OIL IMPREGNATION OF WOOD

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It is the object of my invention to improve and simplify the oil impregnation of wood, and especially of certain kinds of hard wood, such as beech, birch, maple, and oak; and to make possible the effective impregnation with oil of green and partially seasoned wood.

The impregnation of wood with certain oils, and especially with creosote oils or oils containing creosote oil, is a well established preservative treatment. The effectiveness of the treatment is largely dependent upon the extent of the impregnation. It is essential for good preservation that the sapwood be practically completely impregnated, and desirable that the heartwood also be largely impregnated if not practically completely so. In wood of the character of railroad ties, for instance, this effective penetration of the oil has heretofore often been quite difficult and expensive to obtain. Indeed, it has been impossible to obtain with any hard wood unless the wood was well seasoned. Even then penetration of the heartwood has been impossible with such woods as maple, beech, and birch; so that with those woods sapwood impregnation has of necessity been accepted as satisfactory, and it has been considered necessary to have the wood well seasoned for any treatment.

By my invention, effective penetration is obtainable, with most woods, with relative ease and low cost, and with little or no deleterious effect on the wood as from checking and cracking, even with such woods as maple, beech, and birch. Not only is it obtainable, and better obtainable, in completely seasoned wood, but it is also obtainable as never heretofore in green and partially seasoned wood, even in maple, beech, and birch. Indeed, I find that by my treatment I am able to get in green and partially seasoned wood an oil impregnation which in the case of many woods is better than that ordinarily obtainable hitherto even in completely seasoned wood.

In carrying out my invention, I proceed as follows:

After the wood has been formed into the desired structural shapes, such as railroad ties, dock members, or constructional timbers, it is placed in the usual impregnating cylinders in which oil impregnation is carried on. The wood may be either green, or partially or completely seasoned.

Then air or other inert gas is forced into the cylinder under pressure, to create on the wood an air pressure of several atmospheres. I prefer to raise the air pressure from 25 to 100 pounds, measured in excess over atmospheric pressure, and find that 50 pounds gives excellent results. If desired, the cylinder may be gently heated at this time, to obtain a preliminary heating of the wood; but this is not essential. This preliminary treatment with air under pressure is desirable, but may be omitted.

When the air pressure in the cylinder has been raised to the desired value, say 50 pounds in excess of atmosphere, and desirably after that pressure has been held for 10 or 15 minutes to permit the high-pressure air to enter more completely into the pores of the wood, I then force hot oil into the cylinder to fill it. The oil is maintained under a pressure equal to or greater than that of the air in the cylinder, and the air in the cylinder is allowed to escape as necessary as the oil takes its place. I prefer to raise the pressure on the oil somewhat higher than the air pressure used; if desired the oil pressure may be raised even up to the usual oil-impregnating pressure of 150 to 225 pounds. The temperature of the oil that is forced in is desirably between 150° and 240° F., although such temperature may vary rather widely. The oil used is desirable of the same character that is to be used for the final impregnation, such as a creosote oil, a mixture of creosote and petroleum oils, or any other preservative oil; but that is not necessary, as this preliminary treatment with oil, although producing greater ultimate oil impregnation, is primarily for gently and uniformly heating the wood without undue strain on the wood.

After the hot oil is forced into the cylinder to fill it, the temperature of the cylinder and its contents is raised to between 180° F. and 240° F. This usually takes from one to several hours, depending upon the size of the cylinder and the heating equipment. I prefer to use the heating by steam coils within the cylinder. The cylinder and oil are maintained at this elevated temperature for a time, desirably from one to four hours, to get the wood heated gently but thoroughly throughout its structure.

Then the cylinder is emptied of oil, and steam is introduced and held under pressure for from one to several hours. The steam is desirably under a pressure of between 5 and 40 pounds; I find that from 15 to 20 pounds gives excellent results. A relatively high temperature within the cylinder is maintained during this steaming period to retard condensation. Some condensation may occur, however, and any water so obtained may be drawn off either intermittently or continuously.

After the steaming period, the steam is desirably allowed to escape from the cylinder. The cylinder may then be exhausted to produce within it a partial vacuum—desirably to produce between two and eight pounds pressure which may be maintained for from one-half to two hours. These steps of permitting the steam to escape and of producing a vacuum are not essential, for I have obtained excellent results when the second or even both of such steps are omitted.

A certain amount of cooling necessarily occurs.
during the vacuum treatment if that is used, on account of the evaporation which it produces of water within the wood; but such cooling is made and possible, if desired by maintaining steam in the heating coils within the cylinder; and, as stated, the vacuum step may if desired be omitted.

After drawing off the steam from the cylinder and maintaining a vacuum for a while if those steps are used, I then fill the cylinder with the final impregnating and preservative oil; and impregnate the wood with it, using the usual impregnating pressure, which is ordinarily between 150 and 225 pounds. The cylinder and its content may if desired be heated during this impregnating step; but that is not essential, although it is desirable that the contents of the cylinder be maintained at or close to the temperature produced under the steam treatment.

The impregnating oil is maintained in the cylinder under pressure for several hours, desirably at high temperature, until the desired impregnation is obtained.

In carrying out my process, the steps outlined should follow one another promptly, so that the wood which is heated first by hot oil and then by steam pressure, shall be allowed to cool materially before it is treated with the final impregnating and preservative oil.

If desired, the so-called empty-cell treatment may be used as the final treatment.

In carrying out this process, I have found that I am able to get improved penetration, in both sapwood and heartwood, and even when the wood is green or only partially seasoned, I can get excellent and effective penetration, not only with such woods as red oak, but even with maple, beech, and birch.

Further, I find that I can obtain this impregnation with substantially no danger of cracking or checking the wood. I attribute this to the mild but thorough heating of the wood with hot oil and then with steam, because that seems to produce the heating without undue stresses on the wood structure; in contradistinction to the relatively inferior results obtained by the more drastic heating of the wood with continuous currents of hot air or with steam alone, which tend to increase checking and cracking by removing moisture too rapidly from the exposed surfaces on and in the wood.

By my method, which makes it possible to get effective oil impregnation of wood which is green or only partially seasoned, I am able to effect considerable savings. These include savings in reducing the number of required handlings of the wood, and savings in eliminating the necessity for large seasoning yards and large inventories during the seasoning period.

I claim as my invention:

1. The process of impregnating wood with oil, comprising immersing the wood in hot oil under pressure, then subjecting the wood to steam, and then immersing the wood a second time in oil under pressure.

2. The process of impregnating wood with oil, comprising immersing the wood in hot oil under pressure, then subjecting the wood to steam, and then immersing the wood a second time in hot oil under pressure.

3. The process of impregnating wood with oil, comprising immersing the wood in oil, then subjecting the wood to steam, and then immersing the wood a second time in oil and maintaining such oil under pressure.

4. The process of impregnating wood with oil, comprising immersing the wood in hot oil, then subjecting the wood to steam, and then immersing the wood a second time in hot oil and maintaining such oil under pressure.

5. The process of impregnating wood with oil, comprising giving it two successive oil-impregnating treatments, and interposing a treatment with steam between the two oil-impregnating treatments.

6. The process of impregnating wood with oil, comprising subjecting the wood to an inert gas under elevated pressure, then immersing the wood in oil, then subjecting the wood to steam, and then subjecting the wood to oil impregnation under pressure.

7. The process of impregnating wood with oil, comprising subjecting the wood to an inert gas under elevated pressure, then immersing the wood in oil, then subjecting the wood to steam, and then subjecting the wood to oil impregnation under pressure.

8. The process of impregnating wood with oil, comprising subjecting the wood to an inert gas under elevated pressure, then immersing the wood in oil under pressure, then subjecting the wood to steam, and then subjecting the wood to oil impregnation under pressure.

9. The process of impregnating wood with oil, comprising subjecting the wood to an inert gas under elevated pressure, then immersing the wood in oil, then subjecting the wood to steam, and then subjecting the wood to oil impregnation under pressure.

10. The process of impregnating wood with oil, comprising immersing the wood in oil, heating the whole to about the boiling point of water for a sufficient period to get the wood heated throughout, then subjecting the wood to steam, and then subjecting the wood to oil impregnation under pressure.

11. The process of impregnating wood with oil, comprising subjecting the wood to an inert gas under elevated pressure, then immersing the wood in oil, then subjecting the wood to steam, and then subjecting the wood to oil impregnation under pressure.

12. The process of impregnating wood with oil, comprising immersing the wood in oil, then subjecting the wood to steam, allowing the steam to escape and subjecting the wood to a partial vacuum, and then subjecting the wood to oil impregnation under pressure.

13. The process of impregnating wood with oil, comprising immersing the wood in oil, then subjecting the wood to steam, then immersing the wood a second time in hot oil and maintaining such oil under pressure.

14. The process of impregnating wood with oil, comprising immersing the wood in oil, then subjecting the wood to steam, then immersing the wood a second time in hot oil under pressure.

15. The process of impregnating wood of the character of maple, beech, and birch, comprising immersing such wood in hot oil under pressure, then subjecting such wood to steam, and then immersing such wood a second time in hot oil under pressure.

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