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METHOD AND MEANS FOR DRYING LUMBER

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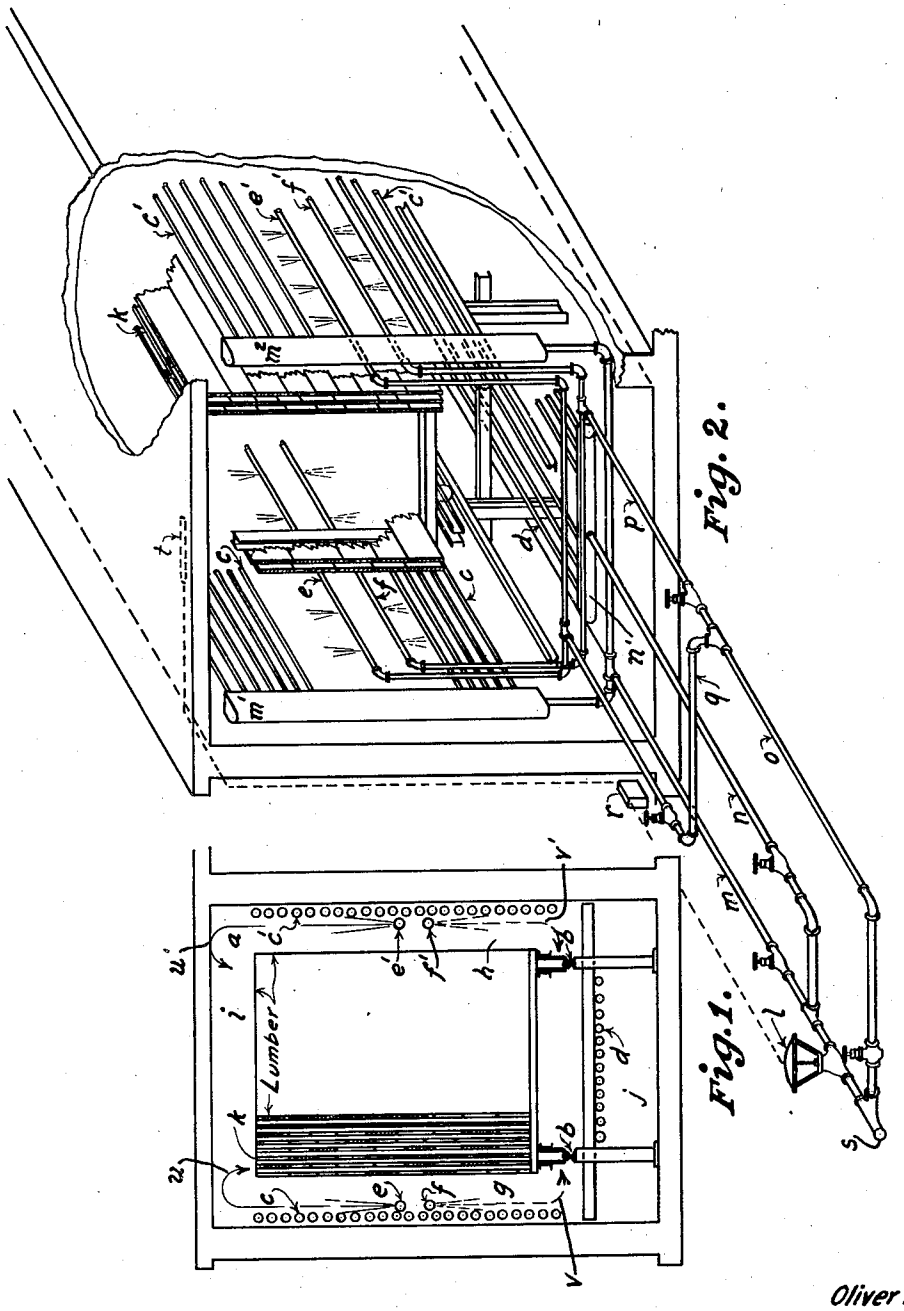


Fig. 2.

Fig. 1.

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METHOD AND MEANS FOR DRYING LUMBER.

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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 particularly to the kiln drying of lumber when consisting of a number of units, or boards, piled edgewise into a stack, with vertical spaces extending through the stack.

In the present method of kiln drying lumber many of the pieces are frequently so badly checked as to have to be cast aside, and thus impose a heavy loss, such checking is the result of the heated air in the chamber becoming too dry.

The object of our present invention is to provide a method and means for thoroughly drying lumber stacked as mentioned, in the shortest practical period of time, by artificial heat maintained at just the proper degree of humidity and circulated between the units of the stack.

We attain our object by a process which may be described as consisting in so supporting and stacking the material as to provide a space at the top, the bottom and the sides of the stack and provide vertical spaces through the latter. Then heating the interior of the chamber by an agency located at and arranged parallel with its sides, simultaneously injecting sprays of moist hot fluid upwardly along the sides of the chamber from a horizontal line lying midway between its top and bottom. The heating and spraying bring about the desired circulation and in that way accomplish the thorough drying of the lumber while protecting it against checking due to lack of sufficient moisture. We carry our invention into practice by the means diagrammatically illustrated in the accompanying drawings, the figures of which represent as follows:

Fig. 1 is a cross section of a kiln chamber illustrating the practical and convenient arrangement of the coils of heating pipes and of the spray pipe which carry our method into practice; and

Fig. 2 is a diagrammatic perspective of the drying chamber, showing the arrangements of the heat coils and spray pipes and a convenient connection of the coils and pipes to a source of heated moist fluid under pressure and a control for the respective coils and pipe.

In the kiln chamber *a* are placed rails *b* on which to run the trucks on which the lumber to be dried is stacked. Along the sides of the chamber are provided vertically arranged coils of heating pipes *c* and *c'*; along the floor of the chamber directly below the rails are provided horizontal coils of heating pipe *d*, the latter being arranged so as to lie within the perimeter of the area at the bottom of the stack only and so as not to project beyond the bottom of the stack to the sides of the chamber, since the spaces *g*, *h*, *i* and *j* must have unobstructed communication with each other in order to permit the free circulation of the heated humidized fluid.

Along the sides of the coils *c* and *c'* in spaces *g* and *h* midway between the top and the bottom of the chamber are provided two horizontal spray pipes *e* and *f* and *e'* and *f'* located one above the other, each of said spray pipes being provided with spray vents, those of the upper pipes *e* and *e'* being adapted to discharge upwardly and those of the lower pipes *f* and *f'* being adapted to discharge downwardly.

The heating coils *c* and *c'* and *d* and the spray pipes *e* and *f* and *e'* and *f'* are respectively connected to a source of heated moist fluid under pressure, preferably steam, which is usually obtainable in all lumber-yards, and the passage of said fluid into said coils and pipes is controlled by suitable devices as diagrammatically illustrated in Fig. 2, for example:

The steam from source *s* passes through a controller valve *l*, as for example, those made by Hohman-Nelson Co. or C. J. Tagliabue and branches to two pipes, *m* and *n*, *m* connects to headers *m'* and *m²* feeding side coils *c* and *c'* and *n* connects with bottom header *n'*, feeding bottom coils *d*. Each of the lines has a valve as shown which may be hand operated or may be of the nature of a pressure regulator. The controller valve, *l*, has a connection from a diaphragm top to a controlling mechanism *r* which in turn is connected with a thermostatic element as

t which causes the operating mechanism to open or close the valve, l, as may be required. Such diaphragm valve and operating mechanism being well known, needs no further description. It should be noted that the controller valve l, will operate on either line m or n.

The line o branches off before the steam passes through the controlling valves l and o in turn is divided again into two lines p and q. q connects with the upper set of spray lines e and e' while p connects with the lower set of spray lines f and f'. In each of these lines, o, p and q are shown valves which may be hand operated, the one in line o may also be in the nature of a pressure regulator.

The operation of the kiln is briefly as follows:

At the beginning of the drying period, after the kiln has been filled with truck loads of lumber stacked on the trucks as mentioned, the steam is turned into the heating coils c and c' and into the upper spray pipes e and e'. The steam issuing from vents in the latter spray pipes induces an upward circulation in the spaces g and h, constituting flues, between the sides of the stack and the sides of the chamber and the heating coils c and c' promoting and inducing the rise of the heated air from these coils as indicated by the arrows u and u'. The rising heated air will flow over the top of the lumber stack and descend downward in the vertical spaces k of the stack by the action of the gravity. For the heated air upon coming in contact with the cooler lumber will gather moisture from the latter and become heavier and thus tend to fall. After the drying process has been carried on to a certain stage, in the manner described, and the lumber having become pretty well heated through, the upper part of the stack of lumber will be nearly dry, and then circulation is reversed. Such reverse circulation is accomplished as follows: The upper spray pipes e and e' are shut off and the lower spray pipes, f and f' turned on and simultaneously the heating coils c and c' are turned off and the lower heating coils d are turned on, thus inducing a downward circulation of the air in the spaces g and h, the descending currents of air passing over the heating coils d and becoming reheated move upward through the vertical spaces k of the stack; the circulation being assisted by the pressure of the sprays of the fluid ejected by the lower spray pipes f and f' are indicated by the arrows v and v'. This method of treatment clearly hastens the drying operation of the stack of lumber in its entirety since each step of the drying, circulation created by the steam sprays and the heating of the air works in conformity with the physical or natural laws and in no instance opposes the latter.

We claim:

1. The method of kiln drying consisting in so stacking the material in a chamber as to provide a space at the top, the bottom, and the sides of the stack, and vertical spaces between the units of the material composing the stack, injecting sprays of moist heated fluid in one vertical direction along the vertical sides of the chamber from a line lying between the top and the bottom of said stack, then discontinuing said sprays and injecting other sprays of moist heated fluid in the opposite vertical direction along the vertical sides of the chamber from a line lying between the top and the bottom of said stack, heating the interior of the chamber by an agency located at its sides simultaneously with the injection of said sprays in an upwardly direction, and heating the bottom of the chamber under the bottom of said stack simultaneously with the injection of said sprays in a downwardly direction.

2. The method of kiln drying consisting in so supporting and stacking the material in a chamber as to provide a space at the top, the bottom, and the sides of the stack, and vertical spaces between the units of material composing the stack, heating the interior of the chamber by an agency located at its sides, simultaneously injecting sprays of moist heated fluid upwardly along the vertical sides of the chamber from a horizontal line lying between its top and bottom, then discontinuing said heating and sprays, and heating the bottom of the chamber directly under the bottom of the stack only, and simultaneously injecting sprays of moist heated fluid downwardly along the vertical sides of the chamber from a horizontal line lying between its top and bottom.

3. In a kiln of the character described, means for supporting a stack of material spaced from the floor of the kiln chamber, a source of moist heated fluid under pressure, heating means arranged vertically along the sides of the chamber, other heating means located at the bottom of said chamber and entirely within an area corresponding to that of the bottom of the stack, so as not to extend beyond the latter to the sides of the chamber, two horizontal spray pipes located one above the other at the sides of the chamber and between the top and the bottom of the stack, each of said spray pipes being connected to said source of fluid and being provided with vents, the vents of the upper pipe being adapted to discharge upward and those of the lower pipe being adapted to discharge downward.

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