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WOOD-PRESERVING COMPOSITION

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The present invention relates to a process of preserving wood and similar cellulosic materials subject to attack by stain, decay and mold fungi, as well as other micro-organisms, and refers particularly to a composition for this purpose.

Pentachlorophenol, tetrachlorophenols and, to a lesser extent, lower poly chlorophenols, have been found to be especially useful toxic substances for the treatment of wood and wood products to preserve them from attack by molds and micro-organisms such as are responsible for staining and decay. For finished mill work, tetrachlorophenols and pentachlorophenol have been applied to the wood in the form of a liquid composition by dipping. One of the principal requirements of the solvent or carrier which was to be used in such coating or impregnating compositions was that it be readily volatile. Solvents which were used included pine oil, kerosene, Stoddard solvent naphtha, alcohols, etc. It was also essential that the liquid composition should penetrate and spread in the wood when dipped therein. For this purpose various liquids called penetrants have been added to facilitate penetration of the end grain of the wood, and other materials called spreaders, have been added to aid spreading in the wood at right angles to the grain.

However, considerable difficulty has been encountered in using liquid tetrachlorophenol and pentachlorophenol compositions containing volatile solvents such as solvent naphtha, pine oil, alcohols, etc., for wood coating and impregnation, since, as the solvents volatilize, the polychlorophenols creep or work to the surface of the wood and so-called "blooming" or crystallization occurs. The crystalline deposit which thus forms as a bloom on the surface, besides having an objectionable appearance on the wood, is easily disengaged by rubbing, brushing or even blowing. When blooming occurs, as it invariably does with such compositions containing volatile solvents, the full value of the treatment is thus not afforded. Besides representing a loss of toxic material when the crystals come to the surface of the wood, disengaged crystals from the wood surface may present a health hazard.

The principal object of the present invention is to provide a liquid wood-preserving composition containing polychlorophenols which will not bloom on wood or similar materials coated or impregnated therewith, and will thus reduce the health hazard and increase the efficacy of a treatment with polychlorophenols. It is a further object of the invention to provide an improved liquid composition for this purpose and a method for its application which will produce deeper penetration of the wood and thus provide better protection against stain, decay and similar attacks by micro-organisms.

I have discovered that the above objects are admirably realized by using a liquid composition comprising rosin or a similar resinous substance, toxic agents such as polychlorophenols, for example, tetrachlorophenols or pentachlorophenol, and a solvent such as a high-boiling, relatively non-volatile oil such as petroleum fuel oil or similar material. An example of such a liquid wood-preserving composition is one consisting of 5 parts of rosin and 5 parts of pentachlorophenol dissolved in 90 parts of Shell Petroleum Corporation's No. 2 Mid Continent fuel oil. Such compositions are applied to the wood either by dipping, spraying or brushing, and the solvent instead of evaporating rapidly, partially remains on the surface of the wood for a short period and gradually penetrates into the wood. The composition acts both as a penetrant and spreader in the body of the wood.

Heretofore in using liquid wood-preserving compositions containing volatile solvents, brushing or spraying were poor methods of applying the compositions because sufficient penetration could not be achieved. It was thus necessary to use dipping treatments in which the wood was subjected to contact with liquid compositions for periods differing according to the degree of penetration desired, which period might vary from several minutes to a matter of hours. These dipping treatments were in reality soaking treatments. By using the coating composition of the present invention the coating composition may be spread on the wood by brushing, spraying or dipping. The composition slowly penetrates into the coated wood as the surface becomes dry. The full penetration and distribution of the treating solution continues over a period of from several hours to a day or more, even after the surface is dry. The penetration of the wood by the liquid composition is deeper than that obtained with soaking in volatile liquid compositions for periods usually permitted in dipping treatments. Greater quantities of wood can therefore be treated by dipping in any particular dipping vat in a given period according to the invention, since the effectiveness of the treatment is not dependent solely upon the period the wood remains submerged in the treating solution. The solution continues to penetrate into the wood after the wood is removed from the liquid. Since the solvents used in the improved compositions possess high flash points the fire hazard is considerably reduced. The composition is also suitable for application to wood by pressure treatments according to the methods known in the art.

The rosin or similar resinous substances in the composition has several functions. Liquid compositions without rosin when made with high-boiling oils, for example, Shell No. 2 fuel oil, still

produce blooming on the surface of the wood, although a slight reduction in tendency is noted with various oils of this character. However, I have discovered that rosin and similar resinous substances added in suitable proportions completely suppress blooming. Furthermore, the rosin has an additional function in solubilizing the toxic phenol, for example, pentachlorophenol and tetrachlorophenols. Compositions prepared according to my invention have a shorter drying time on the wood, that is, the surface of wood treated therewith is drier in a shorter period of time than that treated with a similar composition not containing rosin, and the period required for penetration of the composition throughout the wood is not lengthened. Wood treated with the composition of my invention shows just as deep penetration as that treated by means of compositions not containing rosin, and since my invention also contemplates the use of particular solvents which have both a spreading and a penetrating action, wood thus treated exhibits deeper penetration than that resulting from treatment with compositions prepared with volatile solvents or compositions containing volatile solvents together with so-called spreaders and penetrants.

In using phenolic preserving compositions, the blooming and failure of such compositions to penetrate have seriously affected the so-called "paintability" and "puttiability" of the treated wood, that is, paint and putty when applied to the wood would not adhere firmly and in the course of time even that which had adhered would gradually become disengaged. With the compositions of the present invention, the paintability and puttiability of the wood is not substantially impaired after treatment. Since the compositions dry rapidly when applied to a wood surface, the wood is ready for painting and the application of putty shortly after treatment, and since the surfaces are dry and free from bloom rather than oily and coated with crystals, putty and paint adhere firmly thereto.

In producing the liquid coating and impregnating compositions of the invention I dissolve approximately 5% by weight of a tetrachlorophenol or technical mixtures of tetrachlorophenols, or pentachlorophenol in 90% by weight of a fuel oil or a similar petroleum hydrocarbon oil, preferably one having a high flash point. Smaller proportions of the polychlorophenol component may be used but the resulting impregnated wood is not as completely protected. Greater proportions of the toxic materials in the liquid compositions may be used but these greater additions are, of course, limited to some extent by the solvent power of the petroleum oil and by economic considerations. The compositions must be stable and must completely retain all the polychlorophenol without any separation or crystallization at outdoor temperatures. For prolonged fungicidal protection a wood impregnated with a composition containing 5% of polychlorophenol according to the method of the invention is eminently satisfactory.

The petroleum oils which I prefer for the purposes of the invention are those having characteristics within the approximate ranges given hereinbelow:

Gravity A. P. I. at 60° F.----- 20-40
 Flash point A. S. T. M.----- 140° F. and higher
 Viscosity Saybolt Universal at 100° F.----- 30-40
 A. S. T. M. distillation range.----- 300°-750° F.

Petroleum solvents boiling at lower ranges than those hereinabove specified may be used provided they dissolve the desired proportion of the toxic chemical. The odor and color of the oil must also be considered for the particular application. For some purposes, odorous oils or oils of dark color are not objectionable but for bright lumber of the highest grade, light-color odorless oils are essential. Oils of high boiling range are desirable, as hereinbefore stated.

Although petroleum oils have been specifically described, high-boiling chlorinated solvents and aliphatic as well as aromatic solvents may be used. The rosin or similar resinous material has proven effective in preventing "blooming" tendency which the solvents might engender. Of course, economic considerations are in favor of the use of petroleum solvents or their mixtures with small proportions of other solvents.

In using the compositions of the invention, different solvent mixtures may be used in the treatment of wood products of different thicknesses. Thus, for example, a mixture of low-boiling and high-boiling petroleum solvents is eminently suitable for the preparation of compositions for treatment of thin wood boards. For thicker boards, greater proportions of high-boiling solvents are desirable to facilitate deeper penetration.

Rosin in my compositions may be replaced by other resinous materials soluble in the solvents used and compatible with the phenol. Cumaron-indene resins, petroleum resins such as that sold under the trade name "Santo-Resin", rosin residues, ester gum, rosin esters, petroleum tar resins and resins derived from rosin such as that designated by the trade name "Vinsol" may be used to replace the rosin partially or completely.

The proportions used in the composition may be varied. The possible variation will be limited by the solubility of the particular toxic substance in the particular solvent. The ratio of rosin or other resinous material to toxic substance necessary to suppress blooming of the toxic substance in the particular solvent and to provide compositions of desirable surface-drying time will also be variable.

The invention is applicable to the treatment of wood and wood products which are particularly subject to decay and stain especially those materials which are subjected to humid and moist conditions which favor the development of stain and decay. Cellulosic materials such as cloths, papers, wall boards and the like which are also subject to attack by micro-organisms can be similarly treated with these compositions.

The compositions may be modified by the addition thereto of secondary materials such as wetting agents, water-repellents, insect-repellents, fire retardants, substances which exert a synergistic action on the chlorinated phenols and other materials having favorable action on the impregnation or penetration of the composition or have a desirable action in further protecting or enhancing the value of the treated article.

In this specification and in the claims tetrachlorophenol is to be understood to signify any of the isomers or a mixture of the isomers. It is also to be understood that the foregoing description is but a preferred embodiment of the invention and that changes and modifications may be made therein without departing substantially from the invention which is defined in the appended claims.

Although the foregoing description has been

specifically directed to the use of tetrachlorophenols and pentachlorophenol as the toxic component of the composition it is evident that the blooming of compositions containing other chlorinated phenolic toxics such as chlorinated cresols, chlorinated coal tar acids, chlorinated wood-tar acids, chlorinated naphthols, or chlorinated hydroxydiphenyls may likewise be prevented.

Reference is made to my copending application Serial No. 272,784 filed on May 10, 1939, which contains subject matter disclosed but not specifically claimed herein.

What I claim is:

1. A non-blooming liquid coating and impregnating composition for the treatment of wood and similar cellulosic materials to protect them from attack and decay by molds and micro-organisms, comprising a chlorinated phenol dissolved in a solvent therefor in sufficient concentration to provide, when applied to wood and similar cellulosic materials, substantial protection from attack and decay by molds and micro-organisms, and having dissolved in said solvent a resinous substance that is soluble in said solvent and that is compatible with the mixture in sufficient concentration to prevent blooming on wood and similar cellulosic materials treated with the liquid composition.

2. A non-blooming liquid coating and impregnating composition for the treatment of wood and similar cellulosic materials to protect them from attack and decay by molds and micro-organisms, comprising a polychlorinated phenol dissolved in a solvent therefor in sufficient concentration to provide, when applied to wood and similar cellulosic materials, substantial protection from attack and decay by molds and micro-organisms, and having dissolved in said solvent a resin selected from the group consisting of rosin, rosin residues, resins derived from rosin, cumarone-indene resins, petroleum resins and petroleum tar resins in sufficient concentration to prevent blooming on wood and similar cellulosic materials treated with the liquid composition.

3. A non-blooming liquid coating and impregnating composition for the treatment of wood and similar cellulosic materials to protect them from attack and decay by molds and micro-organisms, comprising a polychlorinated phenol dissolved in a solvent therefor in sufficient concentration to provide, when applied to wood and similar cellulosic materials, substantial protection from attack and decay by molds and micro-organisms, and having rosin dissolved in said solvent in sufficient concentration to prevent blooming on wood and similar cellulosic materials treated with the liquid composition.

4. A non-blooming liquid coating and impregnating composition for the treatment of wood and similar cellulosic materials to protect them from attack and decay by molds and micro-organisms, comprising a chlorinated phenol dissolved in a petroleum solvent in sufficient concentration to provide, when applied to wood and similar cellulosic materials, substantial protection from attack and decay by molds and micro-organisms, and having dissolved in said petroleum solvent a resinous substance that is soluble in said solvent and that is compatible with the mixture in sufficient concentration to prevent blooming on wood and similar cellulosic materials treated with the liquid composition.

5. A non-blooming liquid coating and impregnating composition for the treatment of wood and similar cellulosic materials to protect them from attack and decay by molds and micro-organisms, comprising a chlorinated phenol dissolved in a petroleum hydrocarbon fuel oil having a boiling range within the range of approximately 300° to 750° F. in sufficient concentration to provide, when applied to wood and similar cellulosic materials, substantial protection from attack and decay by molds and micro-organisms and having rosin dissolved in said hydrocarbon fuel oil in sufficient concentration to prevent blooming on wood and similar cellulosic materials treated with the liquid composition.

6. A non-blooming liquid coating and impregnating composition for the treatment of wood and similar cellulosic materials to protect them from attack and decay by molds and micro-organisms, comprising a chlorinated phenol selected from the group consisting of tetrachlorophenols and pentachlorophenol dissolved in a solvent therefor in sufficient concentration to provide, when applied to wood and similar cellulosic materials, substantial protection from attack and decay by molds and micro-organisms, and having dissolved in said solvent a resinous substance that is soluble in said solvent and that is compatible with the mixture in sufficient concentration to prevent blooming on wood and similar cellulosic materials treated with the liquid composition.

7. A non-blooming liquid coating and impregnating composition for the treatment of wood and similar cellulosic materials to protect them from attack and decay by molds and micro-organisms, comprising a chlorinated phenol selected from the group consisting of tetrachlorophenols and pentachlorophenol dissolved in a petroleum hydrocarbon oil having a boiling range within the range of approximately 300° to 750° F. in sufficient concentration to provide, when applied to wood and similar cellulosic materials, substantial protection from attack and decay by molds and micro-organisms, and having rosin dissolved in said petroleum hydrocarbon oil in sufficient concentration to prevent blooming on wood and similar cellulosic materials treated with the liquid composition.

8. A non-blooming liquid coating and impregnating composition for the treatment of wood and similar cellulosic materials to protect them from attack by molds and other micro-organisms, comprising approximately 5 parts by weight of pentachlorophenol, 5 parts by weight of rosin, and 90 parts by weight of a petroleum hydrocarbon fuel oil having a boiling range within the range of the following materials in approximately the following proportions: 300° to 750° F.

9. A non-blooming liquid coating and impregnating composition for the treatment of wood and similar cellulosic materials to protect them from attack by molds and other micro-organisms, comprising approximately 5 parts by weight of tetrachlorophenol, 5 parts by weight of rosin, and 90 parts by weight of a petroleum hydrocarbon fuel oil having a boiling range within the range of the following materials in approximately the following proportions: 300° to 750° F.

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CERTIFICATE OF CORRECTION.

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IRA HATFIELD.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 7, for "non-valatile" read non-volatile; line 36, for "ful" read full; line 49, for "penertate" read penetrate; line 57, for "substances" read substance; page 2, first column, line 72, for "Flast" read Flash; and second column, line 11, for "ben" read been; page 3, second column, lines 54 and 64, claims 8 and 9 respectively, for "approximately" read the following materials in approximately the following proportions:; lines 58 and 59, claim 8, and lines 68 and 69, claim 9, for "the following materials in approximately the following proportions:" read approximately; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of February, A. D. 1940.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.