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PROCESS FOR DRYING WOOD MATERIALS BY CONTACT WITH A DESICCANT

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This invention relates to the drying of wood materials. More particularly, it relates to a simple and effective method for drying wood to any desired water content.

The drying or removal of excess moisture from wood in general, and especially the wood stocks normally used in the production of objects requiring good appearance and durability such as veneer sheets, bowling pins, handles, rifle stocks, etc., often presents difficulties due to the tendency of the wood to crack or warp as a result of the drying procedures employed.

These difficulties are particularly acute in the production of veneer.

The term "veneer" as normally employed in the art designates thin wood sheets which in the manufacture of plywood ordinarily vary from about one-twenty-eighth of an inch to one-fourth of an inch in thickness.

In general, veneer is produced by thoroughly soaking appropriate wood stocks and then cutting them into thin sheet-like strips using cutting equipment such as that of the rotary type. These strips must then be dried in order to reduce their moisture content to desired levels. The wet veneer sheets are normally dried by contacting them with circulating hot air such as in a kiln or tunnel drying operation.

Although such drying procedures do reduce the moisture content of the veneer, a considerable portion of the veneer dried in this manner has a tendency to crack and warp and must therefore be discarded.

In an effort to eliminate this source of waste, especially in kiln or tunnel drying processes, the drying steps have been carried out slowly at low temperatures. However, even when using these milder drying conditions, a considerable amount of cracking and warping occurs and, in addition, the longer drying step is less economical because of the additional time required.

It has further been proposed to apply oil to the surface of the veneer prior to drying or to dry the veneer using molten metals or fused salts. These methods, however, are disadvantageous in that a portion of the oil, salt or other treating agent remains in the veneer, thus often necessitating the additional processing of the veneer to remove, insofar as possible, these residues.

The present invention provides a method for drying wood to any desired moisture content which method eliminates the cracking and warping normally occurring in drying operations and also obviates the additional processing of the wood to remove treating agent residues. I have found that this can be accomplished and that wood can be simply and effectively dried by contacting the wood with a specific type of solid adsorbent.

It is therefore an object of the present invention to provide a process for drying or reducing the moisture content of wood materials.

Another object is to provide a process which dries or reduces the moisture content of wood without causing the cracking or warping of the wood either during the drying step or as a result of the drying.

A particular object of the invention is to provide a process of this type for drying wood veneer.

Further objects of the invention and some advantages thereof will become apparent hereinafter.

The specific adsorbents or the desiccants which, according to the process of the present invention, effective-

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ly dry the wood to any desired moisture content while preventing the cracking or warping thereof may be characterized as solid particulate desiccants containing silica and/or alumina.

Typical examples of such desiccants include silica gel, activated alumina, activated clay, silica-alumina gels as well as the alkali or alkaline earth metal aluminosilicates known as natural or synthetic zeolites.

Silica-alumina desiccants containing predominant proportions of silica are preferred. Exemplary of this preferred type of material are the hydrous silica-aluminas containing about 97–98% silica and about 2–3% alumina based on the total silica-alumina content, about 5% water along with trace amounts of the oxides of other metals such as iron and sodium.

It will be noted that the above desiccants are materials of the type referred to as adsorptive desiccants, that is, materials which function due to the adsorptive attraction between the moisture and the surfaces or cavities present in the desiccant. Thus, the desiccants used in the drying method of the present invention are to be distinguished from so-called chemical desiccants as exemplified by magnesium perchlorate, calcium sulfate and other metal salts which function by chemically reacting with water to form hydrates.

The desiccants of the present invention may be employed in a wide range of particle sizes ranging from fine powders to large lumps and in a variety of shapes. Bead-shaped desiccant particles whose spheroidal shape avoids attrition losses are preferred.

According to the method of the present invention the wood is contacted with the solid desiccant for a period of time sufficient to bring the moisture content of the wood down to the desired level. The contacting times required will depend on several factors such as the amount of desiccant used, the particular type and dimensions of the wood. When drying veneer the contacting times may vary from about 5 minutes. Longer contacting times up to 120 minutes or more may, of course, be used. It should be noted, however, that prolonged drying periods are generally unnecessary since the instant process is capable of removing in relatively short contact times amounts of moisture sufficient to render the wood suitable for commercial use.

The temperature conditions employed in the contacting step may range from about room temperature to about 150° F. Temperatures in the range of from about 60 to about 80° F. are preferred. Temperatures substantially above 150° F. tend to detract from the effectiveness of the desiccant.

The amount of desiccant employed can vary greatly and depends on such factors as the type and thickness of the wood, its physical shape, the moisture content thereof, and the moisture content desired in the resulting product. It should be noted, however, that wood to be dried need not be completely covered with the desiccant nor is it necessary to dry both sides of thin wood objects such as veneer sheets, although a more uniform drying is generally achieved when both sides are contacted with desiccant. In any case, the selection of appropriate amounts of desiccant is well within the scope of a worker in the art.

Any suitable method for bringing the desiccant particles into contact with the wood may be employed. Thus, the wood may be introduced into a tray of the desiccant or, for example, in the case of veneer, the veneer sheets carried on rolls may be contacted with the desiccant carried in moving containers. Either batch or continuous phase operations may be used.

After the contacting step, desiccant due to its nature is readily separated from the wood. If necessary, the desic-

cant particles may be regenerated prior to further use. The regeneration can be effected by heating the particles preferably arranged in thin layers to elevated temperatures above 212° F., and then cooling them or allowing to cool before further contact with wood. The desiccants do not require frequent regeneration and one regeneration step per 8 hours of use is generally sufficient in the continuous drying of woods.

The following specific embodiments are given to further illustrate the present invention.

Five pieces of cherry veneer having the dimensions 10" x 8" x 1/16" and containing over 30% moisture were immersed in a vessel containing 4-8 mesh silica-alumina beads at room temperature. These desiccant beads, composed of about 97% silica, about 3% alumina, based on the silica-alumina content, and 5% water, are commercially available under the name "Mobil Sorbead R."

After 20 minutes, the veneer sheets were removed from the desiccant and their moisture content was measured using a moisture meter having a range from 0 to 30%. The veneer sheets thus treated had their moisture content reduced to about 8%. The desired moisture level in veneer of this type is about 10%. The veneer sheets dried in this manner were examined and found to be completely free from any cracks or warping.

Although the invention has been illustrated by reference to the drying of veneer, it is to be understood that wood materials of different shapes and greater thicknesses may also be advantageously treated.

It will be appreciated that many variations and modifications may be made from the above specific embodiments without departing from the spirit and scope of the present invention.

Having thus described the invention, what I desire to secure and claim by Letters Patent is:

1. A process for removing moisture from wood without causing the cracking or warping thereof which comprises contacting at least one surface of the wood with a desiccant consisting of silica-alumina beads of 4 to 8 mesh in size containing a predominant proportion of silica, at a temperature ranging from room temperature to about 150° F., for a period of from about 5 minutes to about 120 minutes.

2. The process of claim 1 wherein the silica-alumina beads contain 97% to 98% silica and 2% to 3% alumina.

3. The process of claim 2 wherein the silica-alumina content of the beads is about 97% silica and 3% alumina, and the beads contain 5% water.

4. The process of claim 1 wherein the wood is a wood veneer.

5. The process of claim 1 wherein the temperature is room temperature.

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