

UNITED STATES PATENT OFFICE.

CARLETON ELLIS, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO COPPER OIL PRODUCTS COMPANY, A CORPORATION OF NEW YORK.

PROCESS OF PRESERVING WOOD.

1,017,636.

Specification of Letters Patent.

Patented Feb. 13, 1912.

No Drawing.

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To all whom it may concern:

Be it known that I, CARLETON ELLIS, a citizen of the United States, and a resident of Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Preserved Wood and Processes of Making Same, of which the following is a specification.

This invention relates to a preserved wood product and the process of making same and relates in particular to railroad ties preserved with oil-soluble arsenic compounds.

The methods heretofore employed for preserving wood have had to do particularly with the injection into wood of aqueous solutions of copper sulfate, zinc chlorid and mercury chlorids, or of such organic preservatives as creosote and coal tar or water proofing agents such as petroleum products, of which Bakersfield oil is typical.

Aqueous solutions of the water-soluble preservative salts are open to the objection that when the wood is exposed to dampness the salts are leached out, more or less, reducing the preservative action correspondingly.

Creosote oils while fairly effective, are not easily obtainable in the large quantities required at a cost which will permit of economical treatment. To be sure there are plenty of low-grade creosote oils cheaply obtainable, but these have usually so large a percentage of rather volatile constituents etc. that preservative action rapidly diminishes on exposure.

Crude petroleum, and more particularly its light-distillate-free residues, have desirable water-proofing qualities, being superior in this respect to creosote. Moreover these heavy oils or residues have a much higher flash point than creosote, as a rule, so that the fire risk in treating wood with heavy petroleum is very slight in comparison with creosote. In the treatment of wood which is to be subjected to great mechanical stress, railroad ties for example, a preferred feature of my invention is the application and use of a preservative whose specific preservative action is carefully regulated to endure for a period substantially that of the mechanical life of the ties. Creosote may be and is used in such proportion that ties show no signs of decay even after their mechanical efficiency is lost. Ordinary petroleum

oils although having a desirable water-proofing action (which by the way is especially pronounced in asphaltic oil residues) have not sufficient fungus-resisting properties to preserve railroad ties up to the extent of their mechanical life. In fact, in the treatment of ties with western Bakersfield crude oil, or Mexican Ebanó asphaltic oil for example, it has been the practice to saturate or completely impregnate the tie with a relatively large quantity of the petroleum oil, which perhaps is not particularly costly if done locally, that is near the source of oil supply, but which would be expensive if the impregnating and saturating processes were carried out at a long distance from the oil regions. The practice in creosoting ties is to inject simply the amount of creosote which will wet the fibers as it were, without filling the pores of the wood with the creosote (empty cell process). Therefore in comparing the cost of creosoting treatment with petroleum oil treatment cognizance must be taken of the relatively large amount of petroleum oil apparently necessarily employed.

In the present invention it is especially the object to fortify petroleum oil such as petroleum residues and heavy distillates, in particular those derived from asphaltic oil, with an antiseptic and preservative compound which has the bactericidal properties of creosote, for example, and the fungicidal properties which creosote lacks, and to produce an oil which when introduced into wood in relatively small quantity will preserve it against moisture and decay without the necessity of resorting to "full cell" treatment.

The present invention also contemplates the process of treating railroad ties and other woody or fibrous material to form the aforesaid preserved wood product; that is to say, the process which consists or involves dissolving in an oil, such as petroleum oil and particularly that form known as asphaltic oil, a relatively small quantity of a high powered antiseptic, more particularly the oil-soluble derivatives of arsenic and copper or mixtures of these, and in fiber-coating the tie or other wood to a more or less extent, adjusting the amount of oil to this end and proportioning the amount of high-powered antiseptic material with respect to the mechanical life of the tie

whereby the preservative life or action and mechanical life substantially coincide.

In carrying out my invention I may combine arsenic (or mercury etc.) with an oil-soluble base or a radical, so as to render it soluble in ordinary petroleum oils and I treat wood, as for example railroad ties, with this oil under conditions which preferably produce merely a fiber coating of the oil in the interior of the wood (empty cell) in contradistinction to the present practice of impregnating wood with a saturating amount (full cell) of Bakersfield or other petroleum oil. In this manner the advantages of petroleum (asphaltic) oil as an inexpensive water-resisting material are secured so that a preserved wood product is obtained which carries a predetermined or adjusted amount of arsenic or similar powerful preservative such as mercury, whereby the preservative effect of the oil is made practically coincident with the mechanical life of the tie. This secures marked advantages as regards the cost of treatment as will be evident.

In carrying out my invention I preferably make use of a compound of arsenic with an oily base, which compound is introduced in small quantity into the cheap petroleum oil diluent and waterproofing agent. Semi-drying oils such as corn or cotton seed oil, soya bean, rosin oil and the like or drying oils such as linseed and Chinese wood oil, are treated with an arsenic compound capable of combination therewith. Chlorid of arsenic is suitable for this purpose. This compound is an acid body and the resulting oil-arsenic compound therefore has an acid reaction. By washing with water or water rendered slightly alkaline with carbonate of soda or hydrate of lime the acidity may be removed and the neutral and nearly neutral arsenated oily base may then be dissolved in heavy petroleum oil such as asphaltic oil residues. The latter oil should be chosen with respect to its impregnating qualities as too viscous an oil would not enter the wood readily except under a very high temperature and pressure. On the other hand as heavy a grade of asphaltic oil should be selected as is consistent with ease of impregnation, suitable oils being cheaply obtainable as indicated. A very heavy bodied asphalt oil may be rendered workable by the addition of 25% or so of spindle oil or creosote. From 1% to 5% of the arsenated oily base is introduced into the asphaltic oil, heat being employed for incorporating when necessary especially when adding the arsenic compound to a heavy bodied viscous product. Arsenic chlorid combines easily with unsaturated organic compounds olefines, terpenes etc. and those which have high molecular weight especially tend to form oil-soluble molecular com-

plexes by treatment with the chlorid of arsenic or its equivalent.

In carrying out that part of my invention which relates to the treatment of wood and the formation thereby of a preserved wood product containing a fiber-coating or fiber-wetting amount of crude petroleum or heavy petroleum oil carrying a lesser amount of oil-soluble or oil-miscible preservative, various metallo-organic compounds other than arsenic may be employed, for example, mercury naphtholate or guayulate, copper oleate and naphthenate, zinc naphtholate or sulfo-oleate may be employed with heavy asphaltic oil with or without creosote and this mixture introduced into the wood preferably so as to give merely a fiber-coating, adjusting the amount of the high-powered preservative with reference to the total amount of oil injected into the wood so that the duration of preservative action substantially corresponds to the mechanical life of the tie or other treated wood. It is well known that different woods vary in endurance to mechanical stress; a white oak railroad tie has a longer mechanical life than a red oak tie. Variations in the mechanical life of ties are still more marked in the case of cypress, eucalyptus and lob-lolly. In each case, the mechanical life being determined, it is sufficient to treat the tie with substantially a fiber coating quantity of the petroleum oil, carrying the high-powered preservative sufficient in amount to carry the preserving action through a period of years, equal to or approximating the mechanical life of the tie. For example with a white oak tie asphaltic oil having a gravity of about .93 is treated with 3% of copper ricinoleate and 3½ lbs. of the oil per cubic foot of tie are injected. With lob-lolly pine an asphaltic oil of .965 specific gravity is treated with 4% of arsenated cotton-seed oil and 4½ pounds of the oil per cubic foot of tie are injected.

The actual injecting procedure employed in carrying out the process and producing the product of the present invention may be any of the standard methods now employed for that purpose, as for example, the ties first may be subjected to a very considerable air pressure, (say 75 lbs.) then treated with the oil at say 130° F. under a higher pressure (say 85 lbs.) and the pressure gradually increased to say 225 lbs. until sufficient penetration is secured. The pressure may then be released whereupon the confined air within the tie expands forcing the excess of arseniated or other oil out of the pores, leaving only a fiber-coating of the preservative.

To recapitulate: The present invention relates to the process of preserving wood, particularly railway ties, comprising injecting into the tissues of the material, a fiber-coat-

ing amount of an oil, preferably of a petroleum asphalt nature, containing a high-powered preservative, miscible therewith, or in solution therein, such high powered preservative preferably being an oil-soluble arsenical, in preferably coating the entire or major portion of the interior fibers of said material so as to be substantially uniformly coated with said oil and preferably in portion in the amount of said high-powered preservative with respect to the mechanical life of the material, whereby preservative action or effect obtains over a period substantially equivalent to the mechanical life of the material in actual use when subjected to mechanical stress or abrasion; and also to the products of said process and in particular to preserved wood containing the arseniated oil, substantially as described.

20 This application is in part a divisional continuation of my co-pending application Serial No. 474,565; that is to say that the present application contains matter derived from aforesaid application but does not claim broadly the use of asphalt oils containing a metallo-organic antiseptic or other high-powered preservative.

What I claim is:

30 1. The herein described process of preserving railroad ties and other fibrous material, which consists in injecting into said ties and the like, at least a fiber-coating amount of an oil comprising asphaltic petroleum carrying arsenic material in solution therein, the said arsenic material being present in predetermined amount whereby preservative action persists for a period substantially equivalent to that of the mechanical life of the tie and similar material and

in causing the major portion of the interior fiber of said ties and similar material to be substantially uniformly coated with said oil. 40

2. The herein described process of preserving railroad ties and other fibrous material which consists in injecting thereinto at least a fiber-coating amount of an oil comprising asphaltic petroleum carrying antiseptic material in solution in the oil, the said antiseptic material being present in predetermined amount whereby preservative action substantially coincides with the mechanical life of the fibrous structure, and in causing the major portion of the interior fibers of said structure to be coated with said oil. 45 50 55

3. A preserved wood product comprising wood containing oil-soluble arsenic in solution in a petroleum oil.

4. A preserved wood product comprising wood containing a solution of an arsenic compound in an oil. 60

5. A preserved wood product comprising wood having its interior fibers coated with a solution of an arsenic compound in an oil. 65

6. A preserved wood product consisting of a railroad tie having its interior fibers coated with a solution of an arsenic compound in asphaltic oil. 70

Signed at Montclair in the county of Essex and State of New Jersey this 13th day of June A. D. 1911.

CARLETON ELLIS.

Witnesses:

NATHANIEL L. FOSTER,
BIRDELLA M. ELLIS.