June 9, 1925. 1,541,350

O. P. M. GOSS ET AL

METHOD AND MEANS FOR DRYING LUMBER

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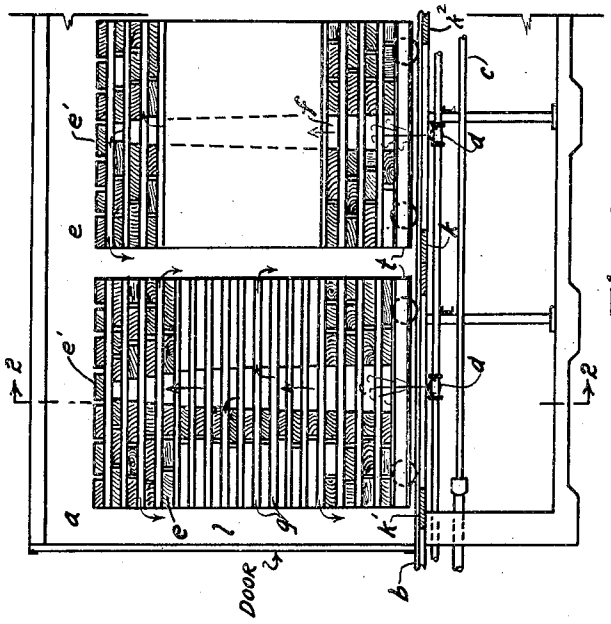


Fig. 2.

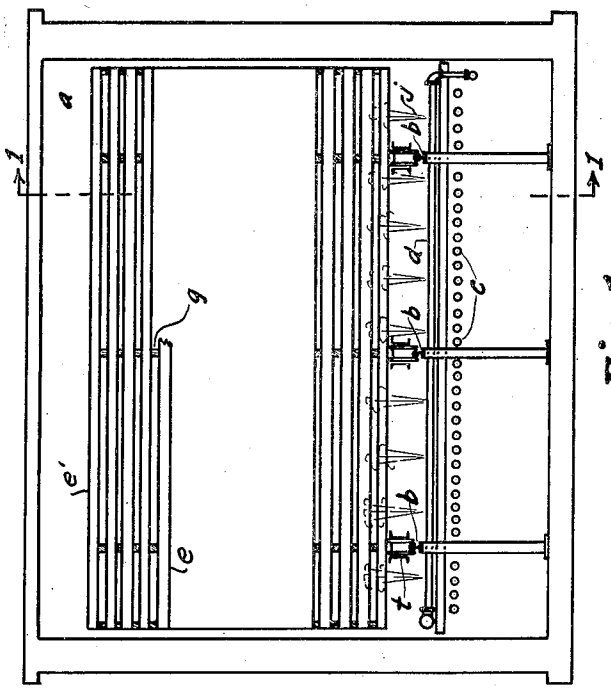


Fig. 1.

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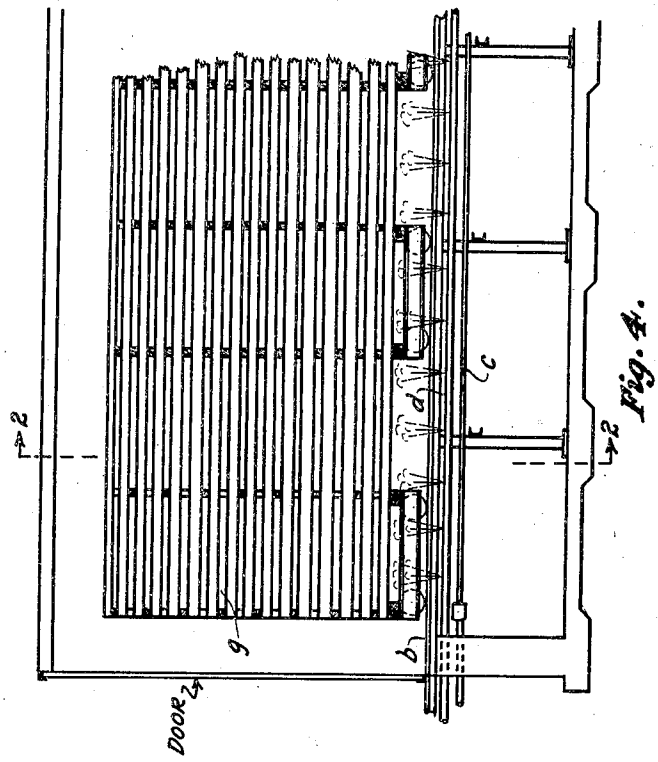


Fig. 4.

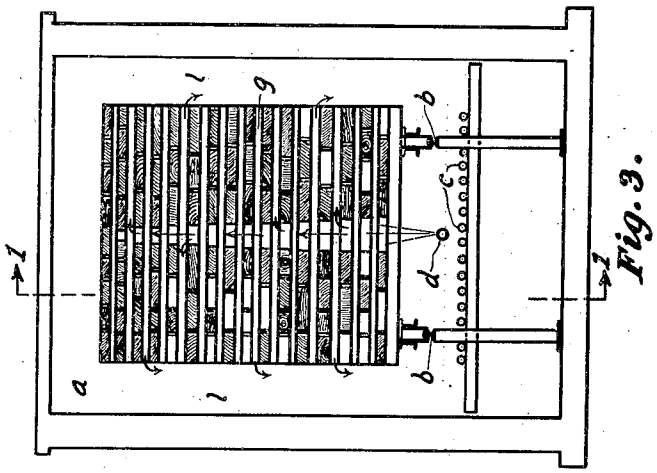


Fig. 3.

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UNITED STATES PATENT OFFICE.

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METHOD AND MEANS FOR DRYING LUMBER.

Application filed September 18, 1923. Serial No. 663,422.

To all whom it may concern:

Be it known that we, OLIVER P. M. GOSS, a citizen of the United States, and a resident of the city of Seattle, county of King and State of Washington, and RALPH H. RAWSON, a citizen of the United States, and a resident of the city of Portland, county of Multnomah and State of Oregon, have invented a certain new and useful Improvement in Methods and Means for Drying Lumber, of which the following is a specification.

Our invention relates to the kiln drying of material especially lumber when consisting of a number of units piled into a stack within the chamber of the kiln.

At the present time it is quite common to kiln dry lumber but the method used and means provided quite frequently result in the lumber being badly checked and thus causing a heavy loss; the reason for such checking being that the heated air in the chamber becomes too dry because not given the required amount of moisture.

The object of our invention is to provide a method and means for thoroughly drying lumber in the shortest practical period of time by artificially heated air maintained at just the proper degree of humidity and causing said air to circulate between the units of material, piled as above mentioned, in such manner as to effectively accomplish the drying.

We attain our object by a process which may be described as consisting of so supporting and stacking the units of lumber in tiers in a kiln chamber as to provide a space at the top, the bottom and the sides of the stack and arranging the units of the pile so as to provide horizontally extending spaces between the tiers. Also so arranging the units of material as to form a vertical, preferably tapering, blind flue in the middle of the stack; by blind, we mean the flue not extending all the way to the top of the stack, but being closed at the top by units of lumber lying across the flue. The air in the chamber is then heated by means of an agency located in the bottom thereof and jets of moist heated fluid or steam are injected upwardly into the bottom of said blind flue, to cause a circulation of the heated air of sufficient humidity upwardly through the middle of the stack, and from thence to continue laterally in the horizontal spaces between the tiers of lumber to the sides of the stack, the rise of the heated air from said heating agency directly upward in the space at the sides of the stack being baffled or impeded so as to cause in such spaces a region of low temperature, and thus convert these spaces into return flues.

In other words, the baffles impede and restrict the rise of the heat from the pipes *c* in our structure to the area of the blind flue and thus cause said heating means to function in co-operation with said jets of moist heated air in promoting an effective circulation through the units composing the stacks of material.

The means which may be employed for carrying our said process into practice are diagrammatically illustrated in the accompanying drawings, the figures of which represent as follows:

Fig. 1 is a cross section taken lengthwise of the blind flue formed in the middle of a stack of lumber as mentioned, the section line being approximately indicated in Fig. 2 by line 2—2;

Fig. 2 shows a longitudinal section on line 1—1 of Fig. 1, showing a kiln chamber provided with heating means and a spray pipe and also provided with baffle plates at the bottom so arranged as to properly function as mentioned;

Fig. 3 shows a cross section on line 2—2 of Fig. 4, illustrates that the devices and the stacking of the material may be so arranged that the blind flue formed in the stack of lumber will extend lengthwise of the kiln chamber instead of cross wise as shown in Figs. 1 and 2; and

Fig. 4 is a longitudinal section taken on line 1—1 of Fig. 3.

The kiln chamber *a* is provided with rails *b*, on which to place trucks *t*. The platform of the latter being of skeleton formation so

as not to obstruct the rise of the heated air through the lumber stack. In the bottom of the kiln chamber we provide coils of heating pipe *c* understood to be connected to some suitable source of heated fluid under pressure, the fluid used being preferably steam since that is available at lumber mills. The stacks of lumber diagrammatically represented by *e* are composed of units horizontally placed on the trucks so piled as to provide a middle blind flue *f* in the stack, that is to say the upper end of the stack is closed by lumber pieces extending cross wise thereof as at *e'*. The units composing the stack are arranged in horizontal tiers spaced from each other by placing sticks between the tiers so as to provide horizontal air passage ways *g* extending from the flue *f* to the sides of the stack. A spray pipe *d* is so located in the bottom of the chamber so as to be alined with the flue which will be formed in the middle of the stack as mentioned, this spray pipe being also connected to the said source of steam under pressure and provided with a plurality of upwardly discharging vents as indicated at *j* in Fig. 1.

In practice suitable pressure regulators are placed in the spray pipes *d* so as to automatically control the amount of spray emitted from the spray pipes and similar pressure regulating means are provided in the coils of the heating pipes *c* so as to control the heat emitted by such coils or, in other words, the temperature of the kiln chamber. We use for such pressure regulating means well known devices which require no description. At the sides of the stack *e* are provided baffle plates *k*, *k'* and k^2, see Fig. 2, directly over the heating coils *c* so as to prevent the rise of the heat from the latter in the spaces 1 between the sides of the stack and the walls of the kiln chamber or between the stacks since, as mentioned, the spaces 1 serve as a return flue and therefore it must be rendered relatively cooler so as to induce a return circulation of the hot moist air injected into the flue *f* and extending from there laterally through the lumber stack into the spaces 1.

In other words, the baffle plates *k*, *k'* and k^2 by preventing the rise of the hot air from the heating coils, allow the air after having been cooled, by passing through the lumber stack, to descend in the spaces 1 and a portion of such air is recirculated. The spray pipe *d* performs an extremely important part in the correct drying of the lumber by injecting moist hot air upwardly into the flue *f* as mentioned. The spray pipe *d* cooperates with the baffle plates *k*, *k'*, and k^2 in causing the heat from the heating coils *c* to ascend in the blind flue *f* and thence distribute the heat laterally quite uniformly throughout the lumber piled in the stack; the boards or units of the stack being preferably arranged flatwise as shown more clearly in Fig. 2 or Fig. 3 so that the strata of heated air will be caused to pass over the wide faces of the boards which are separated from each other by sticks as mentioned to provide horizontal spaces. The steam from the spray pipe *d* also performs the essential function of humidifying the hot air emitting from the heating coils *c* and in this way prevents the checking and warping of the lumber. In practice, with a given temperature in the kiln chamber and a given condition of dryness of lumber, the pressure in the spray pipe is so controlled by means of a pressure regulator, as mentioned, as to maintain a spray of steam capable of producing the correct humidity in the kiln.

By means of our process and described devices we are enabled to dry a pile of lumber quickly with a negligible amount of warping and checking also, rendering the drying process uniform through the entire stack and preventing the leaving of the lumber units at the center and lower portions of the stack too moist.

We claim:

1. The method of kiln drying consisting in so stacking the material in the kiln chamber as to be spaced from the top, the bottom and the sides of the latter, providing horizontally extending spaces between the tiers of the stack, arranging said stacked material so as to form a blind vertical flue therein, heating the interior of the kiln chamber by an agency located in the bottom thereof, and causing jets of moist heated fluid to be injected upwardly into the bottom of said flue.

2. The method of kiln drying consisting in so stacking the material in the kiln chamber as to be spaced from the top, the bottom and the sides of the latter, providing horizontallly extending spaces between the tiers of the stack, arranging said stacked material so as to form a blind vertical flue therein, heating the interior of the kiln chamber by an agency located in the bottom thereof, causing jets of moist heated fluid to be injected upwardly into the bottom of said flue, and baffling the rise of the heat from said heating agency otherwise than up into said flue.

3. In a kiln of the character described, means for supporting the material spaced from the floor of the kiln chamber, a source of moist heating fluid under pressure, horizontally extending heating means located in the bottom of the kiln chamber, a spray pipe located in the bottom of the kiln chamber, such pipe having upwardly discharging vents and being connected to said source of fluid, baffles located in the bottom of the chamber over portions of said heating means and being spaced from said spray pipe.

4. In a kiln of the character described,

means for supporting the material spaced from the floor of the kiln chamber, a source of moist heating fluid under pressure, horizontally arranged coils of heating pipes located in the bottom of the kiln chamber and connected with said source, a spray pipe located in the bottom of the kiln chamber, such pipe having upwardly discharging vents and being also connected to said source of fluid, baffles located in the bottom of the chamber over portions of said heating coils and being spaced from said spray pipe.

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