# UNITED STATES PATENT OFFICE.

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## PROCESS OF TREATING WOOD.

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*To all whom it may concern:*

Be it known that I, HAROLD M. NEWTON, a citizen of the United States, and a resident of Minneapolis, in the county of Hennepin and State of Minnesota, have invented a certain new and useful Process of Treating Wood, of which the following is a specification.

My invention relates to processes for treating wood such as paving blocks, fence posts, railroad ties, timber and pilings with a preservative, for instance creosote, in liquid form.

Various processes have been suggested for treating wood with liquid creosote, including the use of a suitable receptacle, usually called a treating cylinder, having a portion thereof, such as one end, removable whereby the wood may be placed within the hollow interior of the cylinder and the cylinder then closed, with means for inducing air or liquid pressure or a partial vacuum within the cylinder, and means for conducting live steam under pressure to the interior thereof. The present process may be employed in connection with any suitable and well known apparatus of the character described.

The chief objections to the use of creosoted wood at the present time are the initial presence on the surface and the subsequent exudation or "bleeding" therefrom of creosote and other substances, such as native pitches, gums, resins, etc., and the formation of a sticky, non-soluble, normally non-volatile substance or compound thereon after the wood leaves the treating cylinder and frequently for several years after the wood so treated is placed in service. When wood, a paving block for instance, is treated in hitherto suggested ways, the preservative is distributed quite unequally in the cells or voids throughout the wood, and the peripheral portions thereof are usually filled far more completely than are the interior portions. Furthermore, some of the constituents of the creosote separate from others during the impregnating process, the finely divided carbon particles held in suspension in the preserving oil and usually known as "insoluble free carbon" being filtered out on the surface and in the peripheral portions of the wood. Such peripheral creosote exudes quite plentifully during hot weather and, as pitches, gums from the wood, etc. have become dissolved by the creosote, such substances are also carried to the surface with the oil. Such exudation of the creosote oil not only gives rise to a substantial economic loss, but, quite importantly, these exuding substances themselves, and they also in combination with the insoluble free carbon mentioned, cause a sticky, normally non-volatile substance to exist on the surface of the wood. Furthermore, such creosote, pitches, gums, etc. unite with the pitch which is used as a filler between the blocks when laid, thereby not only very sensibly lowering the melting point of the filler, but also forming a relatively much larger mass of objectionable sticky substance. This action is more or less continuous, frequently for several years, throughout the summer months thereof. As these surface substances are carried by the feet of pedestrians into houses and stores, the damage to property and the annoyance from this cause have been very great.

The principal objects of the present invention are to provide, in its broader aspect, a process for treating impregnated wood so as to cure the same of objectionable bleeding after it leaves the treating cylinder; to remove superficial and other of the sticky compound referred to and to prevent its formation and re-formation with the pitch used as a filler, as well as to remove the surface gums, oils, pitches, resins, etc. and to prevent their subsequent exudation from the wood.

A further object is to provide a complete process for impregnating wood whereby the wood may be substantially equally charged throughout with the desired quantity of preservative material, and in such manner that bleeding will not thereafter take place, and to provide a process for treating wood whereby it will come from the treating cylinder cleaned of gums, resins, pitches, creosote and the like substances and also be free of the sticky compound mentioned when the wood is put into use.

A still further object is to prevent the lowering of the melting point of the pitch filler used between paving blocks.

Where a preliminary treating process has been employed which has resulted in charging or impregnating the block or other form of wood with creosote or the like my process consists in additional steps to those already taken, and consists preferably first in apply-

ing live steam to the interior of the treating cylinder, which steam may suitably be under a pressure of from five to fifteen pounds per square inch and which pressure is substantially the equivalent of 220 degrees to 250 degrees Fahrenheit. This application of steam raises the temperature of the wood, and the steam pressure is continued preferably until the peripheral portions of the wood have been well heated to a depth of approximately half an inch, such heat naturally insensibly shading off toward the interior. The additional heat causes the absorbed creosote or other fluid preservative to expand and a part thereof to exude from the outer portions of the wood. When the peripheral portions of the block are thus heated the steam is turned off and a partial vacuum is created in the receptacle or treating chamber, which vacuum is preferably not less than twenty inches of mercury, but may be higher, the vacuum being maintained until a portion of the peripheral creosote and the sticky substances are removed, the increased fluidity of the preservative at the higher temperature greatly facilitating this removal. As these peripheral portions were originally more completely charged than were the interior portions the result is a more uniform impregnation throughout the wood.

Various kinds of wood and various original treatments thereof will naturally require various periods of application of the live steam as well as of the vacuum; but the application of live steam for any appreciable period and the subsequent provision of a vacuum for any appreciable period will result in advantage, and persons skilled in the art will readily appreciate in any instance for what periods the steaming or the vacuum operation should be employed to bring about the desideratum of an equable distribution of the creosote through the removal of the excess thereof from the surface and peripheral portions of the wood.

Where wood is treated in accordance with my invention, substantially no more preservative will exude therefrom under the conditions to which it is subjected in actual service, that is to say, under atmospheric conditions.

The preferred steps of my new process, where the wood is treated completely in a series of operations resulting in a suitable charging of the wood with a preservative and curing it of the bleeding and other objectionable properties mentioned, are as follows: The wood to be treated being considered within a treating cylinder the first step is to apply live steam to the interior of the cylinder under a pressure of preferably about fifteen pounds per square inch, which is preferably continued for a sufficient period thoroughly to heat the wood to the center of each piece; secondly, placing the interior of the cylinder under vacuum, which may suitably be from say 20 to 27 inches, or higher, the vacuum being maintained preferably for a sufficient period to remove substantially all of the air, sap and condensed moisture from the wood; thirdly, the wood is covered over by an inflow of creosote oil, the cylinder suitably being completely filled by the liquid creosote and pressure from the creosote pump applied, preferably slowly, and preferably of a low degree, say in the neighborhood of 100 pounds per square inch, the pressure being maintained until the desired amount of oil has been forced within the wood. It is common practice to use considerable pressure upon the creosote, say 150 pounds per square inch and over, through a correspondingly shorter period, but I have found that such practice results in choking the passages of the peripheral portions of the piece and inhibiting the free flow of the preservative to the center thereof. The fourth step consists in applying live steam the second time to the wood, it being understood, of course, that before doing so the liquid creosote is withdrawn from the receptacle containing the wood. The fifth and last step is causing a partial vacuum in the cylinder.

The fourth and fifth steps just mentioned are the same as the first and second hereinabove described in connection with wood already treated with creosote, and these steps will require no further description here. It may be stated, however, that where the process is carried through completely in a succession of closely following steps, as those from one to five last hereinabove specified, I have obtained excellent results by reversing the order of steps four and five; that is, by following step three with suction and following the suction by live steam. This last mentioned order is to be considered a modification of the preferred order hereinabove set forth.

Within the meaning of the appended claims the first two steps of the preferred process for completely treating the wood, that is, live steaming and vacuum, constitute a form of preparation of the wood for the reception thereof of creosote; the first three steps constitute one way of charging or impregnating the wood and the last two steps constitute a suitable and preferred manner of removing excess creosote to prevent bleeding, and for cleaning the wood of creosote, gums, resins, pitches, sticky compounds and the like, and preventing the formation of the sticky compound with the pitchy filler described. The several broadly defined steps in some of the claims of preparing the wood, charging or impregnating the same, removing creosote, etc., from the outer or peripheral portions thereof, or

cleaning substances therefrom are not respectively limited to the specific steps in other claims set forth, as in its broad aspect I conceive that my discovery or invention resides both in taking wood already treated and by additional treatment curing it of the objectionable properties hereinabove described, and also, and more importantly, as a continuous series of operations impregnating the wood with creosote or the like in such manner that thereafter it will be free of the objections named.

In its narrower aspects the invention or discovery resides in the specific steps and in the union of specific and broadly defined steps as in some of the claims set forth.

It is also to be understood that the several steps of the process called for in the claims are to be considered as taken with the wood in a suitable receptacle or treating cylinder as hereinabove described.

It will readily be appreciated that the present "full-cell" process is clearly distinguishable from what are known as empty cell processes in which the object is merely to coat or paint the surfaces of the cells throughout the wood without leaving them charged or filled with preservative material, the present process resulting in the substantial filling of the wood and with such quantity of the creosote removed from only the peripheral portions of the wood as gives rise to the economic loss, bleeding and other objections hereinabove pointed out.

What I claim is:

1. The process of preserving wood which comprises impregnating wood by suitable treatment with a fluid preservative, and then removing some of said preservative from an outer layer only of said wood by applying additional heat and thereby causing exudation of preservative from the wood, whereby subsequent bleeding is substantially prevented.

2. The process of preserving wood which comprises substantially saturating wood with a fluid preservative, and then removing said preservative to a substantial extent from an outer layer only of said wood by application of additional heat and a partial vacuum.

3. The process of preserving wood which comprises impregnating wood by suitable treatment with a fluid preservative, increasing the fluidity of said preservative in an outer layer only of the treated wood, and withdrawing some of the preservative from said outer layer by means of a partial vacuum.

4. The process of preserving wood which comprises impregnating wood by suitable treatment with a fluid preservative, then heating the treated wood externally to increase the fluidity of said preservative substantially in an outer layer only of the wood, and withdrawing some of the preservative from said outer layer by means of a partial vacuum.

5. The process of treating wood with creosote or the like which comprises preparing the wood for the reception of creosote or the like in a suitable receptacle, applying the creosote or the like to the wood in such receptacle under pressure, and, after the wood is impregnated with preservative, applying to the wood in said receptacle live steam under pressure to increase the fluidity of the creosote only in the outer or peripheral portions of said wood, and causing a partial vacuum in said receptacle sufficient to withdraw some of the creosote from said outer portions of the wood.

6. The process of treating wood which comprises placing the wood within a suitable receptacle, applying live steam to the interior of said receptacle, producing a partial vacuum in said receptacle, then applying creosote or the like to the wood within the receptacle under pressure, next drawing off the creosote or the like from the receptacle and applying live steam to the interior of said receptacle for a period of time sufficient only to increase the fluidity of the preservative in the outer portions of the wood, and then again producing a partial vacuum therein to withdraw preservative from such outer portions.

7. The process of treating wood previously impregnated with a preservative capable of being rendered fluid which comprises rendering the preservative suitably fluid in an outer layer only of said wood, and then removing a part of the preservative from said layer, whereby subsequent bleeding is substantially prevented.

8. The process of treating wood previously impregnated with creosote or the like, to prevent bleeding, which comprises heating such impregnated wood in a suitable receptacle in such manner as to induce fluidity of the preservative in the peripheral portions of the wood, and then causing a partial vacuum in such receptacle, whereby some of the creosote in said peripheral portions is withdrawn.

9. The process of treating wood previously impregnated with a preservative such as creosote or the like, which comprises steaming such wood sufficiently to heat up substantially only an outer layer thereof and thereby to render the preservative in said layer suitably fluid ,and subjecting the steamed wood to the action of a partial vacuum for a period of time sufficient to remove some of said preservative from said outer layer.

10. The process of treating wood, impregnated with creosote or the like, to prevent bleeding and to remove gums, pitches and the like therefrom, which comprises heat-

ing in a suitable receptacle the peripheral portions only of the wood so impregnated, whereby the creosote or the like in such peripheral portions is rendered more fluid, and causing a partial vacuum in such receptacle and thereby withdrawing preservative from such peripheral portions.

11. The process of preserving wood which comprises substantially filling the cells and voids of the wood throughout with a fluid preservative in a suitable treating receptacle, and then applying live steam to said wood for a period of time sufficient to expand and drive out a portion of the preservative from the outer layers of the wood, whereby substantially no more preservative will exude therefrom under atmospheric conditions.

12. The process of preserving wood which comprises substantially filling the cells and voids of the wood throughout with a liquid preservative in a suitable treating receptacle, and then heating the wood to a higher temperature while in said receptacle, whereby expansion of the preservative and exudation of a part thereof from the wood occurs within said receptacle.

13. The process of treating wood which comprises placing the wood in a closed receptacle, applying live steam to the wood, producing a partial vacuum in said receptacle, then applying creosote or the like to the wood under pressure, next drawing off the surplus creosote or the like from the receptacle, and then increasing the temperature inside the receptacle to an extent sufficient to cause expansion of the preservative and exudation thereof to a substantial extent from the outer portions of the wood, whereby subsequent bleeding is substantially prevented.

14. The process of preserving wood which comprises subjecting wood to a "full cell" treatment with creosote or the like preservative, then applying heat to said wood to cause expansion of the preservative in an outer layer of the wood and exudation of a part of the preservative therefrom, and removing the exuded preservative.

15. In a "full cell" process of preserving wood with creosote or the like preservative, the final treatment for rendering the wood substantially non-bleeding, which comprises applying additional heat to the substantially saturated wood and thereby causing exudation of a sufficient quantity of preservative from the outer portions thereof to substantially prevent the wood from bleeding subsequently under conditions of practical use.

16. A wood paving block impregnated substantially through with creosote or the like preservative according to a "full cell" treatment, the peripheral portions of said block having such a degree of impregnation per unit of volume that under atmospheric conditions said block is substantially free from exudation of the preservative.

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Witnesses:
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