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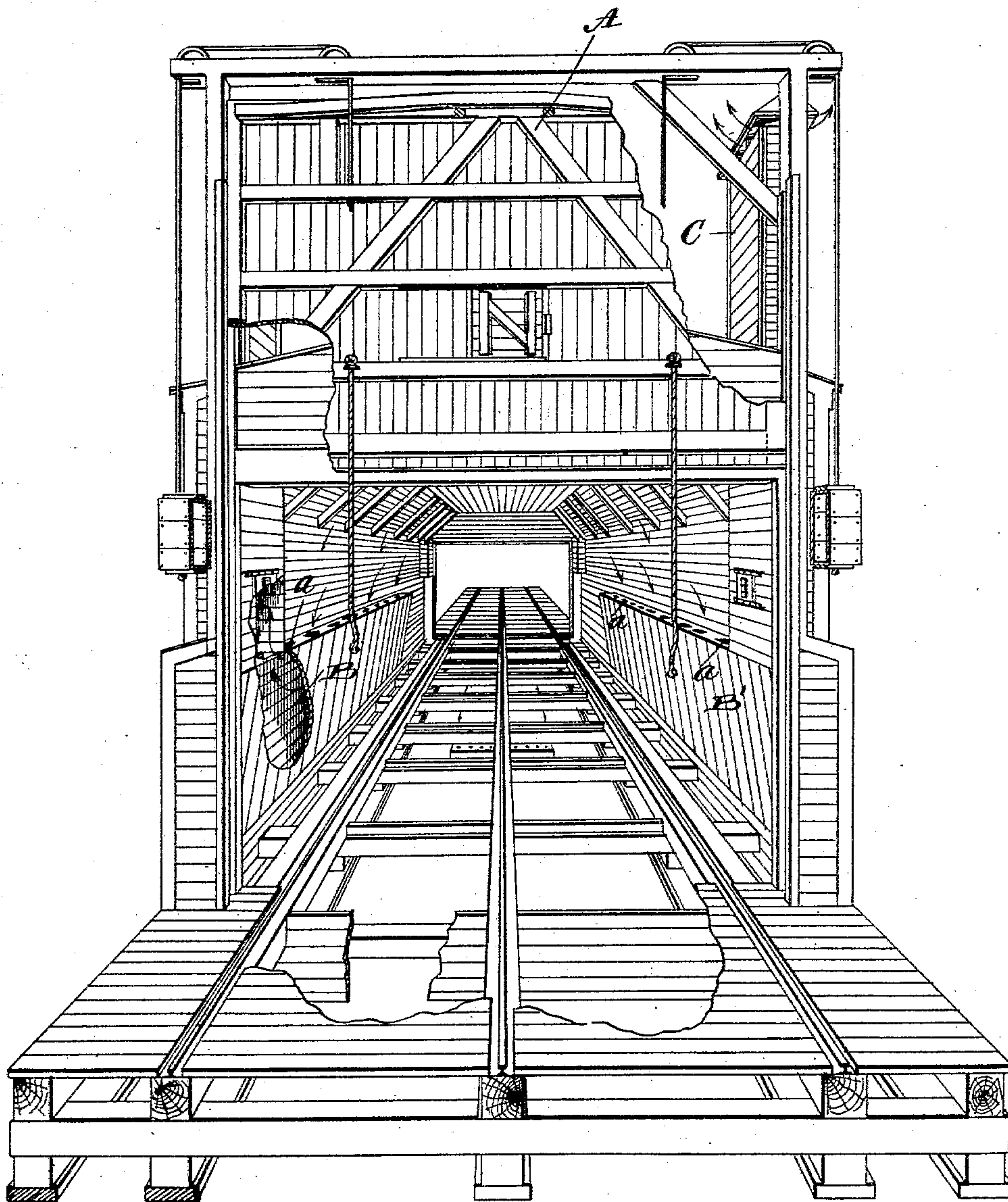
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A. T. BEMIS.  
DRY KILN.

No. 563,704.

Patented July 7, 1896.

*Fig. 1.*



WITNESSES:

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INVENTOR

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(No Model.)

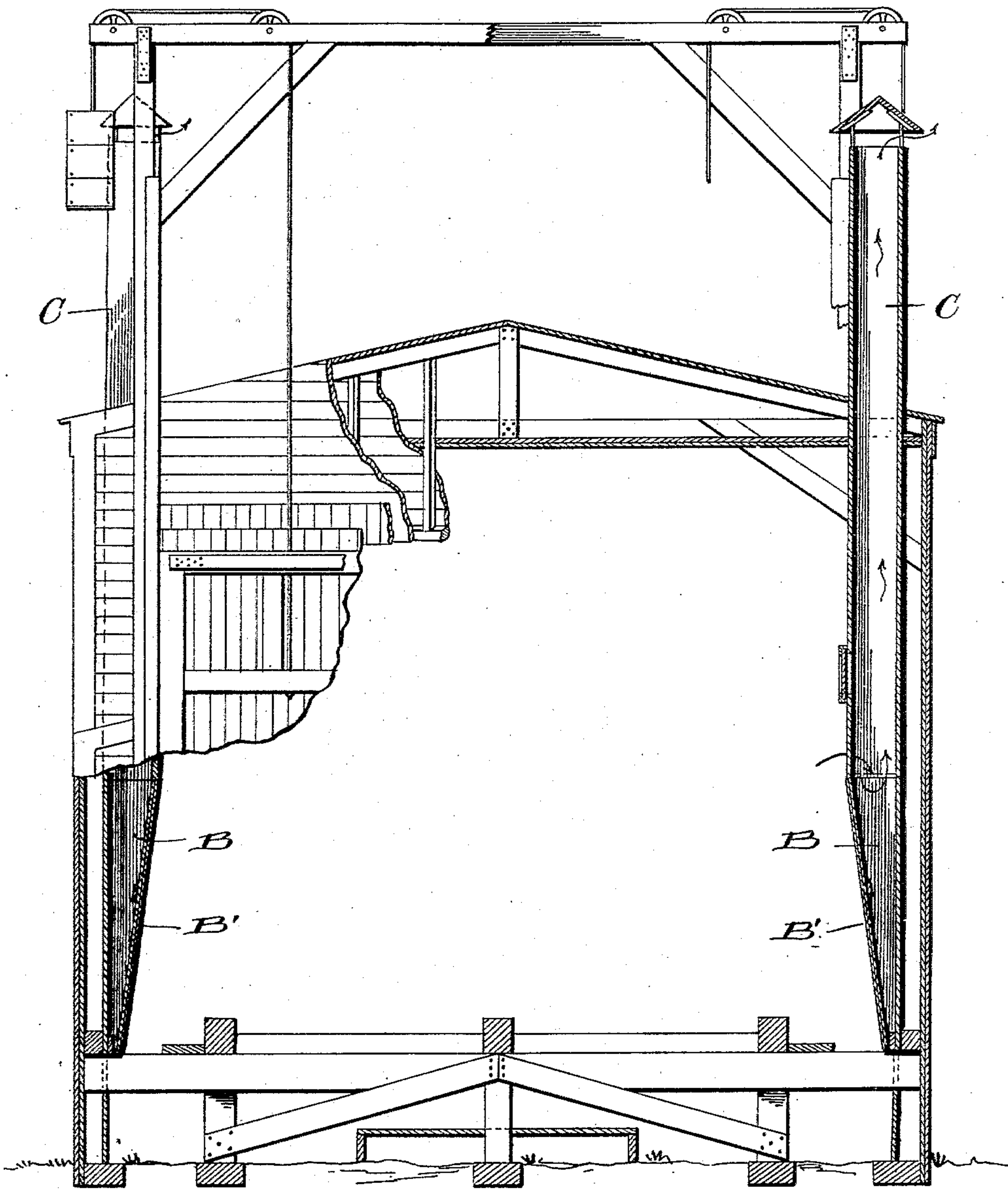
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Patented July 7, 1896.

*Fig. 2.*



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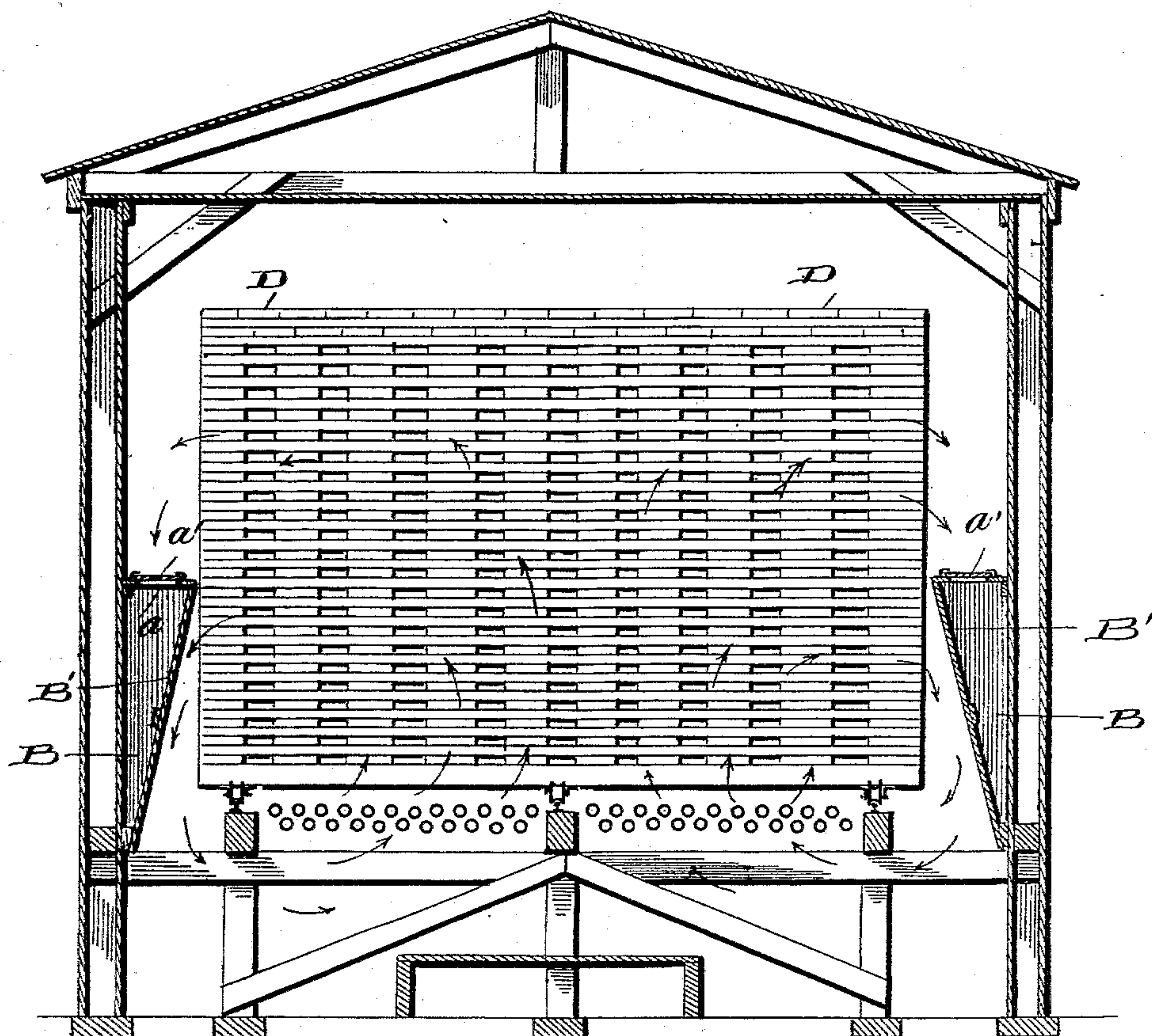
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DRY KILN.

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*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

ALBERT T. BEMIS, OF INDIANAPOLIS, INDIANA.

## DRY-KILN.

SPECIFICATION forming part of Letters Patent No. 563,704, dated July 7, 1896.

Application filed May 2, 1896. Serial No. 590,051. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT T. BEMIS, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Dry-Kilns; and I do 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 letters of reference marked thereon, which form a part of this specification.

This invention relates to certain new and useful improvements in lumber-drying kilns of that class in which the material to be dried is placed upon trucks and run into the kiln, where it is subjected to the action of heated air which is permitted to pass through the material, the air being heated by means of a pipe system located beneath the trucks, the heated air being discharged directly into the drying-chamber of the kiln.

The present invention has for its object, among others, the provision of a dry-kiln of the character described in which the material to be dried will be subjected throughout to a uniform degree of heat, thus insuring perfect drying of the lumber upon the trucks and preventing the warping of the lumber, and also the checking of the boards at the ends and sides of the truck, as is common with the use of many of the lumber-drying kilns in which an uneven distribution of heat is maintained within the drying-chamber.

The invention has for a further object the provision of a drying-kiln in which the upper portion of the drying-chamber of the kiln is entirely free from outlet-passages through which the exhausted air, after it has served its function as a drying agent, is permitted to enter flues which are provided at the receiving end of the drying-chamber and extend longitudinally of the chamber, upon both sides of the same, extending, preferably, about two-thirds of the length of the kiln, said flues having direct communication with an escape-flue extending for a considerable distance above the roof or top of the kiln.

A further and essential object of the invention resides in the provision of flues of the character above described, the said flues be-

ing so constructed and disposed with reference to the lumber upon the trucks as to insure a double circulation of heated air through the lower portion of the lumber piled upon the trucks, thus insuring a perfect drying of the entire mass of lumber upon the truck and entirely obviating the necessity of overdrying the upper half of the load upon the truck, in order to thoroughly and uniformly dry the lower half.

A further object of the invention resides in the provision of a lumber-drying kiln in which the walls and ceiling of the drying-chamber are imperforate, the only outlet for the exhaust-air being through moist-air flues which communicate with exhaust stacks or flues upon each side of the kiln.

To these ends and to such others as the invention may pertain the same consists in the peculiar construction and in the novel combination, arrangement, and adaptation of parts, all as more fully hereinafter described, shown in the accompanying drawings, and then specifically defined 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, like letters of reference indicating the same parts throughout the several views, and in which—

Figure 1 is an end elevation of a dry-kiln, the same being taken from the receiving end of the kiln, with the door raised, thus disclosing the interior of the kiln. Fig. 2 is an end view of the kiln with parts broken away and with the flues shown in section. Fig. 3 is a vertical transverse section through the kiln and loaded truck therein.

Reference now being had to the details of the drawings by letter, A designates a dry-kiln for drying lumber, which in size and form is similar to this class of dry-kilns in common use, being provided with the usual tracks which extend longitudinally through the interior of the drying-chamber, the ends of the kiln being provided with the usual vertically-moving counterbalanced doors. The kiln is designed to be heated from the floor-level, or beneath the same, either by the usual and well-known arrangement of steam-pipes or other suitable means adapted to the purpose,



but as the present invention has no reference to the heating mechanism, being equally well adapted to be used in connection with any of the heating systems in which the heat is derived from a source at or below the floor-level of the kiln, a detailed description and illustration of any form of heating appliance or system is not deemed necessary, and is therefore omitted.

The body or drying-chamber of the kiln is constructed in the form of an apartment having imperforate side walls, and roof devoid of ventilators or other openings which would afford an outlet for heated air, and the doors at the ends of the chamber are designed, when closed, to fit closely, thus preventing the escape of heat at the door-openings. It will be seen that a drying-chamber thus constructed will afford a sealed or closed apartment within the upper part of which the heated air will be retained, and, there being no openings in the side or end walls of the chamber, the efficiency of the kiln will in no degree whatever be affected by wind-storm, which in cases in which the drying-chamber is provided with openings in the side walls of the chamber frequently results in an uneven drying of the lumber, and in other ways greatly impairs the efficiency of the kiln.

Arranged upon the opposite sides of the kiln, in contact with its side walls, I provide moist-air flues B B. The said flues B are of a height, preferably, of about one-half the distance from the floor of the drying-chamber to the top of a loaded car, as shown in Fig. 3 of the drawings, and these flues extend from the receiving end of the kiln for a considerable distance, preferably about two-thirds the length of the kiln. The width of this moist-air flue at the top is such that it extends from the side wall of the chamber of the kiln inward to a point in close proximity to the lumber upon the loaded car, as shown in Fig. 3, and the inner wall of the flue is inclined inwardly as it approaches the lower portion of the kiln, as shown at B'. The top of the said flue B is closed, excepting at intervals of its length, where openings *a*, having each a sliding damper *a'*, are provided. At a point adjacent to the receiving end of the kiln the flue B terminates in the lower portion of an escape-flue C, which extends upward to a point a considerable distance above the roof of the kiln.

It will be understood that the flues B B are upon both sides of the kiln, and, with the escape-flues with which they are connected, are in all respects similar.

In practice, the kiln is preferably built wider than is common in kilns of this character, this being for the purpose of affording a circulation of the air downward at the sides of the lumber upon the truck, as will hereinafter appear.

In operation, the loaded lumber-trucks having been placed within the kiln and the doors at the ends of the kiln closed, the heat is applied, and in passing upward through the

spaces that intervene between the lumber upon the truck comes in contact with the upper tiers of lumber upon the truck, which tiers, as shown at D, are laid in close contact in order to retard the upward passage of the heat. The heat being thus deflected, is forced outward, escaping from the lumber at the sides of the load or pile, as indicated by arrows in Fig. 3 of the drawings. It will be seen that when thus deflected to the sides of the kiln the air which escapes from the lumber at a point above a horizontal line passing through the vertical center of the load will enter the spaces above the moist-air flues B B, where it will thus be caused to enter the said ducts, whence it will pass out through the escape-flues C C, and it will also be seen that the air which passes out from the lumber below the said central horizontal line will enter the said spaces below the wide upper portion or top of the flues B, and, being prevented from entering the said flues, the air will be forced downward, where it will come again into contact with the heating-pipes and again enter the lumber, as is shown by arrows in Fig. 3.

It is a well-known fact to those skilled in the art of lumber-drying that the upper portion of a pile of lumber, when subjected to the usual process of kiln-drying, will dry out much more rapidly than will the lower portion of the pile, and an essential feature of the present invention resides in the construction above described, whereby a double circulation of the air is provided through the lower half of the pile. In order to most effectually secure this second passage of the heat through the lower portion of the lumber upon the truck, I have found that the best results are obtained by placing the pipe system at substantially the level of the tracks, thus affording a space beneath the pipes, which space, when the pipes are heated, becomes a partial vacuum and serves to materially aid in producing and maintaining a current, as will be readily understood.

It will be seen that when any portion of the heated air within the kiln becomes so fully saturated with moisture that it can be no longer held in suspension it will separate itself by gravity from the partially-saturated air, which latter will fill the space above the lumber upon the truck and will occupy the space adjacent to the ceiling of the kiln, while the air which has become more fully saturated will, by gravity, enter the moist-air flues and be discharged through the vertical escape-flues into the atmosphere. It will thus be seen that the lumber being dried must give off sufficient moisture to cause the heated air to become fully saturated before any moisture can be discharged from the kiln. By this means the heated air in the kiln is at all times sufficiently moist to insure the surface of the lumber being kept soft, and thus prevented from checking at the sides and ends of the pile until the moisture is extracted



from the interior of the pile. By other processes of drying the outside surfaces of the lumber become dry and the pores of the wood are sealed by the sap or resin before the moisture in the interior can escape, thus causing the lumber to warp, check, and case-harden, and greatly lengthening the time required in drying.

It is a well-known fact to those who have had practical experience in lumber-drying that in the use of kilns having openings or ducts in the side walls the efficiency of the kiln is greatly impaired by changes in temperature or humidity of the outside atmosphere and varying winds, which objections are entirely obviated by the construction of my improved form of kiln, in which no direct communication between the interior of the kiln and the outer atmosphere is provided, the only communication being through the moist-air ducts contained within the drying-chamber and the vertical escape-flues with which said ducts communicate.

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

1. A moist-air flue for dry-kilns, the same consisting of a chamber adjacent to the side

wall of the drying-chamber of a dry-kiln and extending longitudinally thereof, said flue being substantially wedge-shaped in vertical cross-section, and being provided at its top with a series of openings, substantially as described.

2. A moist-air flue for dry-kilns, the same consisting of a chamber substantially wedge-shaped in vertical cross-section, said chamber being provided with a series of inlet-openings and communicating with an escape-flue, substantially as described.

3. A moist-air flue for dry-kilns, the same consisting of a substantially wedge-shaped chamber, in vertical cross-section, said chamber being placed in contact with the lower portion of the side wall of the drying-chamber and having a series of openings communicating with the interior of the drying-chamber and with an outlet communicating with an escape-flue, substantially as described.

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

ALBERT T. BEMIS.

Witnesses:

W. L. VAN LOAN,  
FRANKLIN H. HOUGH.