

- [54] **DRYING OF TIMBER**
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- [56] **References Cited**  
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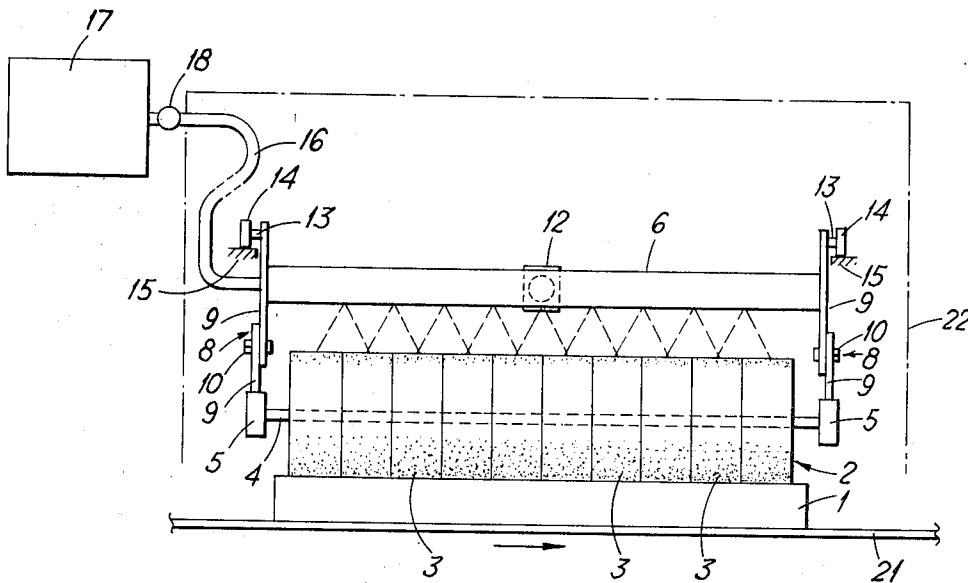
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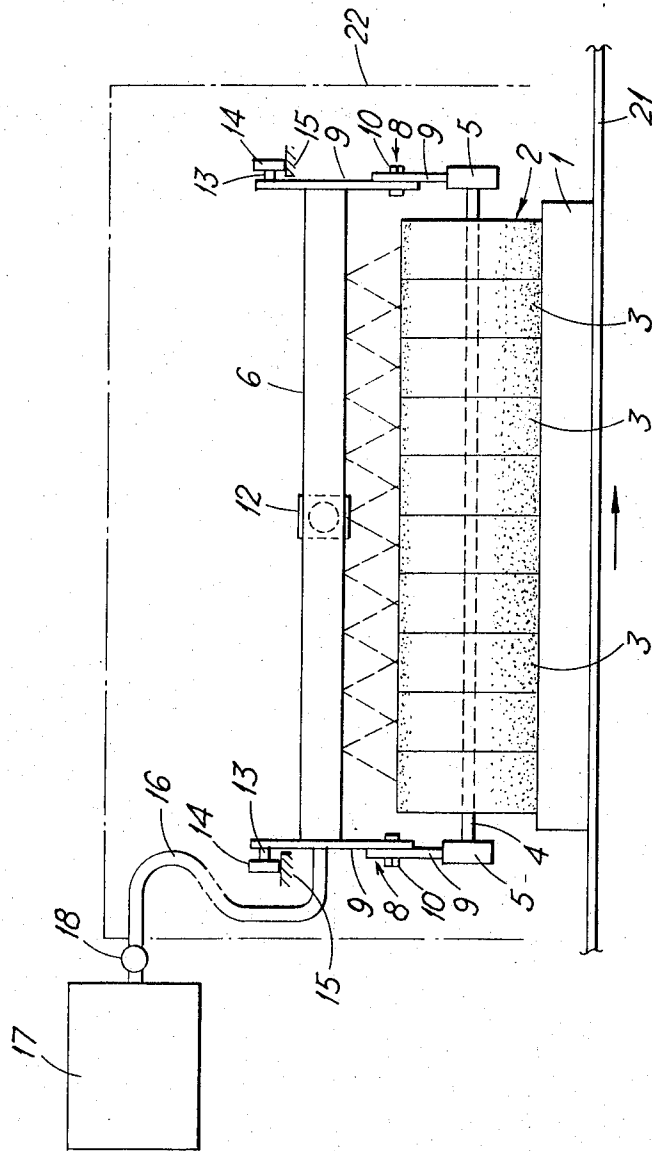
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[57] **ABSTRACT**

A process for seasoning boards or planks of lumber is described in which the lumber is continuously moved through a drying chamber and the lumber is heated to reduce the moisture content to a required level. To prevent the surface of the lumber drying out in advance of the centre the surface of the lumber is intermittently brought into contact with one or more freely rotatable wetting rollers during the passage of the lumber through the drying chamber.

**7 Claims, 1 Drawing Figure**





## DRYING OF TIMBER

This invention relates to the drying or seasoning of timber.

In a conventional kiln drying process the moisture content of boards or planks of lumber is reduced to a desired level to produce fully seasoned lumber. This can be achieved using convection drying in which the lumber is stacked in the kiln and the kiln temperature is raised from about 45°C (80% RH) to about 60°C (40% RH) over a period of two to three days for soft woods and about two to three weeks for hard woods.

More recently processes have been developed in which the lumber is conveyed through a drying chamber at rates of about one foot per minute, and these continuous processes are carried out at temperatures of about 125°C to 130°C where the relative humidity cannot be increased beyond about 40 percent. One problem which immediately arises when using such high temperatures and relatively low humidity is that of preventing the surface of the lumber drying out before the centre of the lumber has dried out and approached the percentage moisture content of the surface. For this reason moistening of the lumber surface is a critical part of these processes. If this is not done, the surface dries out too quickly in advance of the centre and results in surface checking, end-splitting and case hardening. Surface moistening is also useful in processes in which the drying is achieved by intermittent radiofrequency dielectric heating of the lumber since it avoids the need for strict control of the relative humidity.

A known method of moistening the surface of boards or planks of lumber during the drying process is to spray water over the surface. I have found, however, that this is not entirely satisfactory for a number of reasons. Firstly, because it is essential not to spray too much water, it is necessary to generate a fine spray through small-aperture nozzles. Thus, particularly in high temperature convection drying where the nozzles get hot, the apertures tend to become blocked by fur or other deposits. The problem of blockage is particularly severe if the sprays are used intermittently because the water droplets suspended from the nozzles at the end of each spraying period evaporate before the next spraying period.

Secondly, to obtain a uniform moisture distribution over the surface, the alignment of the nozzles with respect to one another is critical, and if one or more of the nozzles is slightly askew it is likely that a portion of the lumber surface will either not be wetted at all or will receive too much water.

The problem can be overcome to some extent by using high pressure sprays but this involves using high pressure tubing and is naturally more expensive.

In accordance with the present invention the surface of a piece of lumber continuously moving through a drying chamber is kept moist by intermittently bringing the surface into contact with one or more freely rotatable wetting rollers.

Each wetting roller is preferably formed of an absorbent spongy material and, in a preferred apparatus for performing the invention, each of several rollers spaced at intervals along the length of the drying chamber is carried at the end of a ram which can be driven backwards and forwards across or along the lumber.

Different thicknesses of lumber (1 inch to 5 inches) are accommodated by adjusting the length of a pair of

rigid connecting arms between which the rollers are mounted beneath the ram. This provides a coarse adjustment but a further fine adjustment can be made by pivoting the arms through a small angle before tightening a securing nut. The fine adjustment is made so that the rollers are under slight pressure when applying moisture to the lumber.

Since the spongy rollers are surrounded by a high ambient temperature it is important to ensure that they do not dry out. This is done by sprinkling the rollers periodically using a sprinkling device carried over the roller and movable therewith. The mark space ratio of the sprinkling periods may be varied automatically in response to the temperature in the drying chamber which will vary in accordance with the type of wood being dried.

The sprinkling device need not have small apertures and there are therefore no blockage problems. As the water is sprinkled onto the roller, the absorbent material automatically spreads the water laterally across the roller to provide a uniform moisture distribution without having to ensure strict alignment of several spray nozzles.

The amount of moisture deposited on the surface of the lumber can be controlled in three ways. Firstly, the period between each wetting operation can be varied. Secondly, the speed of the ram can be varied to control the amount of moisture deposited from a roller having a fixed moisture content. Thirdly, the amount of water sprinkled onto the rollers can be varied to control the moisture content of the rollers.

As an example, for 1 inch soft woods (which are easily dried), the temperature of the drying chamber is about 130°C, the lumber is moistened every 30 minutes, and the rollers are kept very moist by spraying them intermittently between the wetting times.

At the other end of the scale, 3 inches hard woods (which are not easily dried) require a temperature of about 120°C and the lumber surface is moistened every 5 to 10 minutes with somewhat dryer rollers.

If the sponge rollers are sprayed before they are moved over the lumber, the sponges will be very wet at the beginning of each wetting cycle but relatively dry at the end of the cycle. However the moisture distribution is kept relatively uniform because the dry sponges at the end of the cycle pick up the excess water deposited at the beginning of the cycle. Alternatively the rollers are sprayed while moving over the lumber.

In order that the invention may be more clearly understood one example will now be described with reference to the accompanying drawing in which the sole FIGURE is a diagrammatic illustration of surface moistening apparatus for a lumber drying process.

Referring to this FIGURE, a board or plank of lumber 1 is moved through a drying chamber 22 on a conveyor 21. The temperature of the chamber is generally between 120°C and 130°C depending on the hardness of the lumber being dried, but it could also lie in the range 100°C to 120°C.

The lumber 1 is moistened during its passage through the chamber by a wetting roller 2 made up from segments 3 of an absorbent spongy material. The centre of each segment is pierced by a shaft 4 which is freely rotatable in bearings 5 suspended beneath a water pipe 6 by means of rigid connecting links 8. Each link includes a pair of arms 9 which overlap one another and are secured together by a bolt 10. One of the arms in each

pair includes several bolt holes or a slot so that the degree of overlap may be varied to adjust the height of the rollers above the conveyor to accommodate different thicknesses of the lumber 1. A further fine adjustment can be made by pivoting the lower arms through a small angle before securing the two arms together and this fine adjustment is made to ensure that the rollers exert a slight pressure on the lumber during the wetting operation.

The water pipe is connected to the end of a ram 12 and is further connected by brackets 13 to a pair of wheels 14 which run on tracks 15. Reciprocation of the ram 12 therefore moves the complete roller unit backwards and forwards across the lumber as the lumber is moved in the direction shown by the arrow through the drying chamber.

Water is supplied to the water pipe 6 through a flexible hose 16 from a supply 17. The flow of water is controlled by a solenoid valve 18 which is opened and closed at periodic intervals by signals from an electronic timer to control the moisture content of the rollers. The mark space ratio of the wetting periods may be controlled automatically in response to the temperature in the drying chamber by incorporating a thermoresponsive element in the timer circuit.

Several of the units shown in the FIGURE may be positioned at intervals along the chamber in the direction of travel of the lumber in which case the stroke of the ram corresponds to the width of the lumber, or, alternatively, a ram having a stroke equal to the length of the drying chamber could be used to wet the complete length of the lumber in the chamber.

Control of the quantity of moisture deposited on the surface of the lumber is critical and is electronically controlled by a second timer which actuates a second solenoid valve. As the valve opens in response to a signal from the timer, pressure is applied to one side of the ram piston to push the ram out over the lumber. At the end of its stroke the ram hits a limit switch to cut off the pressure and a second solenoid valve is actuated so that air is admitted to the other side of the ram piston for the return stroke.

In a typical operation, a master clock controls several subsidiary clocks which ensure that the amount of moisture deposited as the drying process proceeds is progressively reduced. This is in accordance with the general principle of increasing temperature and reducing the relative humidity as timber is dried. For example, if the second timer is set to reciprocate and ram forwards and backwards every ten minutes, the period

of the first timer, that is to say the period between each opening of the solenoid valve 18, could be progressively increased from five minutes for the first 4 hours of the drying cycle, fifteen minutes for the next four hours, and thirty minutes for the final four hours. Thus, toward the end of the drying cycle, the rollers would be much drier than at the beginning of the cycle. The flexibility of this wetting method can be further increased by varying the period of the second timer.

I claim:

1. A process for seasoning boards or planks of lumber, comprising: continuously moving the lumber through a drying chamber in which the lumber is heated to reduce the moisture content to a required level, and intermittently bringing the surface of the lumber into contact with one or more freely rotatable wetting rollers during the passage of the lumber through the drying chamber.

2. A process according to claim 1 in which the wetting roller or rollers are reciprocated backwards and forwards over the surface of the lumber at predetermined intervals to control the quantity of moisture on the surface.

3. A process according to claim 2 in which each roller is periodically wetted during the passage of the lumber through the drying chamber, the mark space ratio of the wetting periods being varied to control the moisture content of the rollers.

4. A process according to claim 3 in which the mark space ratio of the wetting periods is automatically varied in response to the temperature of the drying chamber.

5. Drying apparatus for the seasoning of boards or planks of lumber including means for conveying a board or plank of lumber through a drying chamber in which the lumber is heated to reduce the moisture content to a required level, at least one freely rotatable wetting roller positioned in the drying chamber, means for reciprocating the roller over the surface of the lumber during its passage through the chamber, and means for replenishing moisture lost by the roller such that the roller is maintained in a moist condition.

6. Drying apparatus according to claim 5 further including means for adjusting the height of the roller above the conveyor to accommodate different thicknesses of lumber.

7. Drying apparatus according to claim 5 in which the roller comprises contiguous segments of an absorbent spongy material.

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