No. 750,588. PATENTED JAN. 26, 1904.

H. M. BUCK.

KILN.

APPLICATION FILED APR. 29, 1903.

NO MODEL. 5 SHEETS—SHEET 1.

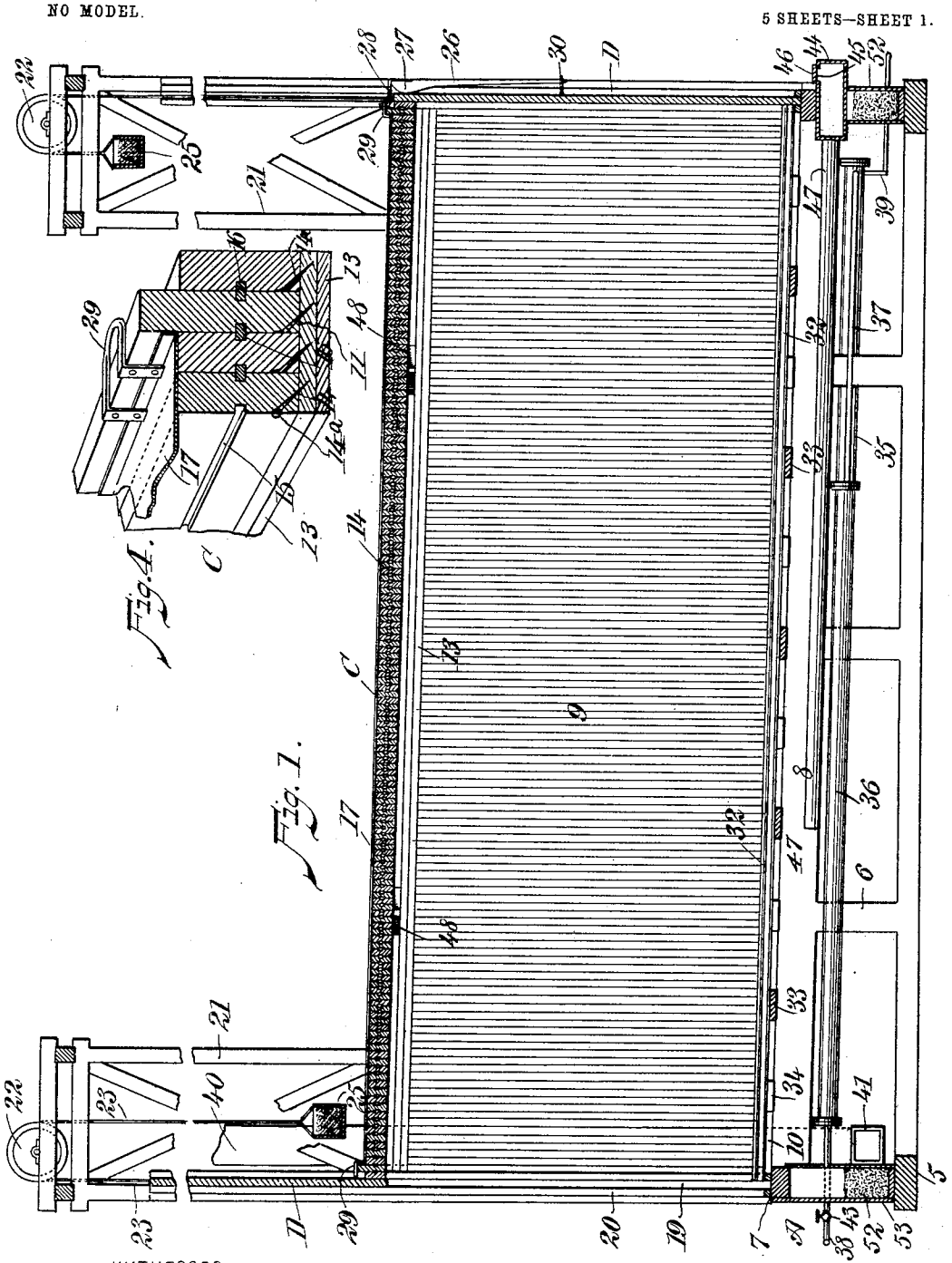


Fig. 4.

Fig. 1.

WITNESSES:

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THE NORRIS PETERS CO. PHOTO-LITHO. WASHINGTON, D. C.

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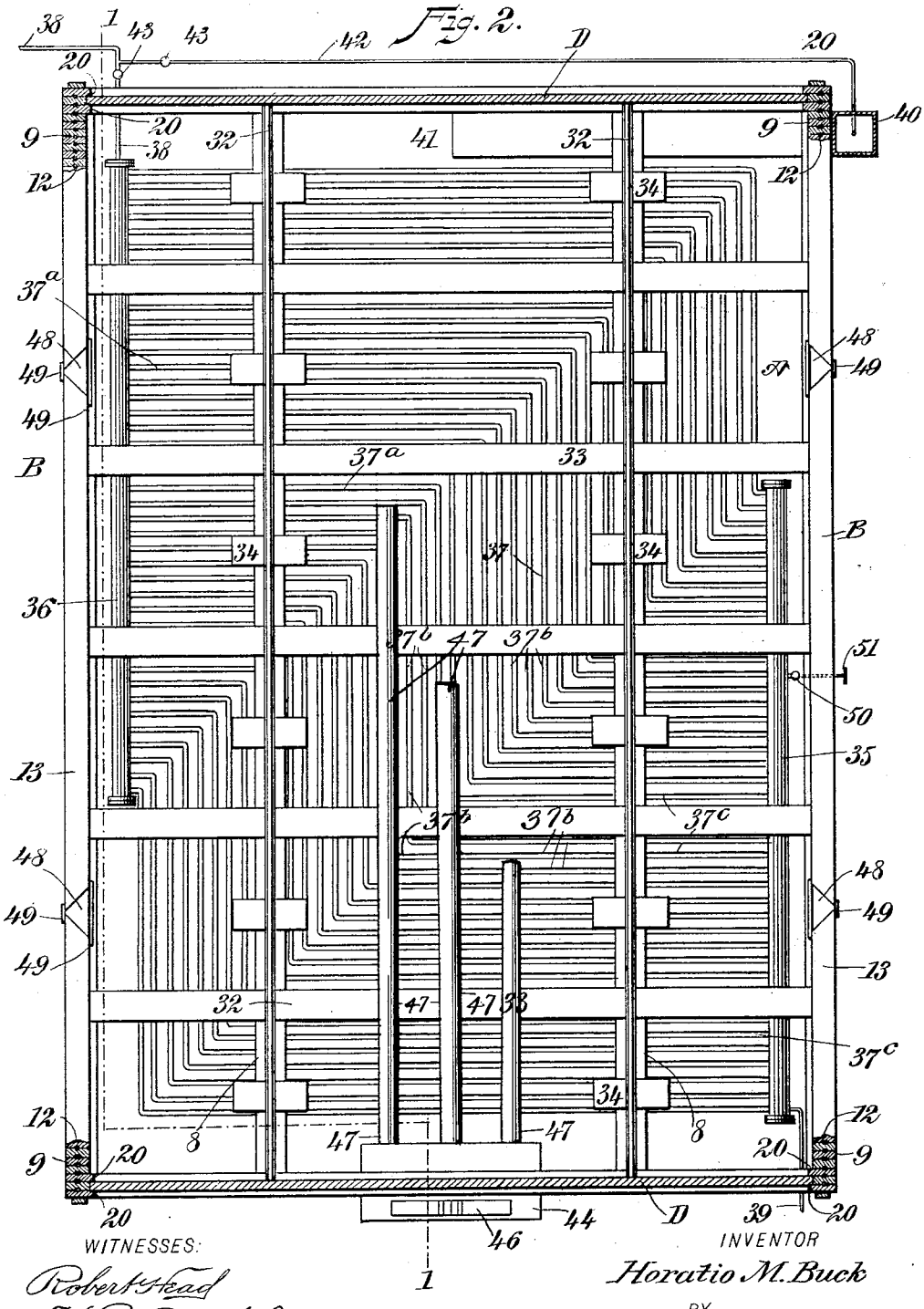
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NO MODEL. 5 SHEETS—SHEET 2.

Fig. 2.



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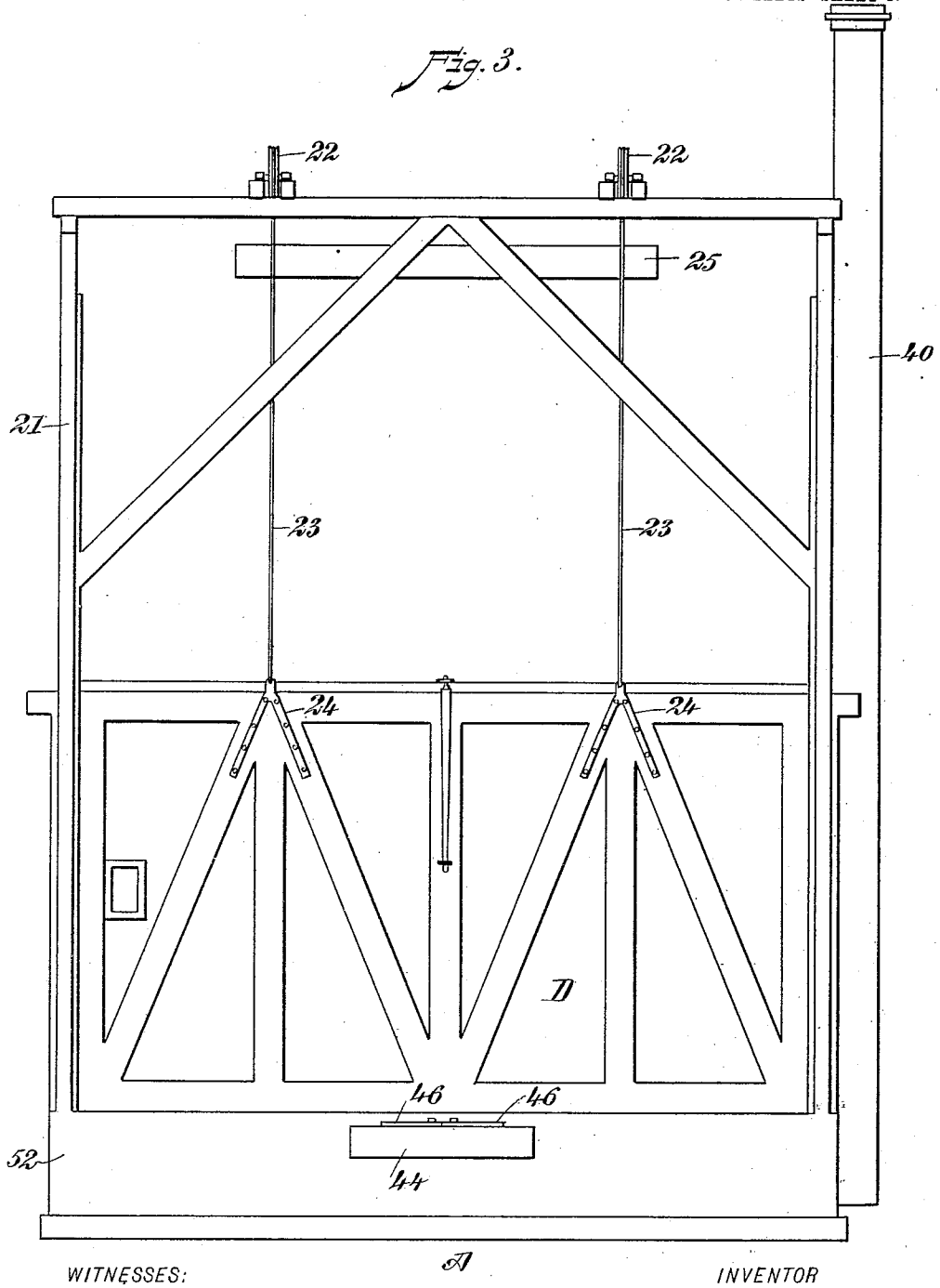
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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 3.



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NO MODEL. 5 SHEETS—SHEET 4.

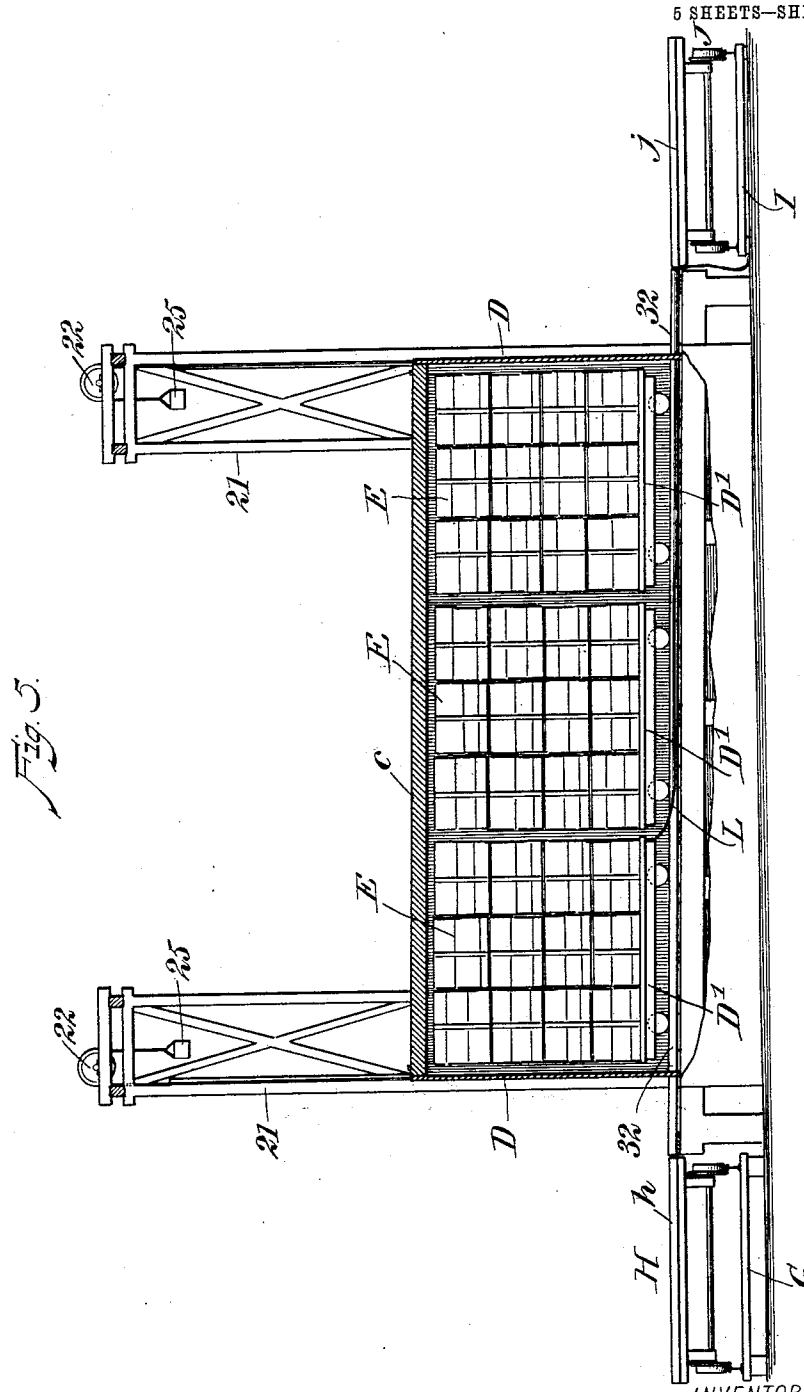


Fig. 5.

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APPLICATION FILED APR. 29, 1903.

NO MODEL. 5 SHEETS—SHEET 5.

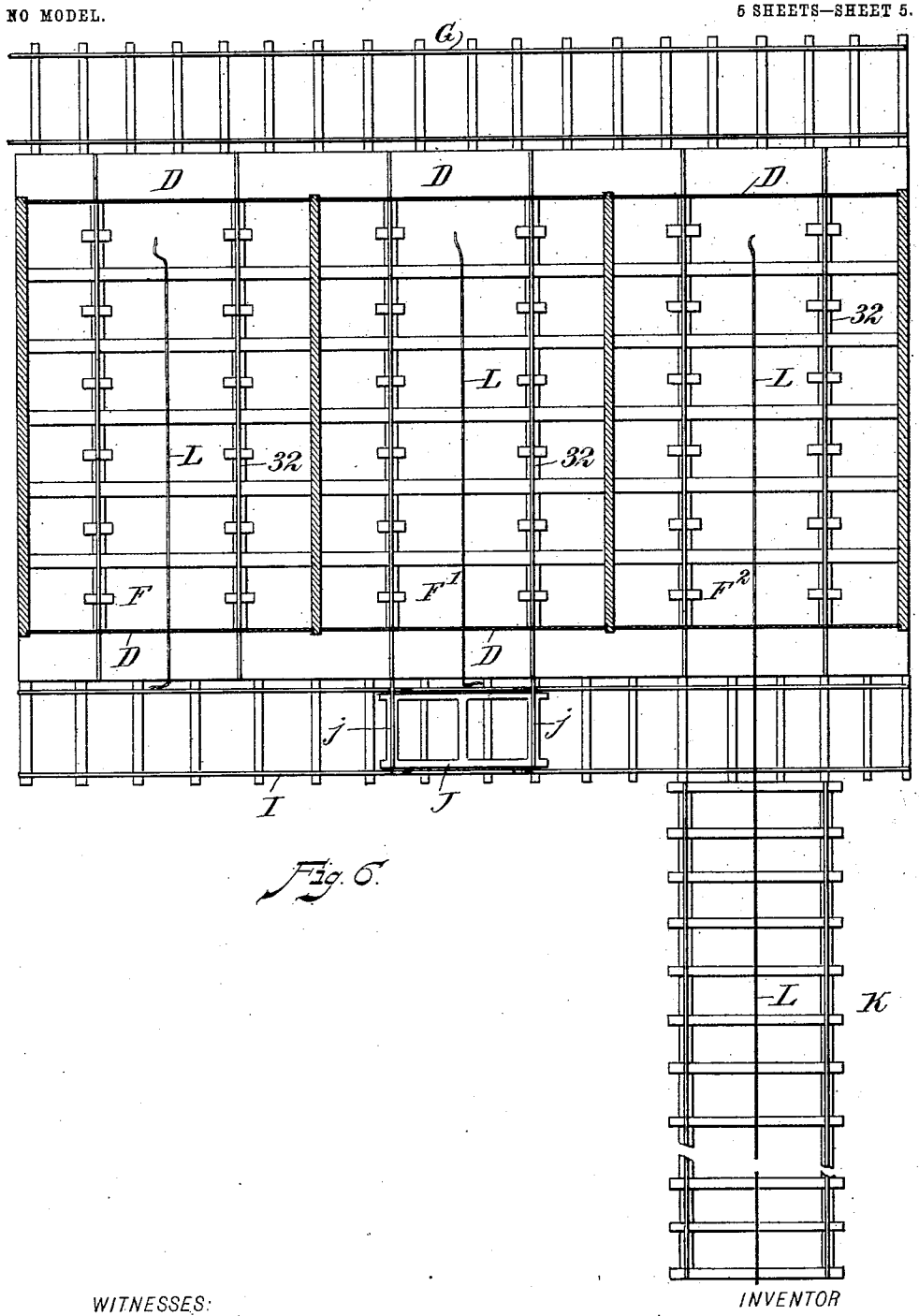


Fig. 6.

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No. 750,588. Patented January 26, 1904.

UNITED STATES PATENT OFFICE.

HORATIO MANSFIELD BUCK, OF BURLINGTON, WASHINGTON.

KILN.

SPECIFICATION forming part of Letters Patent No. 750,588, dated January 26, 1904.

Application filed April 29, 1903. Serial No. 154,815. (No model.)

To all whom it may concern:

Be it known that I, HORATIO MANSFIELD BUCK, a citizen of the United States, and a resident of Burlington, in the county of Skagit and State of Washington, have invented a new and Improved Kiln, of which the following is a full, clear, and exact description.

My invention relates to improvements in kilns for drying shingles, lumber, and other substances; and one object that I have in view is to construct the kiln in an air-tight manner in order to retain the heat and overcome warping or buckling of the parts, thus contributing to economy in the use of steam or other heating medium and minimizing repairs.

Further objects of the invention are to arrange the steam-circulating pipes in a way to allow for expansion and contraction without breaking the connection with headers and to also secure a compact disposition of a large number of such pipes, to draw off the moist air at or near one end of the structure, to provide for the inlet of cold air in regulated volumes and its distribution through the kiln, and to allow the ready introduction of fire-nozzles and hose into the kiln in case of a conflagration.

Further objects and advantages of the invention will appear in the course of the subjoined description, and the novelty will be defined by the annexed claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical longitudinal sectional elevation on the plane indicated by the dotted line 1 1 of Fig. 2. Fig. 2 is a sectional plan view, the plane of the section being taken directly below the roof of the structure. Fig. 3 is an elevation looking at one end of the kiln, showing the door in its lowered closed position. Fig. 4 is a detail perspective view, on an enlarged scale, of a portion of the roof, showing the manner of constructing the same. Fig. 5 is a sectional elevation through a kiln, with a series of loaded trucks therein, showing the manner of arranging the material; and Fig. 6 is a sectional plan view showing a number of chambers and a series of tracks by which loaded trucks may be placed in either of said chambers and quickly withdrawn therefrom in case of fire.

The improved kiln has an underframing A, of any suitable construction, said underframing being shown by Figs. 1 and 2 of the drawings as consisting of a mudsill 5, a series of posts 6, an elevated sill 7, and longitudinal girders 8, all of these parts being joined in any substantial way. The walls B are erected on the underframing in a way to produce an air-tight structure, and these walls, together with the roof C, are built in practically the same way to minimize the loss of the heat supplied to the interior of the kiln. Each side wall consists of a series of planks 9, uniform in width and laid face to face, as represented by Figs. 1 and 2. On the girders 8 at the sides of the kiln are secured one or more planks or plates 10, the same being arranged horizontally and spiked to the underframing. The planks 9 of the side walls are placed on end upon the planks or plates 10, and they are fastened to the latter by diagonal spikes in the same way as the planks 14 of the roof are spiked to the horizontal planks 13. (Shown by Fig. 4.) The vertical planks 9 of the walls are provided in their meeting faces with coincident grooves or channels 11, and these channels receive the tongue-strips 12, whereby the spaces between the planks 9 are effectually closed. (See Fig. 2.) The planks 9 of the side walls are of uniform height, and on the upper ends thereof are laid the horizontal plates or planks 13, the same being disposed in three layers or tiers and fastened by diagonal spikes 14^a to the vertical planks and to each other, as shown by Fig. 4. These horizontal planks 13 support the transverse horizontal planks 14, which form the roof C. The planks 14 extend entirely across the kiln, so that their ends will project beyond the horizontal cap-planks 13. (See Fig. 3.) These horizontal transverse planks 14 are fitted closely together to engage along their flat faces, and each plank is provided in its side faces with longitudinal grooves or channels 15, the planks

being so assembled that the grooves or channels therein will register or coincide with corresponding channels of adjacent planks. The channels receive a series of tongue-strips 16, which span the spaces between the meeting faces of said planks, and thus effectually prevent the escape of heat from the kiln. The detailed construction of the roof C is represented more clearly by Fig. 4 of the drawings; but it will be understood that the vertical planks 9 of the side walls B are laid and united in a way similar to the planks 14 of the roof.

I prefer to apply a thick coating of a composition comprising lime, cement, and salt to the inside and the outside of the ceiling and walls of the kiln, this composition serving to preserve the wood forming the planks 9 14 from the effect of heat confined within the kiln and the action of the weather outside of the structure. The roof C is covered with a layer of roofing material 17, of any suitable nature, and to this roofing material is applied any suitable roofing composition, such as pitch and gravel.

The kiln herein described consists of side walls and a ceiling to produce a single-chambered structure which is open at the ends, said structure being minus a floor. The open ends of the kiln are adapted to be closed by vertically-slidable doors D, one at each end. Each door is arranged to travel in a groove or guideway 19, which is provided on the opposing faces of the walls B by the employment of door-stops 20. (See Figs. 1 and 2.) From each end of the kiln rises a framework 21, adapted to support sheaves 22, idly journaled in elevated positions on said framework. Over these sheaves are arranged weight-cables 23, which are fastened to metallic straps 24, secured firmly to the door. (See Fig. 3.) These suspension-cables pass over the sheaves and are fastened to a horizontal receptacle 25, adapted to be loaded with any suitable weight material. This receptacle is operatively connected with one door by the intermediate cables, and it is arranged over one end portion of the roof C, so that breakage of the cables will allow the receptacle 25 to drop upon the roof, thus overcoming any liability of the receptacle in case of accident to strike one of the workmen. The receptacle is open for the free reception of the weight material, and said receptacle should be weighted so that it will be of less heaviness than the door D, whereby the latter is free to close itself by gravity, and said door may be opened and closed with ease and facility. When the door is lowered to its closed position, it may be jammed tightly against the door-stops 20 by any suitable operating device; but in Figs 1, 3, and 4 I have shown this operating device embodied as a lever 26. The lever is provided with a cam-shaped end 27 and with a projecting hook 28, said hook being adapted for engagement with a keeper 29, which is fastened to the roof C, near an end portion thereof. After the door shall have been lowered the hook 28 of the lever may be fitted into engagement with the keeper 29 in a position to bring the cam-shaped end 27 of said lever against the outer face of the door. The operator should now press the lower end of the lever inwardly toward the door, so that the cam 27 will press said door against the inner door-stop 20, and this lever may now have its free end engage with a ring or eye 30, which is fastened to the door. This construction permits the door to be fastened against the kiln in a way to produce tight joints between the structure and the door, thus minimizing the escape of heat from the kiln-chamber.

The floorless kiln is provided with a longitudinal track which is slightly inclined from one end of the structure toward the other. This track has rails 32, secured to a series of cross-ties 33, the latter being fastened in a suitable way to the longitudinal girders 8 of the underframing. The middle girders of this underframing A are disposed directly below the track-rails 32 to furnish the main support therefor, and suitable blocks 34 are also fastened to these intermediate girders, as shown by Figs. 1 and 2. It is to be understood that the shingles, lumber, or other material to be dried are piled or stacked on suitable cars which are run from an outside track onto the rails 32 of the kiln-track, and these loaded cars are shoved into the kiln toward one end thereof. The "green" or undried material should be introduced into the kiln at one end, and as the material undergoes the drying operation the car should be advanced farther into the kiln toward the other end. The dried material may be withdrawn from the kiln by opening the door at its delivery end, and by this process of gradually advancing the material farther into the kiln as the drying process develops the material may be dried quickly and advantageously without injury thereto, and the heat is utilized to the best advantage.

One of the important features of the present invention resides in the provision of a novel form of heating mechanism, and in the drawings I have shown this heater as consisting of headers 35 36 and a plurality of intermediate bent circulation-pipes 37. (See Fig. 2.) The headers 35 36 are disposed within the kiln below the track 32 and quite close to the walls of the structure. These headers are not equal in length to the kiln; but the header 36 has its outer end extended nearly to the right-hand door, while the other header, 35, has its left-hand portion disposed adjacent to the other door, the inner ends of said headers being disposed in lapping relation as respects the transverse middle of the kiln. The pipes 37 are correspondingly formed and compactly arranged, each pipe consisting of straight lengths 37^a, 37^b, and 37^c. The lengths 37^a of the pipes are fastened or coupled in a suitable

way to the header 36, while the other lengths 37^c of said pipes are united to the other header 35. The lengths 37^b extend in the direction of the length of the kiln, and each length 37^b lies at right angles to and unites the other lengths 37^a 37^c, as clearly shown by Fig. 2. The pipes are arranged for their several lengths to lie parallel to one another, and the peculiar construction of each pipe allows for expansion and contraction thereof, thus minimizing the tendency of the pipe to break loose at its jointed connection with the headers. The employment of pipes of small diameter enables me to use a very large number of them, and the peculiar construction shown by Fig. 2 permits said pipes to be compactly disposed. The pipes lie in substantially the same horizontal plane, and they may be suspended or supported by any suitable devices between their connection with the headers. The entire heating contrivance presents a radiating-surface of large area, which occupies practically the entire space below the track within the kiln-chamber. Live steam may be employed as the heating medium, although hot air or other fluid may be utilized. The heating medium is conveyed to the header 36 by means of a pipe 38, which is coupled to an end portion of this header, and from said header 36 the steam circulates through the bent pipes 37 into the other header 35, the water of condensation being carried off by means of a drain-pipe 39.

Moist air from the kiln is adapted to find its exit through a stack or uptake 40, the same being shown by Fig. 2 as located at one corner of the kiln and having a horizontal duct 41, which extends below the horizontal plane of the heating appliance. This horizontal duct 41 is open at its inner extremity, (see Fig. 1,) and said duct conveys the moist cold air from the kiln into the uptake, from whence it makes its escape. If it is desired to facilitate the exit of the damp cold air from the kiln, I may employ a steam-jet within the uptake, and in Fig. 2 a jet supply-pipe 42 is coupled to the feed-pipe 28, the other end of said pipe 42 terminating in the lower part of the uptake 40. This pipe 42, as well as the pipe 38, is equipped with a cock or valve 43, by opening which the steam may pass from the pipe 38 into the pipe 42 and thence into the stack 40, thereby creating a suction through the duct 41, which accelerates the escape of the damp cold air from the kiln.

Cold air may be supplied to the interior of the kiln by any suitable appliances; but I prefer to use an air-box 44, which is secured to the underframing at one end of the kiln. This air-box is provided with a series of inlet-openings 45, adapted to be partly or wholly closed by dampers 46, and to the air-box is coupled a series of distributing-flues 47. (See Figs. 1 and 2.) These distributing-flues may be of any suitable length and extended to different parts of the kiln-chamber. If desired, the flues may be unequal in length and terminate at different distances within the kiln-chamber for the perfect distribution of cold air therein. I prefer to arrange the air-flues in a horizontal plane above the heating-pipes in order that the inflowing air may be heated by the heat radiated from the pipes, and this cold air is prevented from striking directly against the pipes, thus obviating the condensation of steam therein.

The top horizontal plate or plank 13 in each side wall of the kiln is provided with a series of flared openings 48, each opening being closed by cleats 49, fastened to the inside and the outside, respectively, of the wall. In case of fire the cleats are adapted to be torn away, and a fire nozzle or hose may be thrust through the opening 48 in order to play upon the flame within the kiln. I have also provided a valved steam-outlet 50 in the header 35, (see Fig. 2,) said valve of the outlet being controllable by means of a stem 51, which passes through one of the side walls, in order that the valve may be opened from the outside of the kiln, thus making provision for the introduction of steam into the kiln in case of fire. The walls 52 of the ends of the kiln and below the track 32 are of hollow construction to receive a suitable filling material 53. (See Fig. 1.)

In Fig. 5 of the drawings I have shown a series of loaded trucks D', arranged on the track 32 in the kiln-chamber. These trucks are loaded with material E, of any suitable nature, and the loaded trucks are run into the chamber, so as to practically fill the same from side to side and from top to bottom, a two-inch space being left on sides and top, so that the heat must go up and down through the material before escaping out through the stack. This causes the bottom courses of material to become as dry as the upper courses and secures to the lumberman or "middleman" a considerable saving in the cost of shipping the goods.

With the kiln is associated an arrangement of tracks and transfer-platforms by which the loaded trucks may be placed in either of a series of kiln-chambers and also withdrawn therefrom quickly in case of emergencies, as in the event of a fire. As represented by Fig. 6, the kiln may be built with a series of chambers F F' F^2, each separated from the other and of any desired dimensions. Each chamber has an inclined track 32 and doors D at the ends. Adjacent to the inlet end of the chambers is a track G, on which is adapted to travel a wheeled platform H, (shown by Fig. 5,) said platform having rails *h*, adapted to aline with either of the tracks 32 in the chambers, thus allowing loaded trucks to be run into either of the chambers at one end thereof. On the opposite side of the kiln and adjacent to the delivery end of the chambers is another

track I, on which travels a wheeled transfer-platform J, having rails *j* to aline with either of the tracks 32 in the chambers, said rails *j* of the platform being also adapted to register with a track K, which extends away from the kiln. The foremost truck D′ in each of the kiln-chambers has a metallic cable L attached thereto, by which the loaded trucks may be hauled out of the kiln in case of fire, thus making provision for quickly removing the material out of danger.

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

1. A kiln having a drying-chamber and a suitable floor, a heater below said floor and consisting of headers and a series of pipes all arranged in the same plane, a fresh-air box at one end of the kiln, and a plurality of fresh-air-distributing pipes communicating with said box and extending between the floor and the members of said heater for discharging atmospheric air above the heater.

2. A kiln having a drying-chamber and a suitable floor, a heater disposed below the floor and consisting of headers and a series of pipes all arranged in the same plane, a fresh-air box having a valve-controlled air-inlet, and a plurality of distributing-pipes communicating with said box and extending to different points in the space between the floor and the heater; said pipes discharging atmospheric air above said heater.

3. A kiln having a drying-chamber and a suitable floor, a heater disposed below said floor and consisting of headers and a series of pipes all arranged in the same plane, a steam-supply for one of said headers, a moist-air duct disposed at one end of the kiln on a plane below the heater and having an external uptake, a steam-pipe connected to the steam-supply and arranged to discharge a jet of steam to the uptake of said duct, and means for supplying atmospheric air to the kiln above the plane of the heater.

4. The combination of a kiln having an open end and door-stops adjacent to said open end, a door slidably fitted between said stops, a keeper attached to the roof of the kiln, and a cam-lever having means for detachably engaging with said keeper and adapted to force said door into binding engagement with said stops.

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

HORATIO MANSFIELD BUCK.

Witnesses:
JOHN DOUGHTY,
H. L. BOWMER.