

UNITED STATES PATENT OFFICE

2,329,774

PRESERVATIVE TREATMENT OF WOOD

Emil A. Lefkof, Drexel Hill, Pa.

No Drawing. Application October 25, 1941,
Serial No. 416,496

3 Claims. (Cl. 117—116)

This invention is concerned with the preservative treatment of wood, particularly of heavy timbers such as railway track ties, telegraph poles and the like, for resistivity to subsequent deterioration when exposed to the elements.

Close examination of either green or partially seasoned woods, especially of hard woods such as oak ordinarily used for railway track ties, has revealed that the moisture is not held in the vessels or pores of the wood, but in the fibrous portions thereof. In the preservative treatment of woods, including both partially pre-seasoned and green woods, under pre-existent methods it has been the theory that the empty vessels or pores of the wood could be completely filled simply by maintaining the liquid preservative at a relatively high pressure during the process. I have found, however, that under these prior methods neither the penetration nor the retention of the preservative was satisfactory, the amount of preservative ordinarily retained being only about half that required for proper preservation of the wood. The failure of these prior methods I attribute to the fact that during impregnation, a back pressure builds up in the wood with the result that an equilibrium is eventually established when further injection under the applied pressure ceases altogether so that the vessels or pores of the wood are only partially filled.

Furthermore, in the methods generally followed in the preservative treatment of woods, natural or air seasoning is ordinarily resorted to before impregnation with the preservative agent. Such natural or air seasoning ordinarily takes approximately twelve months for 6 in. railway ties, for example, and about eighteen months for 10 x 12 in. bridge ties, being extremely costly, not only by reason of the labor involved in extra handling of the ties, but also on account of the storage and insurance costs involved as well as the capital investment in the large amount of material which must be kept constantly at hand. Various methods have also been proposed to eliminate the necessity for the natural seasoning, one such method being known as the "Boulton" process wherein artificial seasoning of green timber is effected by boiling it for a protracted period in hot oil under vacuum. Still another artificial seasoning process involves immersion (soaking) of the lumber in hot oil for a comparatively long period of time preparatory to preservative impregnation by one of the otherwise standard methods now in use. In certain instances, the preparatory step is effected with the same apparatus which is used in the

subsequent impregnation. The Boulton process, however, entails the use of additional costly apparatus for condensing the moisture taken from the cylinder during the boiling period under vacuum. Artificial seasoning in these ways is injurious to the wood, being invariably attended by splitting, checking, and/or warping, and requires from five to ten hours for its accomplishment in the apparatus which also adds considerably to the expense of processing. The subsequent impregnating step on the other hand, takes from six to eight hours depending upon the size of the lumber being treated, so that in the complete processing from eleven to sixteen hours are usually consumed.

My invention is directed toward obviating the various above pointed out drawbacks and deficiencies of the prior art methods heretofore employed in the preservative treatment of wood. In other words, I aim to make it possible to completely saturate timber with the preservative and thereby to extend the useful life of the wood in service; to shorten the time required for carrying out the treatment; to secure the above advantages in connection with the processing of seasoned or partially seasoned wood, as well as of green wood as it comes from the forest, with resultant elimination in the latter case of the necessity for the extra handling, storage, labor, insurance and investment costs involved as when natural seasoning is resorted to; and to enable the treatment to be carried out entirely in one operation in a single treating chamber without entailing the aid of special auxiliary equipment such as required in the Boulton process to which reference has been made.

The foregoing objectives and advantages I realize in practice as hereinafter more fully disclosed, through the provision of an improved method in which, during the processing, the pressure of the preservative liquid is periodically reduced to atmospheric pressure or nearly so for relatively short periods to relieve the stresses imposed internally of the wood, so that more of the liquid will be taken in or absorbed during the succeeding pressure period or periods, as the case may be, and by maintaining the liquid at a constant high temperature throughout the processing to keep it fluent and to thereby facilitate its more ready penetration into the vessels or pores of the timber. In treating green wood, I resort to an initial step which involves the subjection of the timber to a short vacuum period, and, thereupon, while under the influence of the vacuum I inject the preservative liquid

into the cylinder, with the result that the entry of the liquid into the vessels or pores of the wood during the ensuing pressure stage is correspondingly facilitated. In treating thoroughly seasoned timber, I resort to a preliminary phase in which the wood is subjected to pressure for a short period after its placement within the cylinder and before the latter is filled with the preservative liquid; while in treating wood which has been partially seasoned, I dispense entirely with either of the initial steps mentioned.

In the practice of my improved method, any standard form of wood treating pressure apparatus may be used. Such apparatus usually consists of a treating chamber of cylindrical form having a removable sealing cover head or heads at one or opposite ends thereof, and a heating coil therein with suitable valves for controlling the supply of a heating medium such as steam thereto, and so regulating the temperature during the processing. Means are also usually associated with the treating cylinder for exhausting air therefrom, also means for introducing and withdrawing the treating liquid, and regulatable means whereby the cylinder contents may be subjected to or relieved of pressure.

To carry out my improved method in the treatment of green (unseasoned) railway ties of standard sizes 3A, 4 and 5, for example, in apparatus such as above briefly described, a group of the ties are loaded upon a tram in the usual way and run into the treating cylinder, the latter sealed, and the contents of the cylinder subjected to a short initial vacuum to condition the wood for the better reception of the preservative. The preservative liquid, which may be a coal tar derivative pre-heated to between 180° and 200° F. is next introduced into the treating chamber and the latter completely filled therewith without breaking the vacuum. The pressure within the cylinder is thereupon raised to approximately 200 lbs. per sq. in. and the temperature increased to approximately 210° F., this being effected as quickly as possible. These conditions of temperature and pressure are maintained for a period of approximately three and one-half hours, during which the solution is effectively forced into the pores of the wood. After the expiration of the three and a half hour period, the pressure is first reduced and a small amount of preservative liquid drained or pumped from the treating cylinder, the ties being, however, kept completely submerged in the liquid without allowing any change in the temperature to take place. The pressure in the treating chamber is then further reduced to approximately one atmosphere, again without permitting any change in the temperature, this operation requiring ordinarily about thirty minutes with incidental ejection of cooled preservative from the wood and its replacement by hot preservative during a subsequent high pressure period. The small amount of preservative previously drained or pumped from the treating chamber is thereupon pumped back into said chamber, and the pressure immediately raised again to approximately 200 lbs. per sq. in. and so maintained for a period of about three hours, still without change of temperature. Finally after the expiration of this three hour period, the pressure is released and the treating chamber speedily emptied of preservative, whereupon a vacuum of sufficient intensity is set up in the treating cylinder to drain the wood of surplus preservative, this final step requiring approximately thirty minutes. The aggregate time thus

consumed amounts to approximately eight hours and five minutes for the treatment as compared to a total of six to eight hours which are ordinarily required to treat naturally seasoned ties, and as compared to a total of eleven to sixteen hours required under the Boulton and kindred methods, where the pre-conditioning was effected by hot oil treatment. The wood is thus not only conditioned by transmitted heat from the surrounding liquid but by the simultaneous forcing of the hot preservative deeply into the wood and into direct contact with the innermost parts of the wood for a predetermined period or periods, during the pressure stages of the cycle, the extent of penetration being increased after each pressure relief stage so that ultimately the wood becomes completely saturated with the preservative. For the treatment of timbers of larger sizes than those of the ties mentioned, the duration of pressure periods is of course proportionately increased. As an alternative, the duration of the pressure periods in my improved method may be shortened and repeated more often without sacrifice of any of the advantages gained, it being understood that these additional stages are carried out likewise with maintenance of the constant temperature hereinbefore specified. In certain instances, as in the treatment of partially seasoned wood according to my invention, after placement of the wood in the cylinder and sealing of the same, it may be subjected to an initial air pressure for a short period instead of to vacuum before the preservative is introduced.

In the treatment of fully seasoned wood according to my invention, the initial vacuum or pressure phases are entirely dispensed with, and the preservative liquid introduced into the cylinder after the latter has been charged with the timber and sealed.

The temperatures and pressures employed in my novel method are all within a safe range which will insure thorough conditioning and impregnation without attendant checking, splitting or warping of the wood.

Having thus described my invention, I claim:

1. The preservative treatment of wood by a method which comprises subjecting the wood for a period of approximately 3½ hours while submerged in liquid preservative within a sealed chamber under a pressure of approximately 200 lbs. per sq. in. and at a temperature of approximately 210° F.; then lowering the pressure while the wood is still submerged to substantially atmospheric pressure but keeping the temperature of the preservative constant; maintaining the lowered pressure for a period of approximately half an hour; again subjecting the wood while submerged in the preservative to a pressure of approximately 200 lbs. per sq. in. for approximately 3½ hours while maintaining the temperature of the preservative constant; repeating the above cycle and finally withdrawing the wood from the chamber.

2. The method according to claim 1, preceded by a preparatory step wherein the wood is placed in the chamber and subjected to vacuum action for a definite period before introduction of the liquid preservative.

3. The method according to claim 1, preceded by a preparatory step wherein the wood is placed in the chamber and subjected to pressure action for a definite period before introduction of the liquid preservative.

EMIL A. LEFKOF.