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THE seasoning of transverse sections of trees without the development of checks extending from the bark to the pith has always been a problem confronting exhibitors wishing to show a tree section as it was in the green state, and to wood novelty manufacturers using whole tree sections in the production of various wood items. The reason a transverse tree section can be expected to check or split during seasoning is that the tangential shrinkage is greater than the radial shrinkage. This condition occurs in both hardwoods and softwoods. The extent of splitting to be expected in drying transverse sections is generally proportional to the ratio of the tangential to the radial shrink. age. This ratio is greater than unity for all common species of hardwoods and softwoods grown in the United States.

With the development of chemical seasoning methods, the Forest Products Laboratory has found that some woods can be stretched and "set" in the tangential direction sufficiently to bring the shrinkage ratio near unity. Under such conditions the liability of checking or splitting during the seasoning is greatly reduced. Chemical seasoning consists of impregnating green wood with hygroscopic salts or other hygroscopic substances by a diffusion process, and then either kiln-drying or air-drying the treated material. The diffusion of the hygroscopic substance is usually arrested while a concentration gradient of the hygroscopic substance exists in the wood.

Sodium chloride, or common household salt, has been much used in chemical seasoning experiments at the Forest Products Laboratory because of its cheapness and excellent hygroscopic qualities. If common salt is allowed to diffuse into wood that is subsequently dried at a relative humidity maintained near 75 per cent, the salt-treated surface areas of the wood will not dry and shrink, yet the untreated interior green portions of the treated wood will dry in response to the lower relative humidity effective at the wood surfaces. The salt-treated wood retains its water at 75 per cent relative humidity and does not shrink, yielding a method whereby the interior untreated portions can be dried and stressed by the unshrunken exterior.

These stresses enable the setting of the untreated interior material; and when the exterior treated portions are finally dehydrated or dried by subjection to lower relative humidities, the interior set portion allows the stressing of the exterior, finally setting the whole specimen in an expanded condition. In other words, chemical seasoning with hygroscopic salts offers a method of literally shrinking wood from the inside out. This chemical process is applicable to the seasoning of tree sections, and, although only sections of yellow birch have been experimented with at the present time, it is believed that the application of the principle to other species is worthy of consideration.

A yellow birch section one inch long the grain was cut from a tree about two feet in diameter and soaked in a saturated solution of common household salt for four days. This salt-treated section was then dried by subjecting it to an initial relative humidity of about 65 per cent at 80° F. After about two months of drying at this condition it was subjected to a relative humidity of about 30 per cent for an additional two months and finally

allowed to stand in a heated office during a winter heating season. After the salt-treated section had been in a 30 per cent relative humidity for some time, it was finished; but further drying of the section while standing in the heated office caused the movement of salt through the finished coating, and refinishing was necessary.

Figure 1 shows the present finished condition of the seasoned birch section. In drying a section after the salt treatment, the salt tends to come to the end surfaces, but it is easily scraped and sanded off at the time the end surfaces are being prepared for finishing. This particular section was finished, after being planed

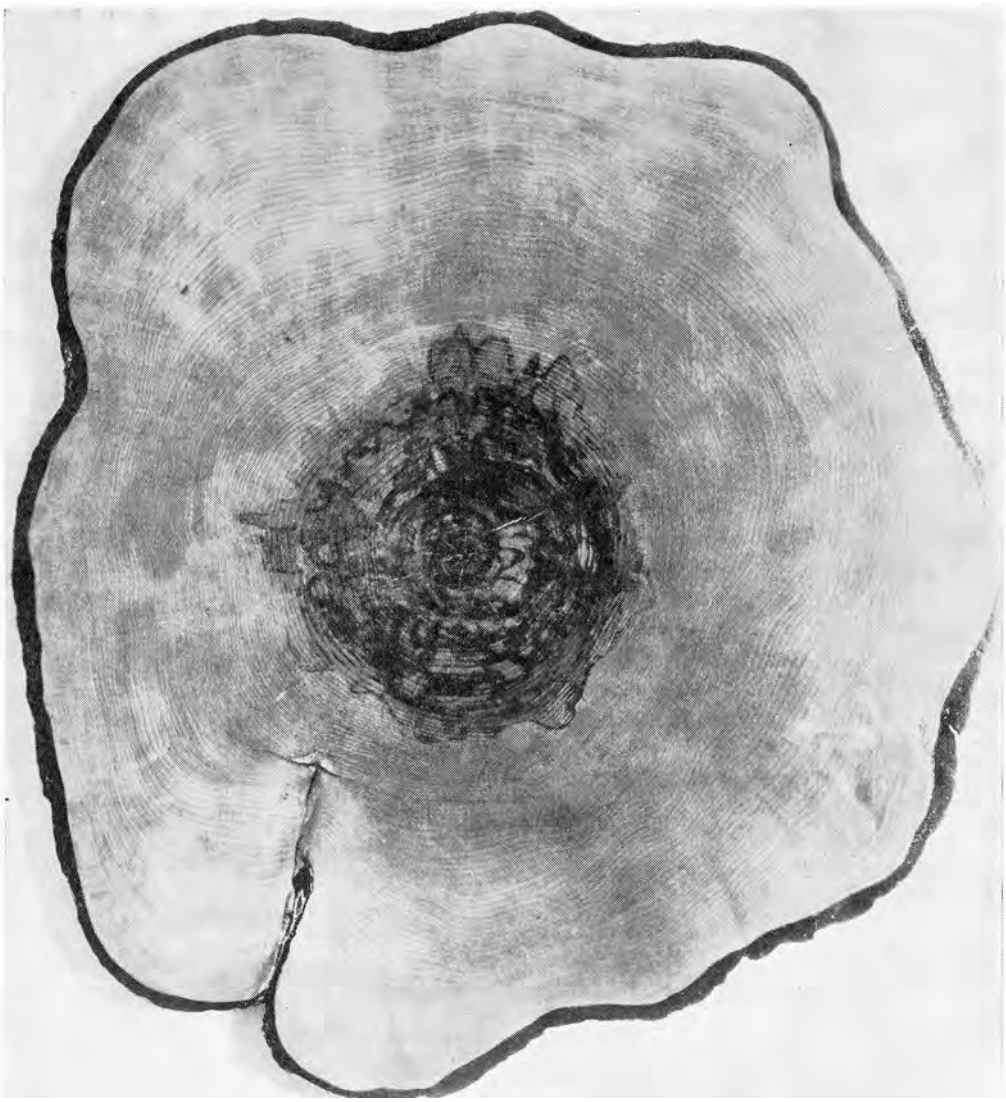

Fig. 1.—Section of yellow birch approximately two feet in diameter and one inch thick, salt-treated and seasoned without checking or splitting.

and sanded to a fine surface, by first applying linseed oil and turpentine mixed half-and-half to bring out color contrasts, after which three coats of shellac were applied, with each coat rubbed down before the final varnish coat was brushed on.

To those interested in experimenting with the use of hygroscopic chemical treatments in the seasonings of tree disks, the following precautions are suggested:

1. The disks must be absolutely green at the time they are treated in the salt solution. If end checking has already started, the treatment is of little value in controlling the checking and splitting in subsequent drying.

2. The sections or disks should be flat and fairly smooth before the chemical treatment is made, in order that in finishing after the specimen has been finally seasoned the salt-treated area is not removed.

3. A treatment in a saturated salt solution for from four days to one week is usually sufficient, although the thicker the disk the longer the treating period should be. Time in the treating solution also depends upon the species ; and if the disks are mostly heartwood the treating period must be prolonged. These treatments can be made at room temperatures. The salt solution should be stirred occasionally.

4. The specimens or disks after having been salt treated should be dried gradually, starting with a relative humidity not much less than 65 per cent. At room temperatures ample time should be allowed for seasoning at the various stages.

5. The disks should be dried to an equilibrium condition a trifle less than would be found in use, if possible, in order to prevent bleeding of the salt after the specimens have been smoothed down and finished.

If the experimenter does not have equipment whereby relative humidities can be controlled, it is possible that cool cellars or other rooms in which atmospheres are at higher relative humidities can be used for the initial drying process. If the relative humidity is too high, the salt will dehydrate the air and the specimen will literally sweat, causing a leaching of the salt, which is not desirable.