at their ends farthest from the headers, a steam connection between the headers, with a valve interposed in such connection, a connection between one of the headers and
40 a steam-supply and a blow-off cock to the other header; substantially as described.

2. The combination of headers, steam-pipes extending outward from the headers and joined at their ends farthest from the headers, a steam connection between the headers,
45 with a valve interposed in such connection, a steam-trap, a connection between one of the headers and a steam supply, and a connection between the other header and the steam-trap, with a blow-off cock in the last-named
50 connection; substantially as described.

3. The combination of steam-headers, means for supplying steam thereto, steam-pipes extending outward from the headers respectively, such steam heating-pipes joined at the
55 ends thereof farthest from the headers, a steam connection between the headers independently of the steam heating-pipes, and means for releasing air from the headers and
60 steam heating-pipes: substantially as described.

4. The combination of headers, steam-pipes extending outward from the headers and joined at their ends farthest from the headers, a steam connection between the headers,
65 with a valve interposed in such connection,

a steam-trap, a connection between one of the headers and a steam supply, and a connection between the other header and the steam-trap, with a blow-off cock in the last-named
70 connection and means for admitting cool air to the drying-room: substantially as described.

5. In a lumber-drier the combination of a fresh-air conduit consisting of a longitudinally-extending chamber underneath the
75 heating apparatus of the drier, such chamber divided into compartments, with means for controlling the admission of air to such compartments, severally, and openings on the sides of the longitudinally-extending chamber whereby thin sheets of air are delivered
80 therefrom into the drier; substantially as described.

6. In a lumber-drier the combination of a fresh-air conduit consisting of a longitudinally-extending chamber underneath the
85 heating apparatus of the drier, such chamber divided into compartments, with means for controlling the admission of air to such compartments, severally, and openings on the sides of the longitudinally-extending chamber whereby thin sheets of air are delivered
90 therefrom into the drier, and means for returning heated and moistened air from near the top of the drier to and mixing it with such
95 sheets of fresh air; substantially as described.

7. In a lumber-drier, the combination of an air-supply conduit consisting of a longitudinally-extending chamber underneath the
100 heating apparatus of the drier, such chamber divided into compartments, with means for controlling the supply of air to the several compartments, and with openings on the sides of the longitudinally-extending chamber through which sheets of air are delivered into
105 the drier, and means for discharging moist air from the drier at points therein below the tops of the piles of drying lumber; substantially as described.

8. In a lumber-drier, the combination of a fresh-air conduit consisting of a longitudinally-extending chamber underneath the
110 heating apparatus of the drier, such chamber divided into compartments, with means for controlling the admission of air to the several compartments, and with openings on the sides of the longitudinally-extending chamber through which sheets of air are delivered into
115 the drier, means for discharging moist air from the drier at points therein below the tops of the piles of drying lumber but above the heating apparatus and returning such moist air to underneath the heating apparatus and there mixing it with the incoming sheets
120 of air, and means for discharging a determined portion of such returning moist air from the drier and to the atmosphere; substantially as described.

HORACE J. MORTON.

In presence of—

CHARLES TURNER BROWN,
FLORA L. BROWN.