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# UNITED STATES PATENT OFFICE.

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## METHOD OF PRESERVING WOOD AND WOOD PRESERVATIVE.

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This invention relates to methods of preserving wood and wood preservatives.

I have discovered that by impregnating or otherwise treating wood with certain aqueous solutions free from alkalinity, and containing a powerful oxidizing agent and a metallic salt, or salts, it is possible to alter the composition of the wood by forming within its texture a permanently insoluble compound which preserves the wood against the organisms causing wet or dry rot, protecting the wood against the ravages of insects, worms, and marine growths; and that this result may be accomplished without injuring the wood for any purpose for which it may be used, without injuring metal which may be used in connection with it, and with an improvement in the appearance of the wood.

The wood preservative which I have invented, as a result of this discovery, consists of an aqueous solution containing certain materials capable of reacting with constituents of the wood. The solution is made free from all alkalinity, as an alkaline condition in the wood is favorable to the growth of mycelium which causes rot. The solution is most desirably slightly acidified with an acid which cannot injure the wood or metal used in connection with the wood. An organic acid, such as acetic acid, is desirable for this purpose.

In my method of preserving wood I treat the wood with an amount of the preservative described in excess of that which can react with the wood, in order to leave an excess of the solution in the wood after the chemical action between the wood and the preservative has taken place.

A specific example of a wood preservative embodying my invention contains the following ingredients in the proportions stated:—

| | Per cent. |
|---|---|
| Potassium dichromate ($K_2Cr_2O_7$) | 5. 6 |
| Copper sulphate ($CuSO_4$) | 5. 6 |
| Acetic acid | 0. 25 |
| Water | 88. 55 |
| | 100. 00 |

I find it most desirable to use the crude form of acetic acid known as pyroligneous acid. This solution contains the reaction products of a soluble chromate on a soluble copper salt and in use carries into the wood both chromium and copper. Both are fixed and rendered insoluble in the woody tissue, effectively preserving it.

A specific method of preserving wood in accordance with the invention consists in (1) heating the wood in a weak dichromate solution (water containing from 1 per cent to 2 per cent potassium dichromate) for three to five hours, raising it to a temperature of from 150° to 180° Fahrenheit, and (2) transferring the wood to the preservative solution above described, which has previously been warmed to the same temperature as the wood, and allowing the wood to soak from eight to twelve hours in the preservative solution, and to cool down to normal temperature. The heating in this specific method is merely for the purpose of aiding the penetration of the wood by the solution. Other known methods for causing such penetration may be used, as for example, the vacuum and pressure method, preceded, if necessary, by steaming the wood. A complete penetration by the solution is desirable in order to preserve the wood thoroughly and permanently, but, in some cases, a treatment consisting of treating the surface of the wood with the preservative solution is sufficient. This treatment has a decided preservative effect, and serves also to protect the wood against insects, worms, and marine growths, but not quite as effectively as does the penetration treatment.

While it is impossible to determine accurately the exact reactions which take place, in treatment of wood with the preservative, I have found that the products of reaction occurring in the described preservative solution react with constituents of the wood to form permanently insoluble lignin compounds having a slight brownish color.

My method of preserving wood may advantageously be applied to all sorts of wood and wood products. Wood which has been treated with the preservative has been found to resist decay indefinitely when exposed either to air, fresh water or sea water, and to be immune from the attacks of insects, worms, and marine growths. The general appearance and graining of the wood is not altered except that the graining is somewhat intensified, and the wood is given a richer color. The preservative in no way interferes with the subsequent varnishing or painting of the wood.

It is possible to add ordinary preservative materials, such as sodium fluorid, to the described solution.

What I claim is:

1. As a new wood preservative, a slightly acid aqueous solution of a soluble chromate and a soluble copper salt.

2. As a new wood preservative, a slightly

acid aqueous solution of a soluble chromate and a soluble copper salt, acidification being with acetic acid.

3. In the preservation of wood, the process which comprises treating wood with a slightly acid solution containing a chromate and a copper salt.

4. In the preservation of wood, the process which comprises treating wood with a slightly acid aqueous solution containing potassium dichromate and copper sulfate and their products of reaction.

5. In the preservation of wood, the process which comprises treating wood with a warm weak solution of potassium dichromate and thereafter treating the wood with an aqueous solution of copper sulfate and potassium dichromate.

6. In the preservation of wood, the process which comprises treating wood with a slightly acid aqueous solution containing potassium dichromate and copper sulfate and their products of reaction, acidification being with pyroligneous acid.

7. Woody fiber containing insoluble products of reaction formed by the treatment of such fiber with a solution containing a copper salt and a chromate.

8. In the preservation of wood, the process which comprises treating wood with a slightly acid aqueous solution containing potassium dichromate and copper sulfate and their products of reaction, the proportion of potassium dichromate being greater than corresponds molecularly to the copper sulfate.

9. In the preservation of wood, the process which comprises treating wood with a slightly acid aqueous solution of dichromate and copper sulfate, said solution containing about 12 per cent of the two salts and said salts being present in about equal proportions.

In testimony whereof, I have hereunto set my hand.

GILBERT GUNN.