(No Model.) 3 Sheets—Sheet 1.

V. L. EMERSON.

LUMBER DRIER.

No. 535,981. Patented Mar. 19, 1895.

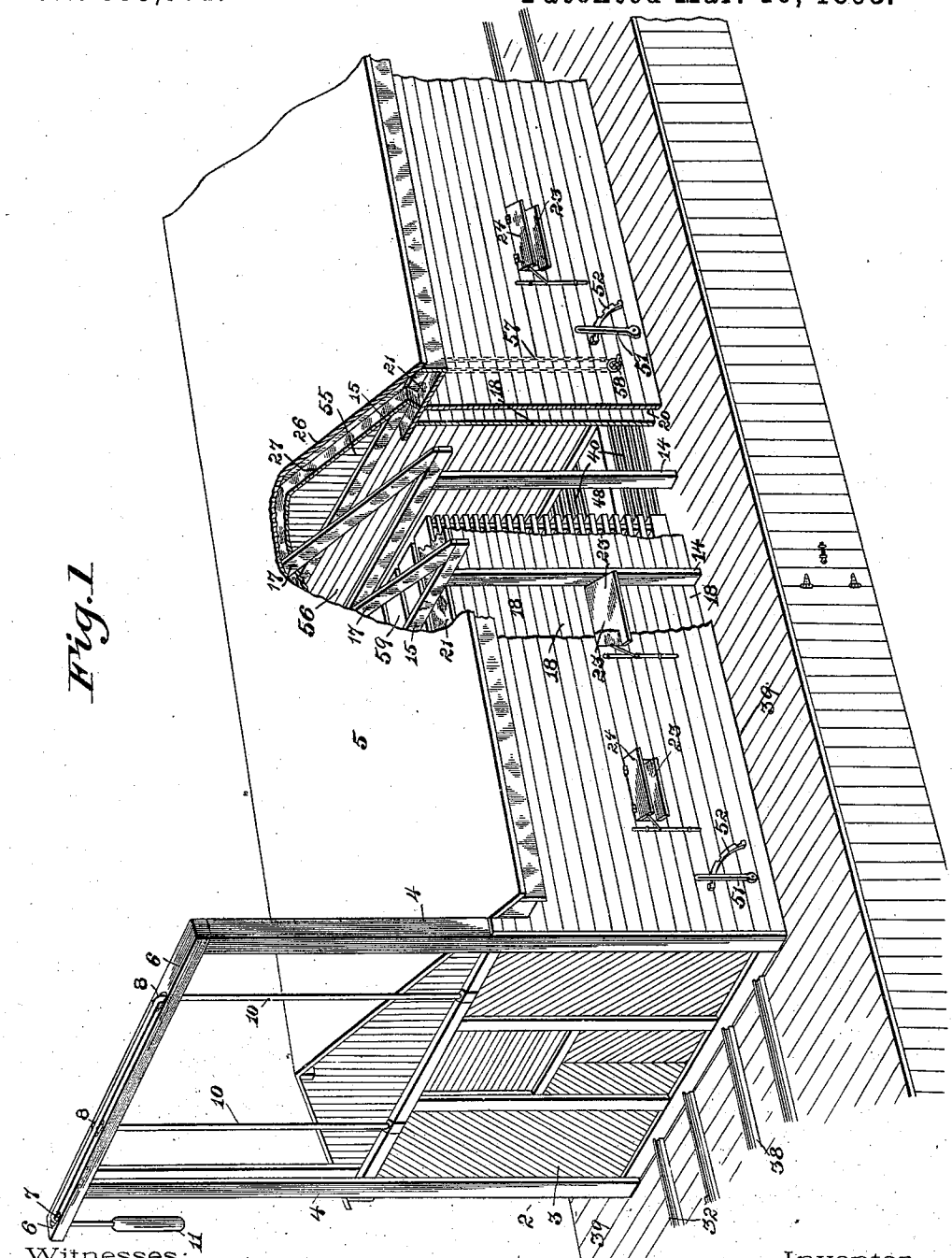

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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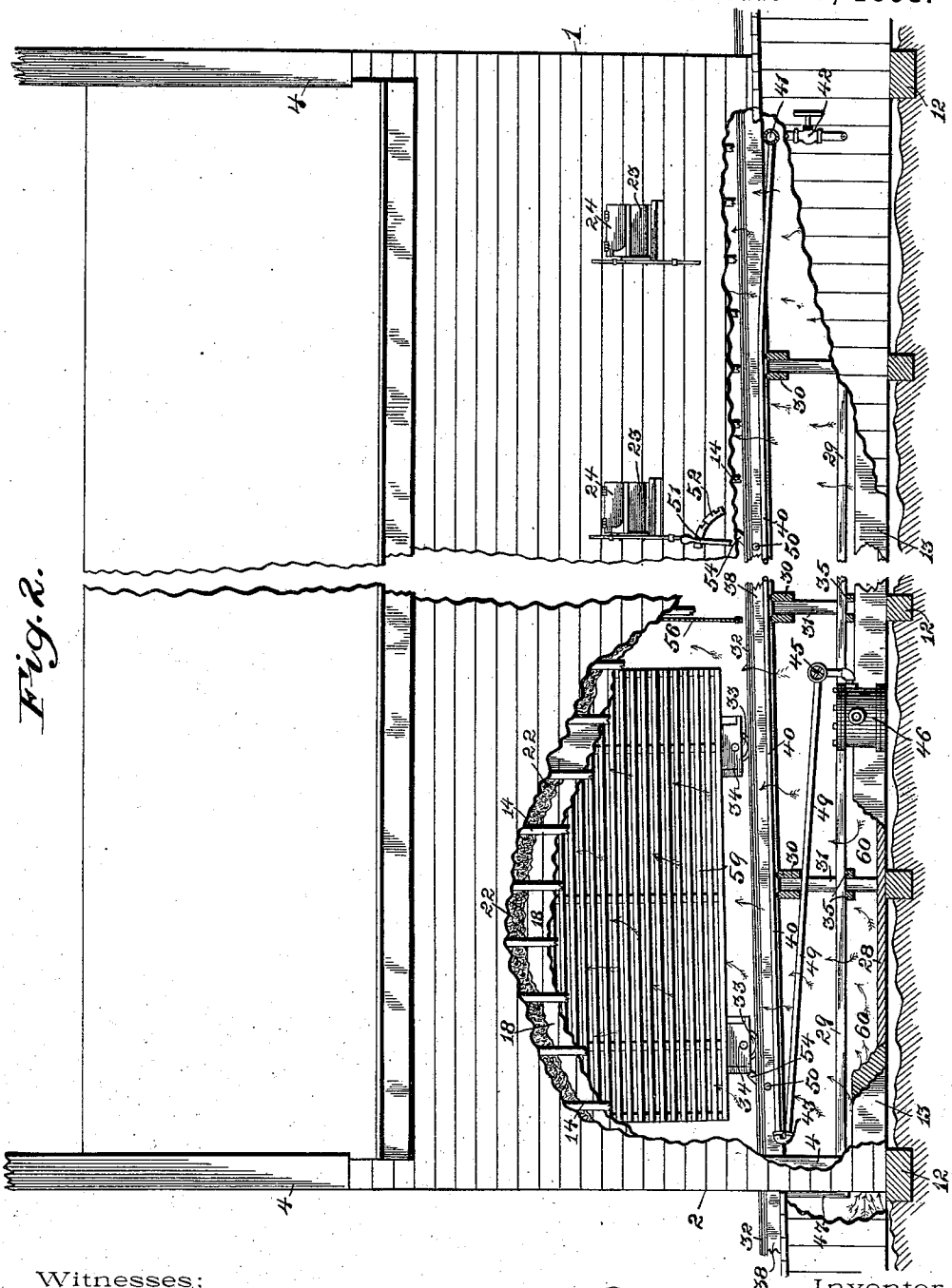

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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LUMBER DRIER.

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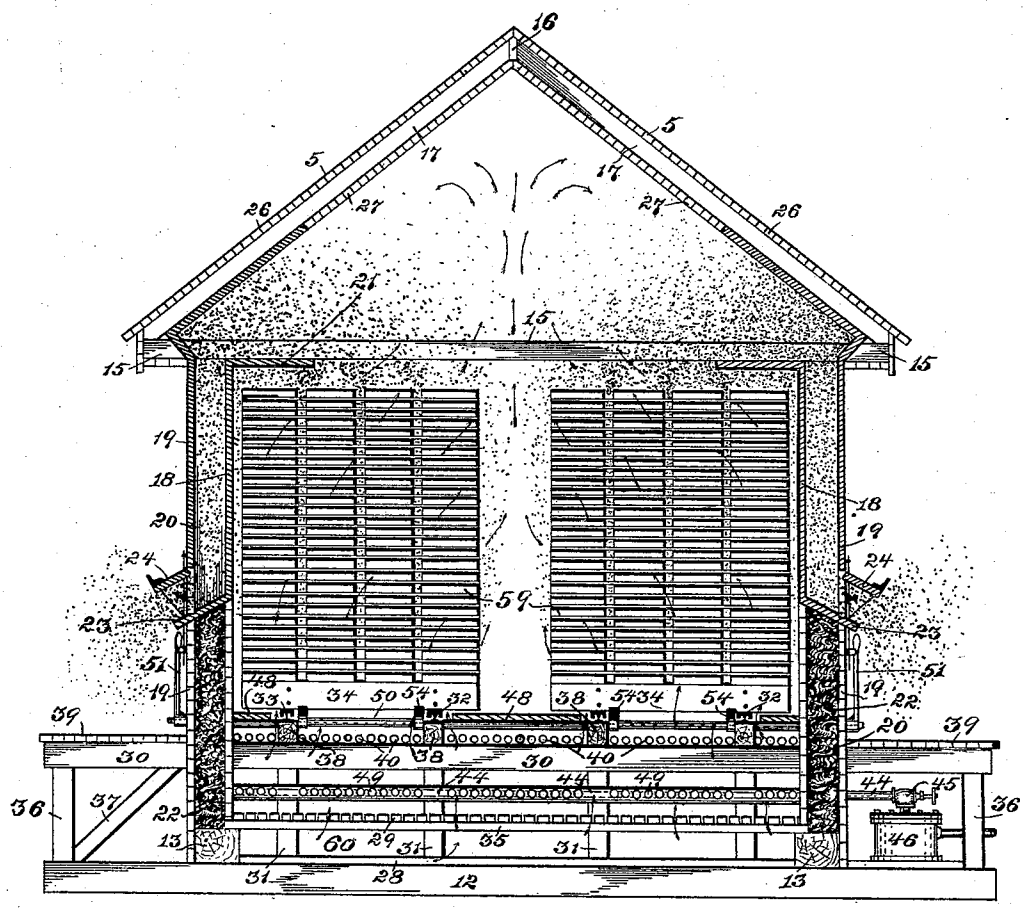
Fig. 3.



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UNITED STATES PATENT OFFICE.

VICTOR L. EMERSON, OF BALTIMORE, MARYLAND, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ANNETTE E. EMERSON, OF SAME PLACE.

LUMBER-DRIER.

SPECIFICATION forming part of Letters Patent No. 535,981, dated March 19, 1895.

Application filed June 9, 1894. Serial No. 514,109. (No model.)

To all whom it may concern:

Be it known that I, VICTOR L. EMERSON, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Lumber-Driers; 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.

My invention relates to lumber drying kilns and has for its object to furnish a structure of this class which will be economical in construction and expenditure of heat, and shall increase the output with a decrease of boiler power.

With this object in view my invention consists in the improved construction, arrangement and combination of parts hereinafter described and afterward specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of a kiln constructed in accordance with my invention, a portion of the side and roof being broken away to show the interior construction. Fig. 2 is a view in side elevation the side being broken away to show the inner construction, and the central portion being broken away to shorten the figure in the drawings. Fig. 3 is a vertical cross sectional view on a plane passing through two of the escape openings one on each side.

Like numerals of reference mark the same parts wherever they occur in the various figures of the drawings.

Referring to the drawings by numerals 1 designates the receiving end of the kiln and 2 the discharging end, each of which during the process of drying is closed by a door 3, sliding vertically in ways in the upwardly extending corner posts 4 of the building. These posts extend above the roof 5, and each pair is connected by a cross bar 6 one of whose ends extends beyond one post and carries a pulley 7. Two additional pulleys 8 also in this cross bar 6 are mounted between the posts and over all the pulleys mentioned pass ropes 10 connected at one end to the door and at the other end to a balance weight 11. By raising the sliding door 3, the entire end of the building below the gable of the roof 5, is thrown open for either the admission or discharge of the lumber stacked on trucks.

The building or structure is made as follows:—Base timbers, 12, are placed upon the ground at right angles to the longitudinal line of the building and extend beyond the side thereof. Upon these are placed two parallel lines of longitudinal stringers or sills, 13 which designate the width of the building proper, and upon these are set the studding 14 and corner posts 4 which form the frame work for the side walls and also carry the trusses 15, 17, which support the roof 5. The trusses referred to consist of the cross timbers 15 which rest on and connect the studs 14 at opposite side of the building. These truss timbers 15, like the timbers 12 also extend beyond the side walls to form the eaves of the roof. Extending from the stringer 16, at the apex of the roof 5, to the opposite ends of the cross timbers or joists and resting thereon are the other two legs 17 of the roof truss. At the inner side of the studding or framework 14, referred to and from the longitudinal stringers 13 to the cross truss timbers 15, are fastened the longitudinally extending boards 18, which form the inside wall of the building and in like manner the outside wall is also constructed by the longitudinal boards or weather boarding 19. It will thus be seen that a space 20 is left between the inner and outer walls and any two adjacent posts or uprights 14 thus forming a compartment, closed at the bottom by the sill 13, and at the top by the deflector plate 21 fastened to the under side of the cross truss timbers and extending the entire length of the building and from the ends of said cross timbers in toward the center of the building some distance beyond the inside wall. The majority of the spaces 20, referred to are filled from bottom to top with saw dust or other non-conducting material 22, and the balance are filled only about half way up from the sill 13 to a dividing plate 23, extending from the inner wall to and a little beyond the outer wall 19, with a fall or water shed toward the outside. A door 24 suitably hinged at the top and provided with a suitable lifting and adjusting apparatus 25 is placed in the outside wall just above the plate or water shed 23 and communicates

with the upper empty space 25×, above said dividing plate 23. It will now be seen that this space can be put into communication with the outside atmosphere by opening the door 24 and is to be used as a duct or vent for the moisture by having its upper end open through the deflector plate 21, into the interior of the kiln or building. These ducts or vents are placed at suitable distances along the side of the building. The roof like the side walls, see Figs. 2 and 3, is made up of an outer and inner facing 26—27 and its compartments filled with saw dust or other non conducting material, but unlike the latter has no ducts or vents.

Upon the base cross timbers 12 and throughout the length of the building is laid a solid flooring 28 to form the bottom for the air intake or passage. Above this floor 28 is a slatted or partly open floor 29 supported by cross bars or timbers 35 resting on the side sills 13. This slatted floor 29, breaks up the current of air and enables it to be distributed equally. The bottom or solid floor and the slotted floor just referred to are parallel with one another and above the latter are a series of cross timbers or joists 30, which are as long as the base timbers 12 and like them extend beyond each side of the building. There is one of these cross timbers 30 fastened at each side of each of a series of upright posts 31 resting on the base timbers 12. These posts and the cross timbers 30 at the receiving end 1 of the building are higher than at the discharging end 2 and have a gradual fall from one end to the other and upon the posts are placed four lines of stringers 38 upon the upper surfaces of which are fastened the track rails 32 upon which the wheels 33 of the two lines of trucks 34, travel.

The cross bars or timbers 35 which support the slotted floor 29 in addition to resting on the sills 13 are fastened to and are partly supported by the upright posts 31, referred to. A post 36, similar to the ones 31 already mentioned is at each end of each of the base timbers 12 and is to support the end of the two corresponding cross timbers 30. Suitable diagonal braces 37 outside the building give additional stiffness to the framework.

Upon the ends of the cross timbers 30 outside the building are fastened boards forming a platform or walk 39, extending from one end of the building to the other, and inside the building and resting also on the said cross timbers 30 are strips of metal which support series of longitudinal lines of live steam pipes 40 all connected to the high or receiving end 1, of the kiln to a main supply pipe or header 41, extending cross wise and to the outside of the building, where it is provided with a hand valve 42. These lines of pipe start at the header 41, just mentioned and extend toward and have a continuous fall to the opposite end of the building where each has a downwardly projecting return bend 43, and then continues back again for some distance as at 49 and terminates in a main discharge or drain pipe 44 also extending cross wise of the building and provided with a hand valve 45 and finally discharging or emptying into a suitable trap 46, outside of the building.

It will be seen that from the above construction of the steam pipes 40 and headers 41 and 44 that any amount of contraction or expansion of the pipes 40 will not affect the headers but will only bend the return stretch 49 of the pipes. Both ends 1 and 2 of the building from the slatted floor, see Fig. 2, up to the platform 39 are closed by a wall 47 so that all air entering the kiln must pass through the slotted floor from the air passage.

A longitudinally running board or deflector 48, is between the inside rails of the two lines of tracks above the steam pipes 40 and serves to prevent a large column or current of hot air coming up between the two lines of trucks arranged in the building. A similar board is placed between the inside wall of the building and the outside rail of each line of track.

It will be seen from the foregoing description that a load of lumber would move from one end of the kiln to the other by gravity alone and unless some stop were employed would press against the discharging door. To overcome this a rock shaft 50 at the discharging end extends from one side of the building to the other and has one end projecting beyond the wall of the same to which is attached a hand lever 51, which engages a quadrant bar 52 fastened to the side of the building provided with a series of stop notches 53.

Fixed to the cross shaft 50 between the track rails are arms 54 which engage the front ends of the trucks and check the same, when the hand lever is in the position shown in Figs. 1, 2 and 3 but when the hand lever is thrown down releases the truck and drop below the track rails.

Both ends of the roof or the end trusses 15, 17 are walled or boarded down to the cross timbers 15, to prevent the escape of the hot air at the ends of the building and also to enable the sliding doors to fully seal the ends of the kiln. Intermediate of the two ends the roof truss is similarly boarded to form a permanent division 55 of the kiln above the cross beams or timbers 15 and a flexible non combustible roller curtain 56 extends cross wise of the building below this division wall and is connected with a chain 57 on the outside of the building which passes over a hand wheel 58, in easy reach from the side platform so that the kiln can be divided into two rooms or compartments by simply lowering the curtain. A truck checking device like the one already explained is also employed, see Figs. 1 and 2 near the center of the building to prevent the lumber 59 and trucks from running into the dividing curtain.

Having described my invention the operation is as follows:—Green lumber enters into the first compartment or room at the high end

of the kiln where it is first brought into contact with the hot air. The superabundance of moisture in the lumber at this stage causes the air in the first chamber to become quickly saturated thus slightly lowering its temperature and preventing damage to the lumber due to too high a temperature and lack of moisture, and after being partly dried is run into the second room where the seasoning is finished in an atmosphere hotter and drier and from there leaves the kiln. During the process of drying, cold air enters through space and channel 60, then passes through the slotted floor to steam pipes, is there heated and rises through the perforated floor and circulates through the pile of lumber extracting and absorbing moisture therefrom and when it becomes fully saturated the heat keeps driving it up against that part of the roof just above the deflector from which it falls down to the spaces near the eaves and thence through the ducts or vents. Hot air from the bottom is continually forcing more moisture laden air up and as this moisture laden air is so much heavier than the atmosphere it naturally falls by gravity down the duct and into the atmosphere, the hot air on account of its own lightness leaving it and tending to remain in the apex of the roof of the kiln. The heavily dotted portion of the drawings represents heated air which has been saturated with moisture extracted from the lumber and which is continually being forced upward by the new currents of dry heated air coming in at the bottom. In this way the moist air is forced upward until it passes into the roof space. With it some air passes up which is not moisture laden to such an extent that this naturally rises to the central or highest part of the roof space while the saturated air accumulates near the eaves and being heavier than the drier air, falls by gravity down the side ducts and out into the open air, at the side of the kiln, the rapidity of its discharge being doubly regulated, first, by the adjustment of the exit door, and, second, by the amount of hot air admitted at the bottom of the kiln. The accumulated mass of saturated air at the level of the eaves, is protected from the currents of ascending hot air, by the deflectors on the eaves level, as contact with such currents would tend to extract some of its moisture and prevent its being promptly discharged from the side of the kiln. The central current of hot air being strongest, rises more rapidly and striking the apex of the roof, is deflected thereby toward each side, as indicated by the arrows in Fig. 3, forming a continual eddy, and driving such air as is moisture laden and heavy, sidewise and downward between the deflectors, into the spaces heretofore mentioned bringing it into direct communication with the side ducts. As before stated, such saturated atmosphere being heavy, falls then by its own gravity through said ducts and is discharged. One of the objects in having the outside openings of the ducts below their upper ends is to retard or suppress the natural draft of the kiln.

It will be seen from the foregoing that the moisture readily leaves the hot air, that no forced draft is required as the exit of the moisture laden air regulates the draft or intake of air at the bottom, and vice versa. It will also be seen that the entire apparatus can be operated from outside the kiln, there being no reason for the operator to enter the kiln at any time during the process of drying or filling the drier.

Having described my invention, what I claim is—

1. A drying chamber provided with suitable hot air supply at the bottom leading up through piles of material to be dried, combined with the partitions 21 above the material extending laterally inward and outward, the outward portion containing a series of apertures leading to ducts communicating with the outside air, substantially as and for the purpose set forth.

2. A dry kiln provided with suitable heating apparatus located beneath the material to be dried, deflectors 48, above the heater, the lateral inwardly extending partitions forming with the roof pockets, for receiving moisture laden air, and ducts leading down from said pockets between the double walls of the kiln, and into the outer atmosphere, as and for the purpose set forth.

3. A dry kiln provided with suitable hot air supply at the bottom leading up through piles of material to be dried, combined with the partition 21, above the material, extending laterally inward and outward, the outward portion containing a series of apertures leading to ducts which communicate with the outer atmosphere above the level of the radiators of the said kiln, and the hinged doors 24 adapted to close the outlets of the said ducts, substantially as shown and described.

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

VICTOR L. EMERSON.

Witnesses:

S. BRASHEARS,

E. NEWMAN.