Sept. 18, 1928. 1,684,627

J. F. HOPE ET AL.

APPARATUS FOR DRYING WOOD

Filed July 19, 1926 3 Sheets-Sheet 1

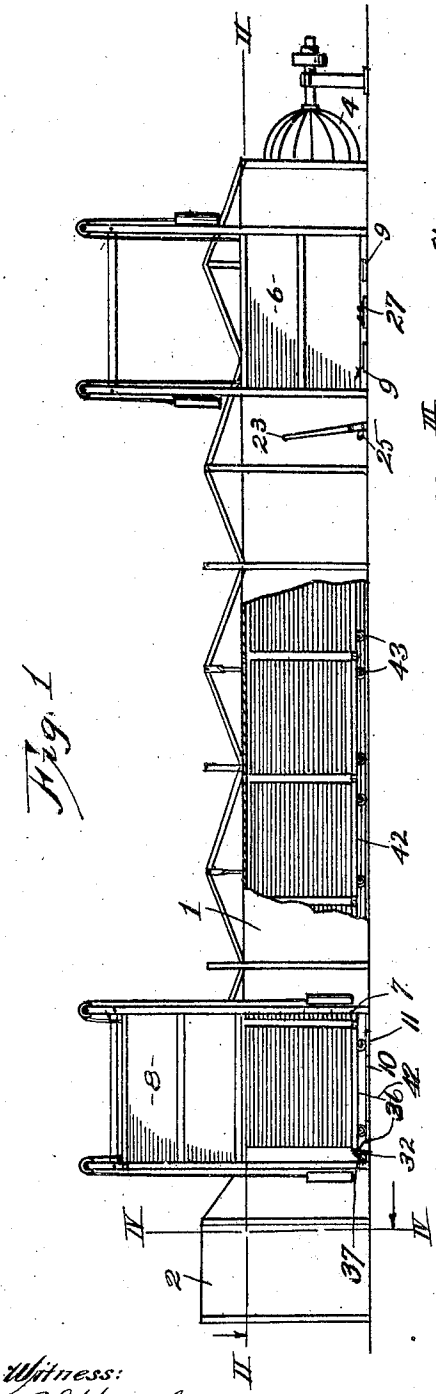


Fig. 1

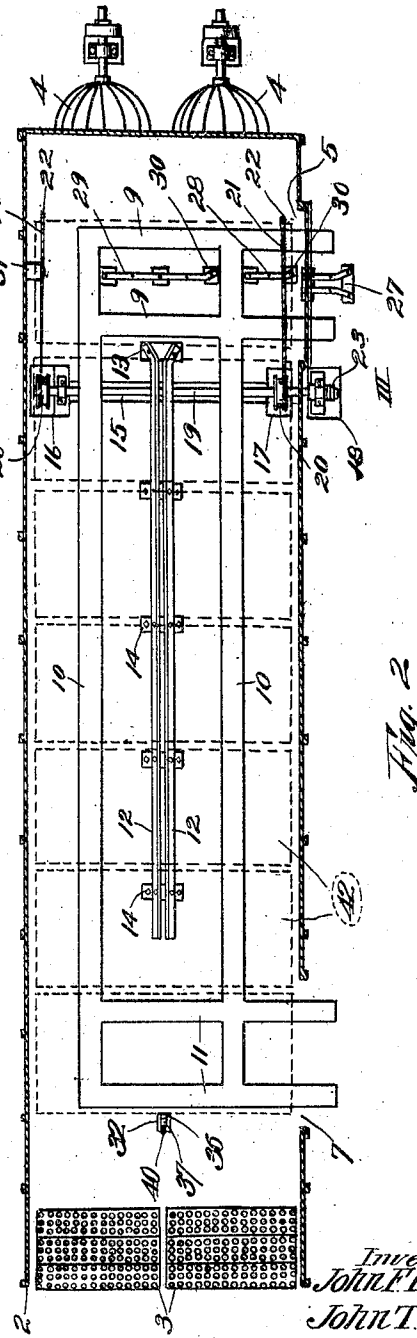


Fig. 2

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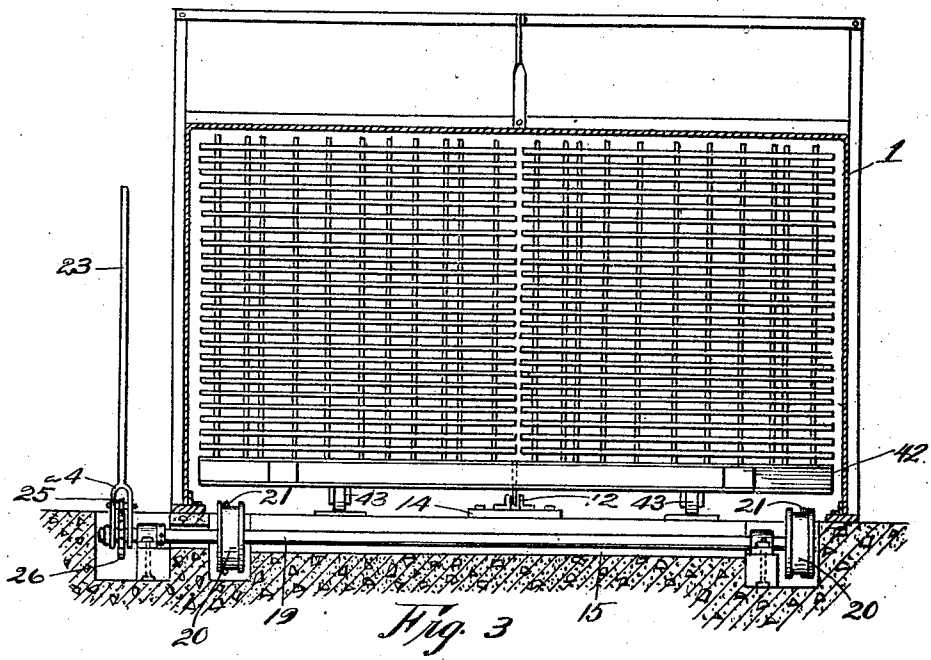


Fig. 3

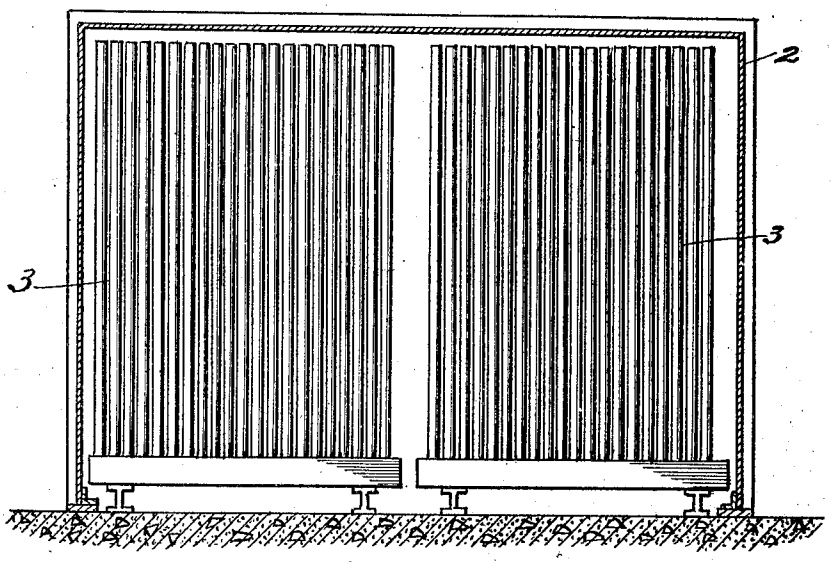


Fig. 4.

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APPARATUS FOR DRYING WOOD

Filed July 19, 1926 3 Sheets-Sheet 3

Fig. 5

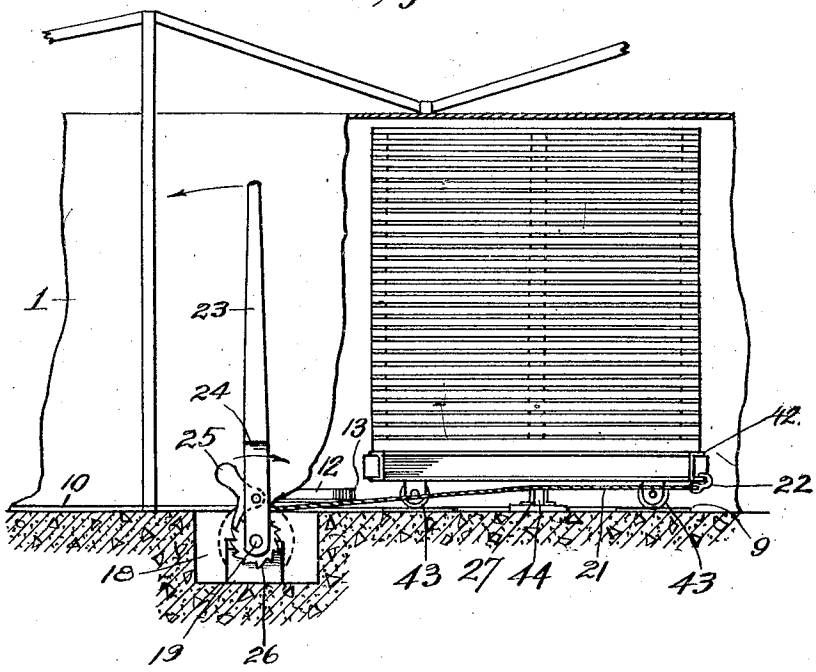


Fig. 6

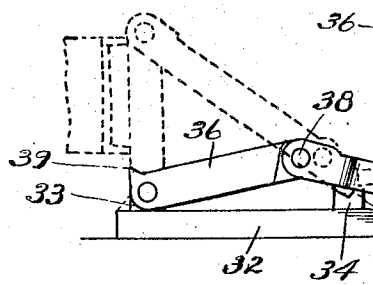
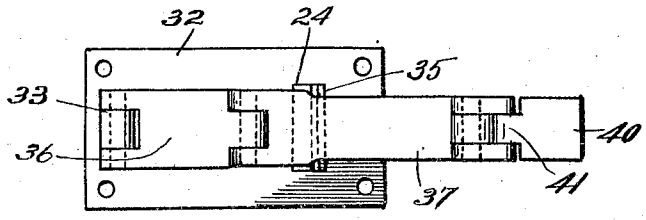


Fig. 7



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Patented Sept. 18, 1928. 1,684,627

UNITED STATES PATENT OFFICE.

JOHN F. HOPE AND JOHN T. HOPE, OF KANSAS CITY, MISSOURI.

APPARATUS FOR DRYING WOOD.

Application filed July 19, 1926. Serial No. 123,273.

This invention relates to wood drying kilns, and more especially to kilns of that type wherein a vacuous condition is established and sustained for effecting a uniform curing of the stock without case-hardening its surface, as stock hardened at its surface too rapidly is not fully cured at its center and will split or check in a relatively short time. Kilns operating under a vacuum, as exemplified by Patent No. 1,353,591, issued September 21, 1920, perform the curing function efficiently, but we have found that the time required in the operation of curing by such a kiln can be materially shortened by providing a front end of greater-air inlet capacity relative to the cross-sectional area of the body portion, and a large obstructing heating coil or radiator, which heats the indrawn air and at the same time so retards it that, if unobstructed otherwise, a vacuous condition is created and established back of the coil or radiator. As a result a high temperature is attained which, in conjunction with the vacuous condition, greatly facilitates the drying or curing operation, it being obvious that loaded trucks within the kiln and obstructing circulation, materially increase or intensify the vacuous condition mentioned. As a result of the provision of an inlet opening of materially greater cross sectional area than the body portion and of the use of a correspondingly enlarged heater, the process of curing is greatly enhanced and the output of the kiln materially increased.

Our primary object therefore is to produce a kiln for curing stock as efficiently but with much greater celerity than the kiln of said patent, and a further object is to provide a kiln having doors which can be opened easily by one man, and which has other features which generally facilitate the operation of moving the trucks at a small expenditure of power and cost.

With these objects in view the invention consists in certain novel and useful features of construction and combinations of parts as hereinafter described and claimed; and in order that it may be fully understood, reference is to be had to the accompanying drawings, in which:—

Figure 1 is a side elevation, partly broken away, of a wood drying kiln embodying the invention.

Figure 2 is a horizontal section on the line II—II of Figure 1.

Figure 3 is an enlarged vertical section through the body of the kiln, on the line III—III of Figure 2.

Figure 4 is a vertical transverse section on the line IV—IV of Figure 1.

Figure 5 is an enlarged fragmentary side elevation to clearly disclose the mechanism for imparting travel to the wood drying trucks when within the kiln.

Figure 6 is an enlarged side elevation of a stop for arresting forward travel of the trucks when they attain their final position in the kiln, the stop being shown in reversed position from that in which it appears in Figure 1.

Figure 7 is a plan view of the stop as it appears in Figure 6.

Referring to the drawings in detail, 1 indicates a kiln structure capable of accommodating simultaneously a number of trucks containing stacked slabs or sticks of wood to be dried, the kiln being of considerable length and preferably of rectangular form in cross section. At its front end it is enlarged as at 2 by an increase in height or otherwise, and substantially filling the enlargement or the front end thereof is a heating device, such as a system of steam coils, as at 3. At its opposite end the kiln is equipped with one or more suction fans 4 of any preferred or conventional type whereby a circulation of air may be established, the air drawn into the front of the kiln being heated through contact with the heating coils and exhausted at the fan end of the casing, the obstruction of the front end by the heating coils tending to establish and maintain a partial vacuum throughout the length of the structure rearward of its enlarged end.

The kiln is provided near its rear end with a side opening 5 controlled by a counterweighted or other suitable door 6, the door being preferably arranged to operate edgewise, moving upward to uncover and downward to cover said opening. A similar door opening 7 near the front end of the structure is controlled by a similar door 8. As the fans are operating continuously there is a suctional pull on the doors which can be readily overcome by manual power where slide doors are employed, and for this reason slide doors are preferable to hinged doors. Running into the kiln from the door opening 5 is a trackway composed of plates 9, and said plates are connected by a longitudinal trackway com-

posed of plates 10, connected to another trackway composed of plates 11 leading out of the doorway 7, the trackways of course resting upon or in the foundation of the kiln at ground level so as not to interfere with the doors. Extending longitudinally of and centrally between the trackway plates 10, is a slotted guideway composed of parallel rails 12 diverging at their rear ends at 13 to provide a flaring mouth for the slotted guideway, the said rails 12 being secured to anchor blocks or plates 14.

Forward of the trackway 9 and adjacent thereto, is a transverse trench 15, enlarged as at 16 and 17 within the kiln, and extending through said trench and suitably journaled therein is a shaft 19 equipped within the trench openings 16 and 17, with grooved pulleys 20, and fastened thereto at the front ends are chains or cables 21 equipped at their rear ends with hooks 22. A lever 23 is journaled upon the shaft 19 within opening 18, and is preferably forked at its lower end at 24 to conveniently carry the gravity pawl 25 for engagement with a ratchet wheel 26 keyed or otherwise secured upon the shaft 19.

A slotted guideway 27 leads through opening 5 and is disposed between the outer ends of the plates of trackway 9 midway between the latter, and in line with the rearmost side of said slotted guideway 27 are guide rails 28, 29, the ends of said guideways nearest opening 5, being inclined as at 30 in the same direction. Said guideways 28 and 29 are within the kiln structure, and also within the latter and adjacent the opposite wall thereof from that provided with the door openings, is a bumper 31. In line with the slotted longitudinal guideway hereinbefore described and forward of the trackway 11, is a stop device consisting of a base plate 32 having an upstanding lug 33 at its rear end and a notched upstanding lug 34 near its front end, the front wall of the notch of said lug constituting a shoulder 35. Bars 36 and 37 are pivotally linked together at 38, the rear end of bar 36 being pivoted to lug 33 and having a toe 39 to engage the base 32 and arrest the swinging movement of said link when it has attained a vertical position. The bar 37 at its free or front end, is adapted to engage the notch of lug 34 when bar 36 is vertical, and brace the latter against reverse or downward swinging movement so that it shall constitute an abutment or stop. For convenience in operating this stop device, a foot plate or lever 40 is provided with a narrow shank 41 fitting in the bifurcation at the front or free end of bar 37. The operator by applying pressure on this foot plate or lever fulcrumed on lug 34, can readily trip the brace bar 37 from engagement with the notched plate so that the linked bars may fall to the collapsed or inoperative position indicated by full lines, Figure 6.

Trucks 42 of conventional design and adapted to carry loads of stacked lumber in slab or stick form, are provided with casters 43, to run on the trackways, and each truck has a depending guide pin 44, to engage the guideways and center the trucks on the trackways, and the kiln is so proportioned with respect to said trucks that when loaded trucks are standing on trackways 9 and 11, the space between said trucks will accommodate a number of other trucks of the same type with the adjacent sides of all the trucks abutting.

In the practical operation of the kiln, the door 6 is operated to permit a truck loaded with green stock, to be run into the kiln on trackway 9 until it is arrested by the bumper 31, at which time its supporting casters are longitudinally alined with the plates of trackway 10. An operator enters the kiln through the doorway opening 5 and engages the hooks 22 with the rear side of the truck, as indicated in Figure 2 and more clearly in Figure 5, and after leaving the kiln closes door 6, and the heated air circulating through the kiln carries off a certain amount of moisture from the load on the truck. After the wood has been subjected to this treatment for a sufficient length of time, an operator through the instrumentality of lever 23, draws the truck forward until the entrance opening 5 is unobstructed. The operator then trips the pawl in the direction indicated by the adjacent arrow, Figure 5, and another operator enters the kiln and disengages the chains from the first named truck. Another loaded truck is then run into the kiln through the door opening 5, and the operator within the kiln or entering for the purpose, draws the chains or cables back and hooks them to the rear side of the last-named truck. He leaves the kiln and the door is closed, and after a sufficient length of time has elapsed for further curing of the wood on the first truck and initial curing of the wood on the last truck, the lever is again operated to draw the rearmost truck forward and hence push the other truck ahead of it until the door opening 5 is again left unobstructed. The pawl is again tripped from engagement with the ratchet wheel, the door again opened, and another loaded truck run into the kiln and engaged by the hooks. The operations previously described are repeated, and are repeated again and again until the truck first placed in the kiln has attained a position in line with the door opening 7, at which time it is clamped against the stop device. By the time the first truck has reached the stop device, the wood thereon has been largely cured. and after sufficient time has elapsed for its complete curing,—this being determined by the condition and character of the wood and by proper inspection,—the door 8 is opened and an operator enters the kiln through said door opening 7 and trips the stop device so

that the truck containing the cured wood can be withdrawn from the kiln through the opening 7. He then resets the stop device, leaves the kiln and recloses the door 8. The lever is then manipulated to advance all of the trucks until the second one has reached the stop device, and then another truck containing green or uncured wood is placed in the kiln through the door opening 5. It has been found by maintaining a certain degree of heat within reasonable limits and a proper suctional pull or circulation, that by the time a truck has progressed intermittently in the manner explained from the rear to the front end of the kiln, its contents have been largely cured, it being obvious that the condition or kind or character of the wood, the degree of heat and suctional force all affect the period required for curing operation. It is important that the front end of the kiln shall be of such size in excess of the cross sectional area of the body of the kiln that the current of air passing through the kiln would travel at a substantial increase of speed after it leaves the enlarged end if it were not for the fact that the heating coils so obstruct said enlarged end that the operation of the fans maintains a vacuous condition within the body of the kiln back of its enlarged end, the loaded trucks of course further obstructing the circulation and therefore increasing the vacuous condition. It has been found in practice that wood can be cured efficiently and in a minimum period of time by a kiln of the character described, and that the appliances enable two men to handle the trucks and the like with celerity and economy.

From the above description it will be apparent that while we have described and claimed the preferred embodiment of the invention, it is to be understood that we reserve the right to make all changes properly falling within the spirit and scope of the appended claims.

We claim:

1. A wood drying kiln open at its front and rear ends and provided near its ends with side openings, the front end of the kiln being of greater cross-sectional area than the body portion, doors controlling the side openings, one or more suction fans at the rear end of the kiln to exert suctional force therein, a heating device in the enlarged front end to retard the passage of air drawn into the front end by the suctional action to a sufficient degree to insure the production of a vacuous condition in the kiln back of said heating device when the doors are closed.

2. A wood drying kiln open at its front and rear ends and provided near its ends with side openings, the front end of the kiln being of greater cross-sectional area than the body portion, edgewise movable doors controlling the side openings of the kiln, one or more suction fans to exert suction rearwardly through the kiln through the front and rear ends, a heating device in the enlarged front end to retard the passage of air drawn into the front end by the sectional action to a sufficient degree to insure the production of a vacuous condition in the kiln back of said heating device when the doors are closed.

3. In a wood drying kiln, a tunnel portion having side door openings near its ends, parallel tracks on the bottom of the tunnel portion and extending longitudinally therein, parallel pairs of tracks extending through the door openings and intersecting the first-named tracks, a slotted guideway extending longitudinally of the tunnel between longitudinal tracks thereof and the said pairs of transverse tracks, said slotted guideway having a flaring mouth at one end, wheeled trucks to run on said tracks and provided with depending pins to operate within the slotted guideway when the trucks are moving longitudinally within the tunnel for the greater part of the length thereof between the transverse tracks, slidable doors normally closing the side openings of the tunnel, suction means for drawing air into one end of the tunnel and exhausting it at the other end, and means within the entrance end of the tunnel for heating the air entering the tunnel.

In witness whereof we hereunto affix our signatures.

JOHN F. HOPE.
JOHN T. HOPE.