

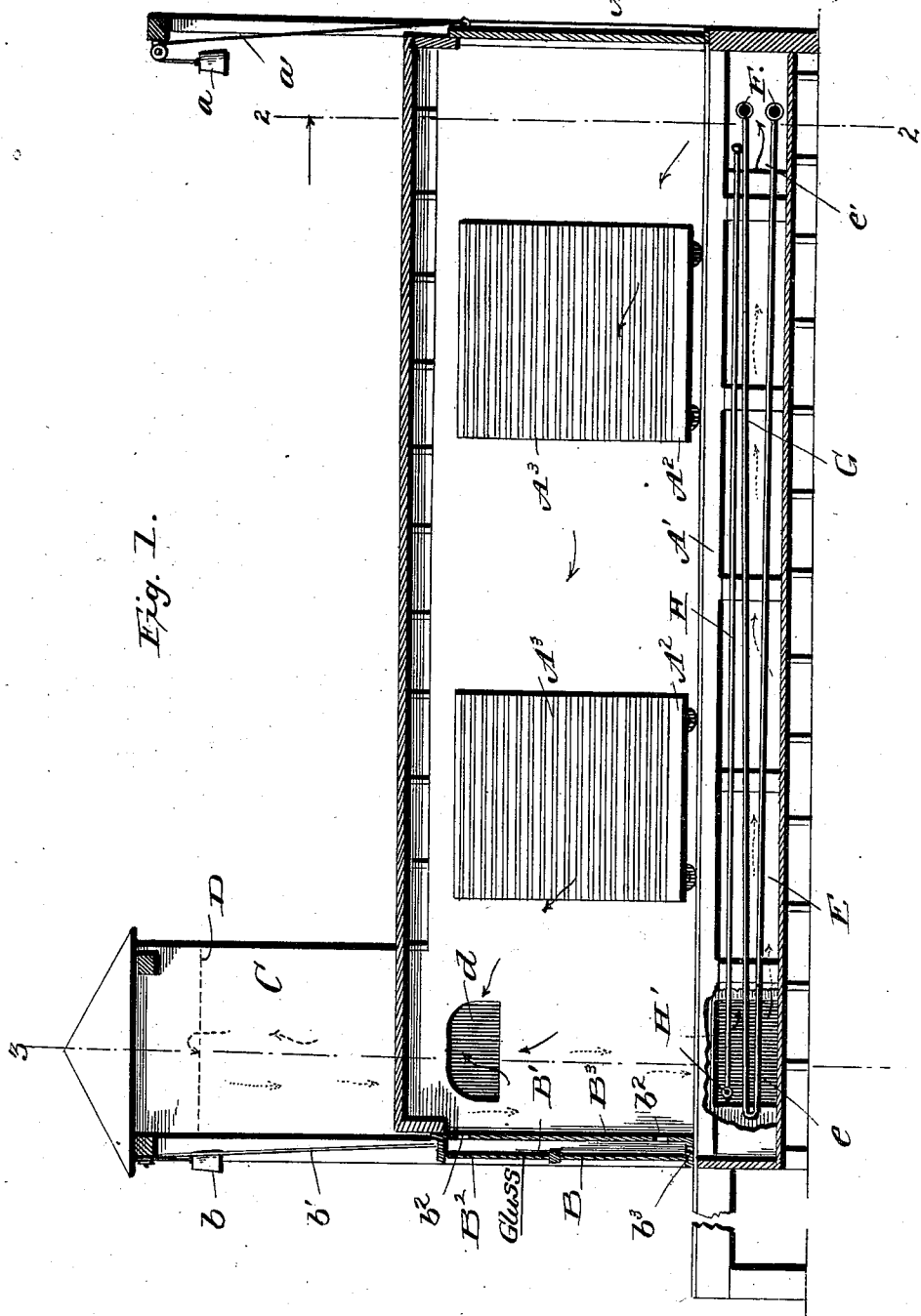
(No Model.)

3 Sheets—Sheet 1.

W. P. MURPHY.
LUMBER DRYING KILN.

No. 531,325.

Patented Dec. 25, 1894.



Witnesses:
L. C. Hills
C. A. Bond

Inventor:
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(No Model.)

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Fig. 2

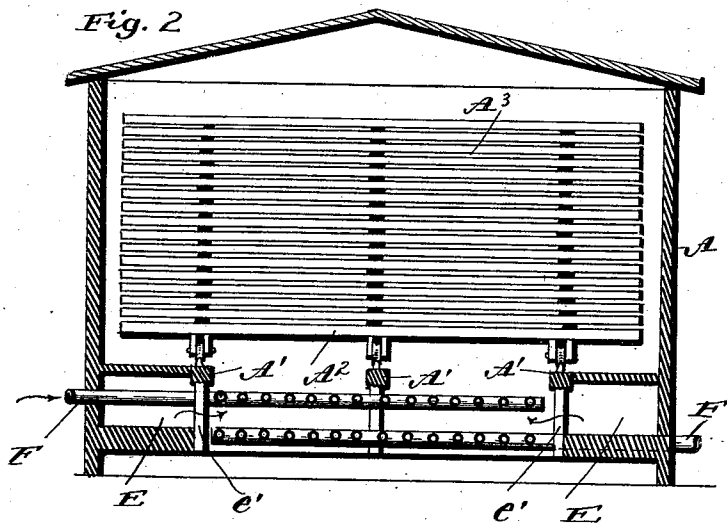
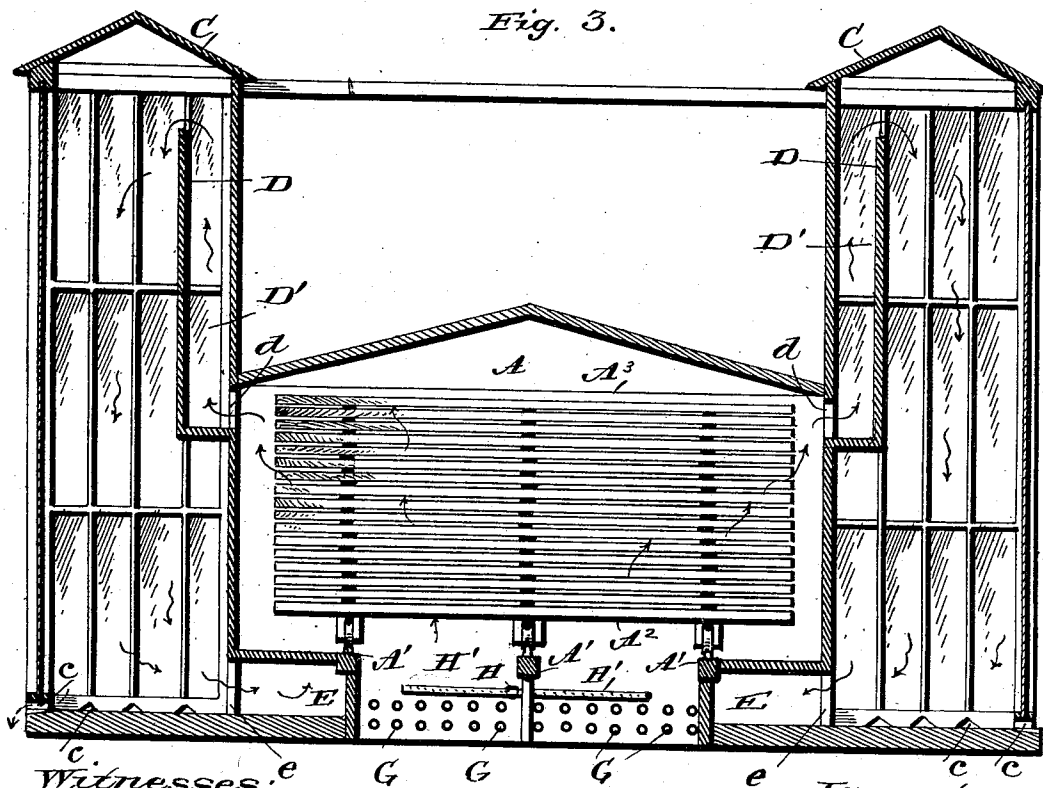


Fig. 3.



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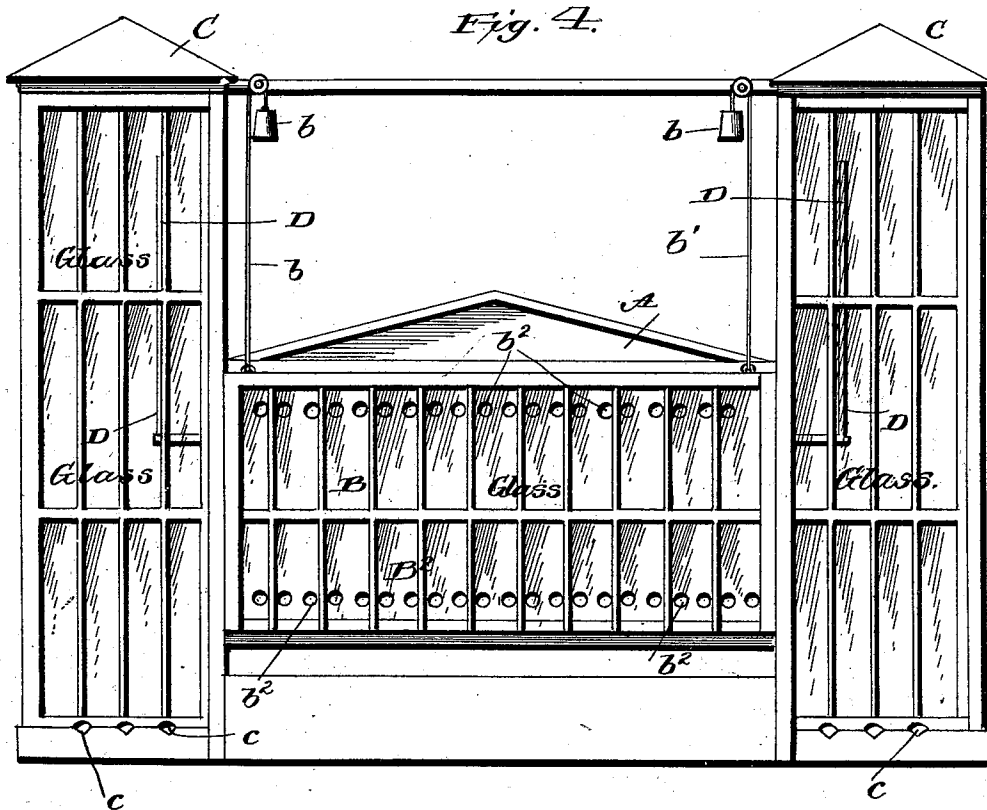
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UNITED STATES PATENT OFFICE.

WALTER P. MURPHY, OF RIDGWAY, PENNSYLVANIA.

LUMBER-DRYING KILN.

SPECIFICATION forming part of Letters Patent No. 531,325, dated December 25, 1894.

Application filed April 23, 1894. Serial No. 508,623. (No model.)

To all whom it may concern:

Be it known that I, WALTER P. MURPHY, a citizen of the United States, residing at Ridgway, in the county of Elk, State of Pennsylvania, have invented certain new and useful Improvements in Lumber-Drying Kilns, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in dry-kilns, the objects and advantages of which will be fully hereinafter set forth and the novel features thereof particularly pointed out in the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this specification, and in which—

Figure 1 is a substantially central vertical longitudinal section through a kiln embodying my improvements. Fig. 2 is a vertical cross section through the same on the line 2—2 of Fig. 1. Fig. 3 is a similar section on the line 3—3 of Fig. 1. Fig. 4 is a front elevation.

Like letters of reference indicate like parts throughout the several views.

This invention is an improvement upon my Patent No. 515,604, dated February 27, 1894. Although glass is employed in this invention as in the prior patent as the condensing agent to remove the moisture from the body of the kiln or rather the air therein the manner of applying the heated air to the lumber is actually the reverse of that employed in the prior patent. In the prior invention the final drying of the lumber was accomplished by the increased or highest temperature which existed at the finishing end of the kiln. In the present process the drying is accomplished by the employment of a high temperature and is finished with a lower temperature. So also there is employed in this case as shown and described a glazed door or closure for one end of the kiln as in the prior patent but this feature may or may not be employed as may be desired as other more efficient and satisfactory means for condensing the moisture driven from the lumber and accumulating in the kiln is provided. This means consists of a glazed tower or towers which draw the air

from the top downwardly in place of upwardly, most effectually removing all of the moisture therefrom. Another important feature is that the air thus freed from its moisture is conducted to the opposite end of the kiln separated from the body of the kiln and then passes again through the kiln and to the tower or towers, the latter being the sole means for producing the desired longitudinal circulation through the kiln. This longitudinal circulation of the air in a kiln and in practically straight lines cannot be accomplished by any fan or blower but can be by a natural draft and in no other way. The arrangement of the steam pipes is such that perfect drainage is secured and freezing as well as pounding of the steam is avoided, and the pipes can be completely drained and dried in less than five minutes.

It is well known that a high degree of heat will not injure any kind of lumber while it is wet and moist with steam. When the lumber enters the kiln it is immediately heated to as high a degree of heat as it is to be subjected to, say about 130° to 140° Fahrenheit. If green from the saw it will afford all the moisture necessary to permit the lumber to be heated to the center of the board or plank without injuring the same. If the lumber is partly air-dried I provide a live steam pipe running through to the receiving end of the kiln so that enough of live steam can be admitted to make the lumber of the same degree of moisture as if it were green. My process of drying, that is, subjecting the lumber at first to a higher temperature and finishing the same with a lower temperature, does not destroy the fiber nor tensile strength of the lumber, and it leaves it as strong as, or stronger than, if air-dried and does not stain nor discolor it. Furthermore, there is no checking, warping nor honeycombing of the lumber. All of these advantages arise from the fact that moist or green lumber will withstand a higher temperature without injury than dried lumber. As increase of temperature is necessary to remove the moisture I apply a high temperature at the commencement of the process when it can do no injury and gradually reduce the temperature and finish the process at a lower temperature which lower temperature is employed at a time when the

lumber is more liable to injury by a high heat. It will be seen therefore that my process is adapted to the nature of the material being operated upon.

5 A further advantage of my invention is that I avoid the employment of an engine, a fan, cold water pipes, brass, steel or other metal plates which corrode or rust out, requiring constant repairing and replacing and at the
10 same time have in place of these a most powerful condenser which at the same time serves to produce the desired circulation within the kiln.

Referring now to the details of the drawings by letter, A designates the kiln proper,
15 of any desired capacity, through which run the tracks A' upon which are designed to travel the trucks A² of any well-known or approved form of construction. The tracks
20 or rails are suitably supported as shown, and the lumber A³ is designed to be placed thereon in the usual manner as seen in Figs. 1, 2 and 3.

At the finishing end of the kiln is a door A⁴ of any suitable material other than glass,
25 preferably of wood, and mounted for movement preferably in a vertical direction, being counterbalanced by suitable weights *a* and cords *a'* as seen in Fig. 1.

At the receiving end of the kiln is a door B
30 also mounted for vertical movement in the usual manner and counterbalanced by the weights *b* and cords or ropes *b'*. This door is constructed with an air chamber B' between the glazed front B² and the wooden inside
35 wall B³. This air chamber is provided with perforations *b*² as best shown in Fig. 1 to allow the air to pass out, condense on the glass and return dry to the kiln. This forms a glass condensing door, the advantages of which will
40 hereinafter appear. This air chamber is provided with openings *b*³ at the bottom as seen in Fig. 1 to allow of the escape of the water of condensation. The air within the kiln is of a higher temperature at the top of the kiln
45 than at the bottom, thus facilitating the egress of the air from between the glazed portion B and unglazed portion B² said egress being principally at the upper openings *b*².

At the receiving end of the kiln upon each
50 side thereof is a tower C formed of glass upon three sides and provided at the bottom with openings *c* for the escape of the water of condensation, as will be understood from Fig. 3. Within each of these towers is a vertical wood
55 partition D forming air chambers D' which communicate with the interior of the kiln through openings *d* as seen best in Fig. 3, the openings being near the top of the kiln and at the bottoms of the said air chambers. The
60 partitions extend nearly to the top of the towers as shown in Figs. 3 and 4 and by dotted lines in Fig. 1.

Extending longitudinally of the kiln are the troughs or chambers or conduits E which
65 have communication with the bottoms of the towers through the openings *e* as shown in Fig. 3 at the receiving end of the kiln and

with the kiln proper at the opposite end by the openings *e'* as seen in Figs. 1 and 2.

At the finishing end of the kiln I arrange
70 the steam pipes F F connected with some suitable source for keeping up a circulation of steam and connected with these pipes are the longitudinal pipes G which are inclined
75 as seen in Fig. 1 so that the upper one inclines toward the receiving end and the lower one toward the other end so that they will quickly drain. These pipes are arranged
80 through the center of the kiln as seen best in Figs. 2 and 3 and between the tracks and under the trucks.

H is a live steam pipe extending centrally of the kiln and at one end connected with some suitable source of supply and at the other terminating in a cross pipe H', the cross
85 pipes being perforated as seen in Fig. 3.

With the parts constructed and arranged substantially as above set forth the operation is as follows:—When the lumber first enters
90 the kiln the temperature thereof is as high as it is to be subjected to, say about 130° or 140°. If green from the saw the lumber will contain sap enough to produce all the moisture necessary to permit of heating the lumber to the center of the plank or board without injury
95 thereto. If the lumber is partially air-dried then live steam is admitted through the pipe H H' to furnish enough moisture to make the lumber possess as much moisture as if it were green. The towers extend above the top of
100 the kiln proper the required distance, say from eighteen to twenty-four feet, and when the kiln is in operation the towers are at all times from 30° to 40° colder than the body of the kiln. The air is led from the receiving end
105 of the kiln through the openings *d* into the air chambers D' and up over the top thereof into the towers against the glass thereof while full of moisture and condenses and falls to the base of the towers where it strikes a temperature of
110 about 60° lower, the water of condensation on the glass and at the bottom of the tower serving in part to produce this difference in the temperature at the bottom and top of the tower respectively. The water of condensa-
115 tion passes out the openings provided therefor and the air relieved of its moisture passes through the conduits or ducts E to the opposite end of the kiln where it emerges through
120 the openings *e'* to be again carried through the kiln, being carried over the steam pipes, thus keeping up a continuous circulation of air through the kiln. The heating pipes running the entire length of the kiln produce an
125 upright current of air, and as the hot air rises continually the entire length of the kiln and the towers produce a full strong current of air lengthwise of the kiln, it is impossible for any portion of the lumber not to be affected by the current of air. While the air
130 is passing from the base of the towers through the air ducts or conduits to the finishing end of the kiln, the air ducts being located inside of the kiln, the air commences to be re-heated

as soon as it leaves the base of the towers, and by the time it reaches the finishing end of the kiln it is from 20° to 40° hotter and it increases as it passes over the pipes and through the lumber on its way back to the receiving end of the kiln.

Modifications in detail may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

While I have shown two towers one may sometimes be omitted and other such changes made as the circumstances may require, or as may be preferred.

What I claim as new is—

1. A dry kiln having a glass-walled tower at the receiving end projected above the same, as set forth.

2. A dry kiln provided with a glazed tower upon each side thereof at the receiving end, as set forth.

3. A dry kiln provided with a tower with glazed walls and a vertical and a horizontal partition, as set forth.

4. A dry kiln provided with a glass walled tower having communication therewith near the top of the kiln, and a longitudinal conduit separated from the heating chamber and having communication with the tower near the lower end thereof and leading to an opposite end of the kiln, as set forth.

5. A dry kiln provided at its receiving end with a glass walled tower outside of the kiln proper and having communication therewith near the top thereof, and a longitudinal conduit separated from the heating chamber and having communication with the bottom of the

tower at one end and with the kiln proper at the other end, as set forth.

6. A dry kiln provided with a glass walled condensing tower at each side of its receiving end, a longitudinal conduit upon each side within the kiln between the towers and the heating devices of the kiln and communicating with the towers, vertical partitions in the towers, and steam pipes extending longitudinally of the kiln between said conduits, as set forth.

7. A dry kiln provided with glass lined condensing towers, steam heating pipes and an independent live steam pipe constructed to deliver live steam directly into the kiln, substantially as and for the purpose specified.

8. In a dry kiln a door formed with an air space with a glazed wall upon one side and upon the opposite side a wooden wall with perforations, as set forth.

9. In a kiln, the combination of glazed condensing towers arranged outside of the kiln proper and internally longitudinally disposed conduits separated from the heating devices of the kiln and means for giving communication between the towers and kiln at the top thereof and between the towers and the conduits at the bottom of the towers, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

WALTER P. MURPHY.

Witnesses:

HEATH SUTHERLAND,
L. C. HILLS.