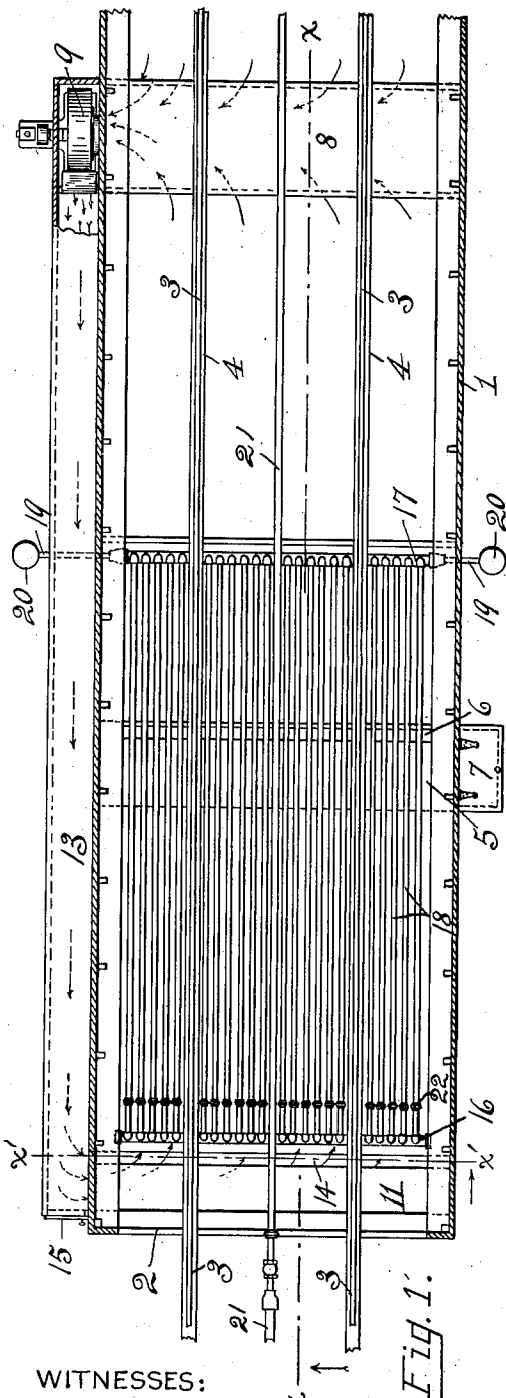


No. 829,497.

PATENTED AUG. 28, 1906.

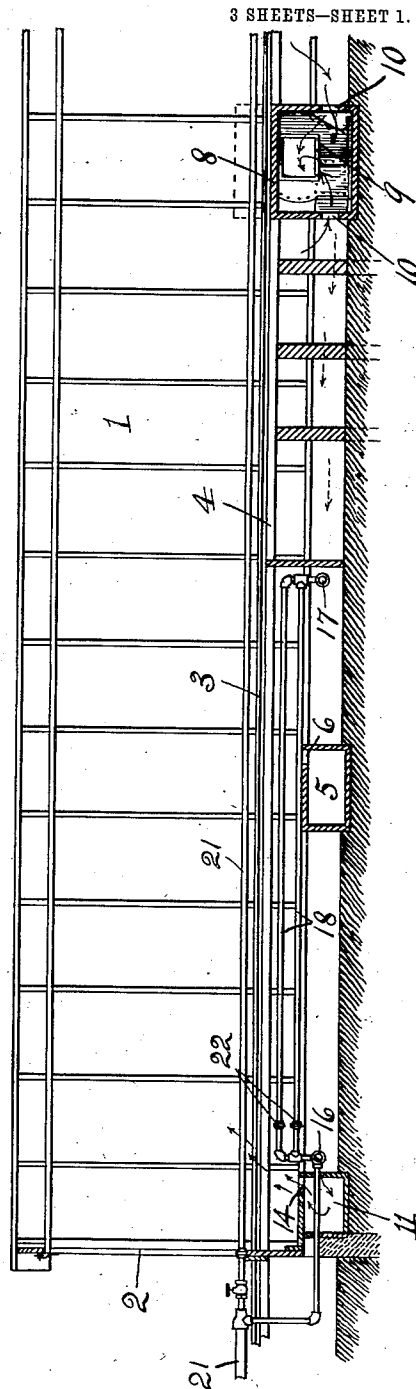
C. F. WILLIAMS.
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WITNESSES:

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Fig. 2.



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3 SHEETS—SHEET 1.

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3 SHEETS—SHEET 2.

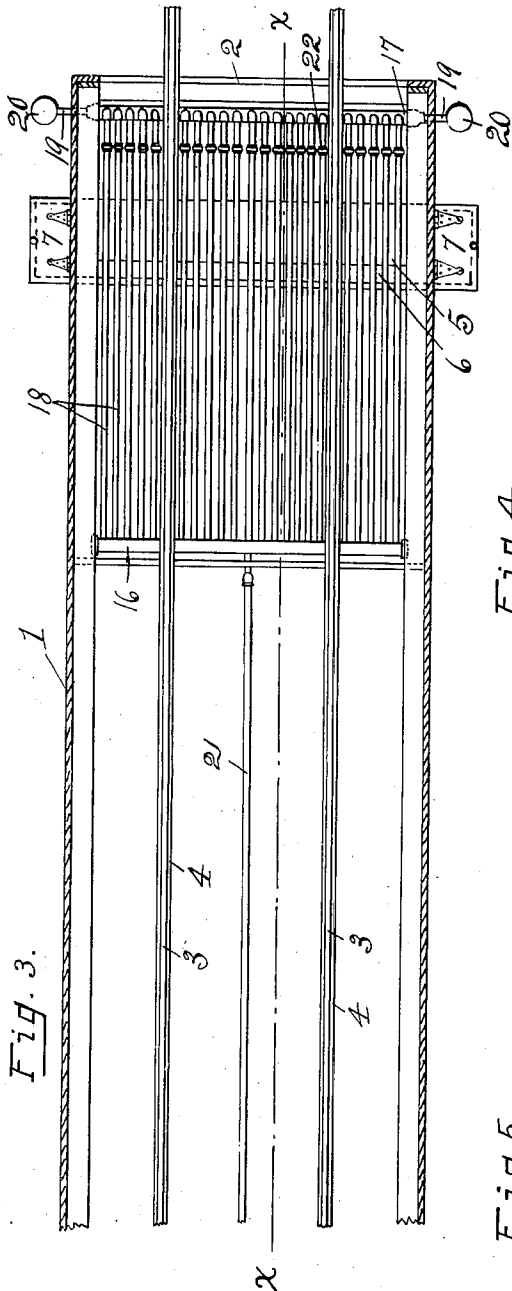


Fig. 4.

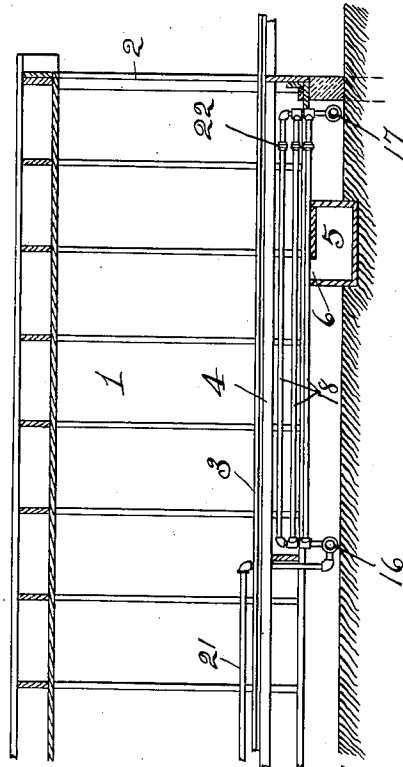
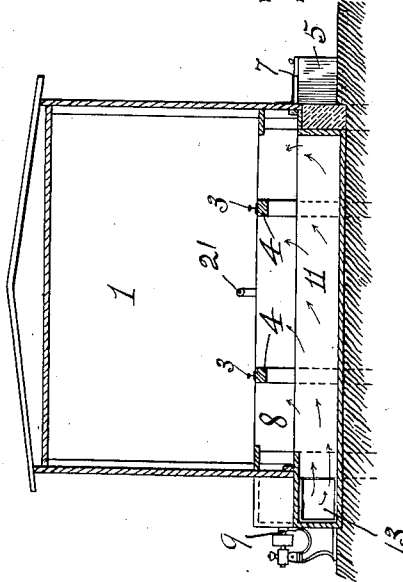


Fig. 5.



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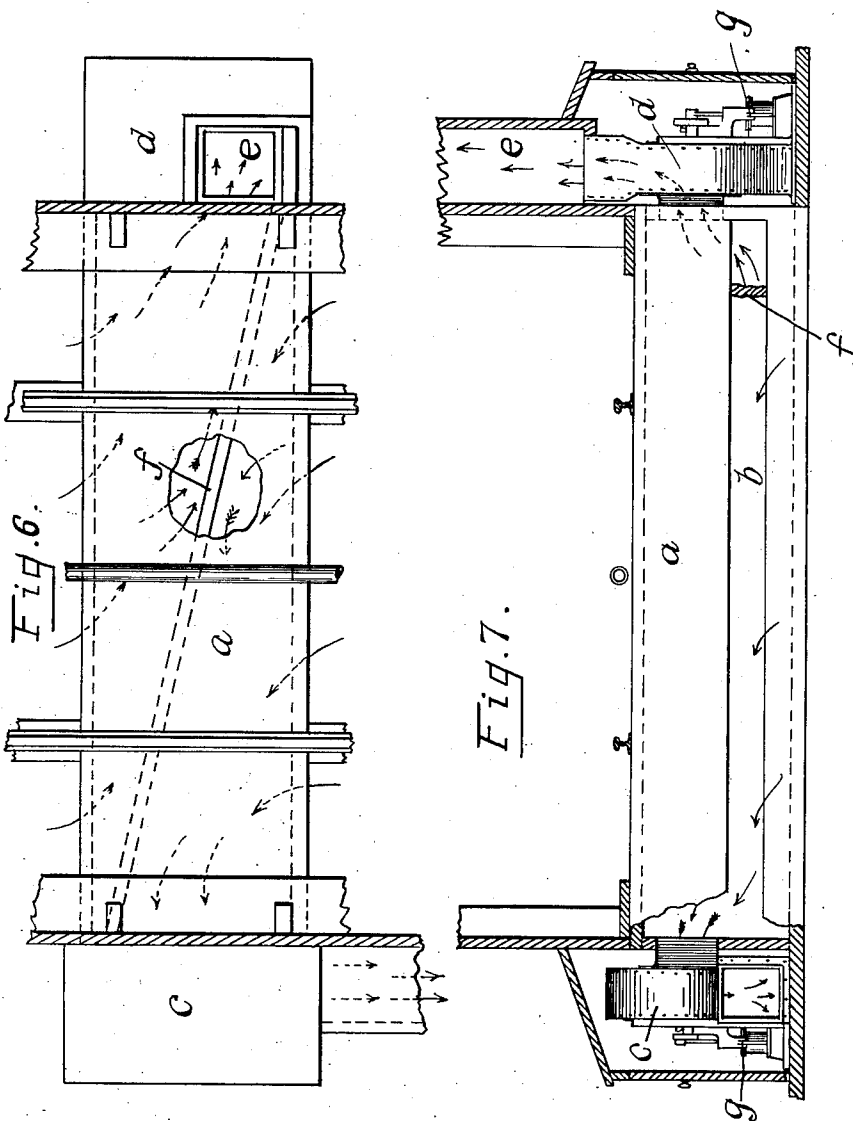
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3 SHEETS—SHEET 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES F. WILLIAMS, OF COLDWATER, MICHIGAN.

KILN FOR DRYING LUMBER.

No. 829,497.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed April 16, 1906. Serial No. 311,883.

To all whom it may concern:

Be it known that I, CHARLES F. WILLIAMS, a citizen of the United States, and a resident of Coldwater, in the county of Branch and State of Michigan, have invented certain new and useful Improvements in Kilns for Drying Lumber; and I 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, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to kilns for drying lumber, staves, headings, or the like; and it has for its object to improve upon the construction of kiln shown and described in my former Letters Patent, No. 772,767, granted October 18, 1904, whereby a more efficient and economical kiln is provided.

The primary feature of improvement in my present construction consists in the provision of simplified means for utilizing and causing the moist air which would otherwise be expelled to the atmosphere from the kiln to be returned thereto adjacent its entrance or wet end. The return of this moist air to the wet end of the kiln-building material aids in the sweating process and it is found prevents the checking and hollow-horning, which occurs in certain kinds of lumber when subjected to a dry-air treatment during the sweating thereof.

Further improved features of my present construction of kiln will be apparent by reference to the following description and to the accompanying drawings, in which—

Figure 1 is a horizontal section of the wet end of my improved kiln, showing a plan of the tracks, piping, and air-conduits. Fig. 2 is a vertical section thereof, taken on the line $x x$ in Fig. 1. Fig. 3 is a sectional plan view of the dry end of the kiln, similar to and forming a continuation of Fig. 1. Fig. 4 is a broken vertical section taken on the line $x x$ in Fig. 3. Fig. 5 is a cross-section of the kiln, taken on the line $x' x'$ in Fig. 1; and Figs. 6 and 7 are slight modifications of the central transverse air-duct of the kiln, Fig. 6 being a top plan view and Fig. 7 a side elevation thereof with portions broken away and the latter showing the exhaust-fan housings in section.

Referring to Figs. 1 to 5 of the drawings, 1 represents the kiln-building, which may be

of any desired length or width and of any suitable construction to render it air-tight. Door-openings 2 are provided at each end of the kiln for the admission and discharge of trucks upon which the lumber or stock to be dried is piled, and these openings are closed by doors. (Not shown.) The rails 3, on which the trucks move, are supported by sills or track-timbers 4 some distance above the floor, ground, or plane of the lower edge of the building.

Extending crosswise of the kiln adjacent each end thereof and a short distance below the plane of the track-timbers 4 is an air duct or chamber 5, which is closed to the interior of the kiln except for a narrow air-exit slit or opening 6, disposed adjacent the inner upper edge thereof and extending across the building, as shown in Figs. 1, 2, 3, and 4. The ends of these air-ducts open without the kiln and are provided with doors or dampers 7 for controlling the admission of air thereto.

The air admitted to the ends of the kiln is expelled therefrom through a transverse air-duct 8, disposed centrally of the building and having one end communicating with an exhaust-fan 9, which is designed to create a forced draft in the duct to draw the air from the kiln-room. This central air-duct is closed to the exterior of the building except for a narrow slit or opening 10, which is provided in each side thereof near its lower edge, as shown in Fig. 2, and extends therein substantially the width of the building.

In order to utilize the exhaust-air for the purpose hereinafter explained, I provide a transverse duct 11 adjacent the door at the wet or entrance end of the building and connect one end of this with the exhaust of the fan 9 through the medium of the conduit 13, which is disposed at the side of the building. The air which is driven through the conduit 13 and into the duct 11 is expelled therefrom to the interior of the building through the slit or opening 14 in the top of said duct. The conduit 13 is provided at its outer end with a door or damper 15, which may be positioned to entirely close its opening, so as to direct all of the returned air into the kiln, or may be adjusted to expel all or only a portion of the air to the outer atmosphere, as the operation of the kiln may require.

In order to heat the air which enters the kiln through the ducts or chambers 5, a series of pipes, adapted to be heated by live or exhaust steam, are arranged at each end of

the building immediately below the plane of the rails 3 and above the chambers 5, as shown in the drawings. A convenient construction of heaters consists of connected headers 16 and 17, arranged at the ends of the building, the connections between these headers forming the heating-surfaces. These connections preferably consist of a plurality of lines or sections of pipe 18, which are arranged in parallelism and connected at their ends directly to the headers by nipples, ties, elbows, unions, &c., as shown, or in any other suitable manner. By this construction the water of condensation instead of flowing from one pipe 18 to another, as described and shown in my said former Letters Patent, will flow from each section 18 directly to the header 17, which connects, through outlet-pipes 19, with steam-traps 20 of any suitable construction. Steam is supplied to the two heaters through the feed-pipe 21. The heater at the wet or entrance end of the kiln is preferably made longer than the heater at the dry or exit end and is shown as comprising two lines of connecting-pipes 18, while the other heater has three lines of such pipes. To facilitate the removal of the pipes 18 for the purpose of cleaning, repair, or substitution, each is made in two sections, which are coupled together by unions 22.

In operating the kiln the trucks carrying the lumber or stock to be dried are moved successively step by step through the kiln. When first placed in the kiln, the stock is directly over the heater in the entrance end of the kiln, but between the door and the air duct or chamber 5 at such end, said duct or chamber being positioned approximately two-thirds of the way forward from the rear end of the heater, as shown, thus causing the stock to be subjected to a sweating process which is aided by the stagnancy of the heated air at such end. After the stock has been sufficiently sweated it is moved forward to permit the dry hot air arising from the duct or chamber 5 to pass therethrough and operate to take the moisture therefrom. The forced draft created by the exhaust-fan 9 causes the moisture-laden air after passing up through the stock to take a downward course and find an exit from the kiln through the contiguous slit or opening 10 in the central air-duct 8 and thence to pass through the fan, the air-conduit 13, and either to the atmosphere through the door or damper 15 in said conduit or be returned to the wet or entrance end of the kiln through the slit or opening 14 in the duct 11. This returning of the moist air to and discharging it through the stock during the sweating process materially facilitates such operation and prevents the stock from cracking or becoming "hollow-horned," which condition very frequently occurs with certain kinds of lumber when sweating is occasioned by a dry hot air. After crossing the

central air-duct 8 the stock is subjected to the drying effect of the air which enters through the duct or chamber 5 at the dry or exit end of the kiln and is heated by the heating system at that end. This air is also drawn into the central duct 8 through the contiguous slit or opening 10 therein, due to the action of the fan 9, and commingles therein with the moist air entering from the wet end of the kiln. The combined areas of the two slits or openings 10 in the central duct 8 are approximately equal to the areas of the intake of the fan. The force of the air-draft within the kiln is regulated by changing the velocity at which the fan is run.

In Figs. 6 and 7 is shown a slightly-modified form of the central air-duct of the kiln, which enables it to discharge the dry and the moist air from opposite ends thereof. In these figures *a* represents the central air-duct, which is provided in each side with the intake slit or opening *b*; *c*, the exhaust-fan which creates the draft in the wet end of the kiln and returns the moist air thereto; *d*, an exhaust-fan which is disposed at the opposite end of the duct to the fan *c* and has its exhaust directed into a stack *e*, through which the dry air is expelled to the atmosphere. In order to prevent a commingling of the dry and moist air within the duct and cause each to be directed to the proper fan, a diagonally-disposed vertical partition *f* is positioned therein, which divides it into two triangular chambers, as shown. The fans *c* and *d* are shown as being operated by directly-connected motors or engines *g*.

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

1. A kiln having a wet end and a dry end, and provided intermediate such ends with an air-exit which acts as a division therefor, and a conduit leading from said exit to and communicating with the wet end of the kiln adjacent its entrance, and means for creating a draft therein.

2. A kiln provided with end air-inlet chambers and intermediate air-exit, a conduit leading from the air-exit means to the wet end of the kiln whereby to return the expelled air thereto, means for creating a draft in said air-exit, and means for heating the air admitted to the kiln.

3. A kiln provided with end inlet-ducts and intermediate air-exit, connection between the air-exit and the wet end of the kiln whereby to return the expelled air thereto, means for creating a draft in the air-exit, means for controlling the return of air to the kiln, and means located in the ends of the kiln for heating the air.

4. A kiln provided with end air-inlet ducts and an intermediate air-exit duct the inlet-openings to which latter are located in the opposite sides thereof and extend substan-

tially the width of the building, in combination with means for creating an exhaust through the intermediate duct, and means for heating the air admitted.

5 5. A kiln having an air-exit duct intermediate its ends and leading therefrom to one end of the kiln-building, means for drawing the air from the kiln-room through said exit and returning it to the room at the end thereof, means for admitting air to the building, 10 and means for heating the admitted air.

6. In a kiln, a heating system disposed at the entrance or wet end thereof and extending a distance therein, and an air-inlet duct 15 disposed under the heating system and transversely of the building and positioned a considerable distance in advance of the entrance to the kiln-room whereby to form a dead-air space at such end.

20 7. In a kiln, a plurality of steam-pipes arranged longitudinally thereof at its entrance end to form a heater, an air-inlet duct disposed under the plane of the heater trans-

versely of the building and having a narrow discharge slit or opening extending substan- 25 tially the width of the kiln-room, said duct being disposed adjacent the rear end of the heater whereby to form a dead-air space at the entrance end of the room, and air-exit means.

8. A kiln provided with end ducts for the inlet of air and intermediate air-exit means, said end ducts extending transversely of the kiln-room and having damper-controlled in- 30 lets and elongated slits or openings for the discharge of air to the room, in combination with means located at the ends of the kiln for heating the air. 35

In testimony whereof I have hereunto signed my name to this specification in the 40 presence of two subscribing witnesses.

CHARLES F. WILLIAMS.

Witnesses:

CHARLES N. LEGG,
CHAS. F. HOWE.