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(54) **Method for treatment of creosote impregnated wood to substantially reduce or avoid bleeding.**

(57) The invention relates to a method for treatment of creosote impregnated wood in order to substantially reduce or avoid bleeding, the wood being treated with air at a pressure above atmospheric before impregnation. The method is characterized in that after the creosote impregnated wood has been stored at least until the initial air pressure has been balanced it is subjected to a heat treatment in a heat medium, a vacuum being simultaneously applied.

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Method for treatment of creosote impregnated wood to substantially reduce or avoid bleeding

This invention relates to treatment of creosote impregnated wood and especially to a method of treatment thereof to substantially reduce or avoid bleeding.

Impregnation of wood, such as telegraph poles, electric power transmission poles, piles, sleepers etc, with creosote oil is the method used most frequently at present for protecting the wood from attacks by mould fungi and other organisms as well as vermin. In spite of the development of other impregnating agents having a fungicidal effect, which are water-based and contain e.g. compounds of arsenic, copper and chromium, the creosote oil is the impregnating agent mostly used today for wood products in contact with the ground. In addition to the fact that it provides a perfectly satisfactory protection for a very long time the creosote oil has the further advantage that it improves the mechanical resistance of the wood.

At pressure impregnation of wood with creosote oil the conventional method according to Rüping is used, which means that the wood is given an initial air pressure (of up to  $3.4 \times 10^5$  Pa) before impregnation. The object of this method is to reduce the consumption of creosote oil and therefore the method is called "Rüping's economy method". By this method it is achieved at the following impregnation with creosote oil that the walls of the cell cavities are covered while the cavities largely remain unfilled. In this way the amount of creosote oil is reduced. For example it can be mentioned that at impregnation of poles of fir, using the above-mentioned economical method, about 135 kg of creosote oil per m<sup>3</sup> of sap are used up while at complete impregnation considerably greater quantities of oil should be required.

It is the object of the invention to solve the problem with bleeding of creosote impregnated wood. The expression "bleeding" then refers to the fact that the creosote oil migrates or spreads from the interior of the pole towards its periphery and oozes out on the outside of the pole resulting in that this will be sticky

and thus unpleasant and difficult to handle.

Many attempts have been made to solve the bleeding problem. To this end it has been suggested to store creosote impregnated poles in water basins. With a knowledge of the fact that the storage space of impregnation poles requires an area of about 60 000 m<sup>2</sup> at a big impregnation plant this solution is economically unrealistic. Another way of solving the problem with bleeding of creosote impregnated poles has meant that the outermost layer of the poles has been peeled off. However, for reasons easy to understand this method cannot be carried out neither industrially nor economically. The method is based on the experience that a very high concentration of creosote oil is found in the outer layers after impregnation. In spite of the peeling made the poles will, however, bleed, and therefore the method is little successful merely for this reason.

Although the French patent 808 624 does not solve the bleeding problem the contents thereof will be discussed in brief. This patent relates to washing of creosote impregnated wood by treatment thereof with water vapour at 120 - 130°C for 0.5 - 2 h. Obviously the prerequisite of obtaining favourable results by this method is that all excess of creosote oil has migrated to the outer surface of the wood before washing is carried out. Thus, this patent does not solve the bleeding problem.

The only solution that can at present be practically carried out is an enough long storage of the wood after impregnation. However, this solution is not satisfactory mainly for economical reasons as the impregnation industry needs from 18 to 24 months to produce an acceptably dry creosote impregnated pole from wood.

According to the invention the problem with bleeding of creosote impregnated wood is solved in a simple and economically favourable way.

Thus, the invention relates to a method for treatment of creosote impregnated wood to substantially reduce or avoid bleeding, the wood being treated with air at a pressure above atmospheric before impregnation, and the method has been provided with the characteristic features defined in claim 1.

The method of the invention for treatment of creosote impregnated wood means in principle that the wood is subjected to a heat treatment under simultaneous applying of a vacuum after the creosote impregnated wood has been stored for a certain period, which preferably covers at least 3 months, or until the initial air pressure mentioned above has been balanced. The heat treatment means that the wood is cooked with water as heat medium. In practice the treatment of the creosote impregnated wood is carried out in an autoclave provided with a vacuum pump and internally with steam coils or the like.

According to a preferred embodiment 25 l water per  $m^3$  wood are added to the autoclave, after which the temperature in the autoclave is raised to the boiling point of the water at the same time as a vacuum of 90% is applied, resulting in evaporation of the water. The operating conditions in the autoclave are preferably adjusted so that a maximum temperature and vacuum have appeared after about 0.25 to 0.50 h. The negative pressure or the size of the vacuum is not critical and depends on such factors as the size of the autoclave, the wood to be treated etc. However, according to the invention a vacuum of 70 - 90% is used, i.e. a vacuum to the order of 700 - 900 mbar. The vacuum is obtained by means of a conventional vacuum pump optionally connected to an ejector.

At the method of the invention the creosote impregnated wood is subjected to said heat and vacuum treatment for up to 4 hours calculated from the start of applying the vacuum. However, the length of the treatment time is not critical to the invention as long as the intended effect is obtained, i.e. bleeding is avoided. To be on the safe side a treatment time of up to 4 hours is used.

The invention will be explained more in detail with reference to the following, non-limiting examples.

#### Example 1.

About 35  $m^3$  of creosote impregnated wood stored in the open air for about 3 months were introduced into a cylindrical autoclave having a diameter of 2 m and a length of 25 m, which was internally provided with steam coils and to which a vacuum pump working within a range of pressure of about 700 to 900 mbar was connected. Water

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in an amount of 25 l/m<sup>3</sup> wood was introduced into the autoclave and the temperature in the autoclave was raised to the boiling point of water simultaneously as a vacuum of 90% (900 mbar) was applied. This temperature and vacuum state was reached after 20 min. The time of treatment lasted for about 4 hours, after which the vacuum was interrupted and water was emptied out of the autoclave. During the treatment 7 l water/m<sup>3</sup> wood had been consumed, and it could be established by an analysis of the remaining water that 4 kg creosote oil/m<sup>3</sup> wood had been leached out.

The treated, creosote impregnated wood was stored on trial for one month and no bleeding could be observed.

#### Example 2.

16 logs designated 12 S, 12 logs designated 12 E and 12 logs designated 11 S, which had together a volume of 27.48 m<sup>3</sup>, were introduced into a cylindrical autoclave (tube). A vacuum pump and a heat exchanger were connected to the tube. Water in an amount of about 700 l was introduced at the same time as the wood. The following values of the in and out temperatures of the heat exchanger were noted:

<u>Time</u>	<u>In</u>	<u>Out</u>	<u>Remarks</u>
7 <sup>00</sup>	99°	112°	
7 <sup>10</sup>	99°	112°	
7 <sup>20</sup>	99°	112°	
7 <sup>30</sup>	99°	112°	Wood was introduced
7 <sup>40</sup>	99°	112°	
7 <sup>50</sup>	99°	112°	
8 <sup>00</sup>	99°	112°	Started to take in water
8 <sup>10</sup>	100°	112°	
8 <sup>20</sup>	100°	112°	
8 <sup>30</sup>	100°	112°	Water in
8 <sup>40</sup>	100°	112°	
8 <sup>50</sup>	100°	113°	
9 <sup>00</sup>	100°	114°	
9 <sup>10</sup>	101°	114°	
9 <sup>20</sup>	101°	114°	
9 <sup>30</sup>	101°	114°	
9 <sup>40</sup>	101°	114°	

<u>Time</u>	<u>In</u>	<u>Out</u>	<u>Remarks</u> <b>0148141</b>
9 <sup>50</sup>	101°	114°	
10 <sup>00</sup>	102°	115°	
10 <sup>10</sup>	102°	115°	
10 <sup>20</sup>	102°	115°	
10 <sup>30</sup>	102°	116°	
10 <sup>40</sup>	102°	116°	
10 <sup>50</sup>	102°	116°	
11 <sup>00</sup>	103°	116°	
11 <sup>20</sup>	103°	116°	
11 <sup>30</sup>	103°	117°	
11 <sup>40</sup>	104°	118°	
11 <sup>50</sup>	104°	118°	
12 <sup>00</sup>	104°	118°	
12 <sup>10</sup>	104°	118°	
12 <sup>20</sup>	104°	118°	
12 <sup>30</sup>	104°	118°	Tube was emptied

The stop for half an hour between the introduction of the wood and the intake of water was caused by the fact that the intake valve for water did not let through the water but had to be corrected. The water was sucked in by the vacuum existing in the tube, which amounted to about 900 mbar. The temperatures in the above table are measured in the jacket.

### Exemple 3.

The above example was repeated with 30 poles of 12 m length and designated N and 30 poles of 10 m length designated N, these poles totally taking up a volume of 25.5 m<sup>3</sup>. The amount of water used amounted to about 660 l. For reasons of measurement technique the temperatures indicated in the table below were determined within the cylinder. The vacuum pressure was about 90 %.

<u>Time</u>	<u>Temp. °C</u>	<u>Remarks</u>
9 <sup>15</sup>	20	Wood in
9 <sup>35</sup>	40	Vacuum started
9 <sup>50</sup>	45	Started to take in water
10 <sup>00</sup>	50	
10 <sup>10</sup>	54	Water in. 90% vacuum

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<u>Time</u>	<u>Temp. °C</u>	<u>Remarks</u>
10 <sup>20</sup>	56	
10 <sup>30</sup>	60	
10 <sup>40</sup>	61	
10 <sup>50</sup>	64	
11 <sup>00</sup>	66	
11 <sup>10</sup>	67	
11 <sup>20</sup>	69	
11 <sup>30</sup>	71	
11 <sup>40</sup>	72	
11 <sup>50</sup>	74	
12 <sup>00</sup>	75	
12 <sup>10</sup>	77	
12 <sup>20</sup>	78	
12 <sup>30</sup>	78	
12 <sup>40</sup>	79	
12 <sup>50</sup>	79	
13 <sup>00</sup>	79	
13 <sup>10</sup>	79	
13 <sup>20</sup>	79	
13 <sup>30</sup>	77	
13 <sup>40</sup>	76	
13 <sup>50</sup>	76	
14 <sup>00</sup>	76	
14 <sup>10</sup>	76	The cylinder was empited

After the test being finished the volume of remaining water and "excess" of creosote were determined to 250 l.

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PATENT CLAIMS

1. A method for treatment of creosote impregnated wood in order to substantially reduce or avoid bleeding, the wood being treated with air at a pressure above atmospheric before impregnation, characterized in that the creosote impregnated wood, after being stored at least until the initial air pressure has been balanced, is subjected to a heat treatment in a heat medium, a vacuum simultaneously being applied.
  2. The method of claim 1, characterized in that the wood is cooked with water in an autoclave and that the vacuum amounts to about 90%.
  3. The method of claim 1 or 2, characterized in that maximum temperature or vacuum has appeared after about 0.25 to 0.50 h.
  4. The method of claim 1, characterized in that the vacuum is of the order of 700 to 900 mbar.
  5. The method of any one of the preceding claims, characterized in that the creosote impregnated wood is stored for at least three months before it is subjected to the heat-vacuum treatment.
  6. The method of any one of the preceding claims, characterized in that the time of treatment is at least 4 hours.
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# EUROPEAN SEARCH REPORT

**0148141**  
Application number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 84850383.5
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	DE - A - 1 642 199 (RÜTGERSWERK) * Totality *	1	B 27 K 3/44 B 27 K 3/46
X	GB - A - 687 113 (MONIE SANDERS HUDSON) * Totality *	1	
A	AT - B - 354 062 (HAGER) * Claims 1,2 *	1	
A,D	FR - A - 808 624 (POULAIN) * Totality *	1	
A	DE - C - 347 349 (HÜLSBERG) * Totality *	1	TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
A	DE - B - 1 947 053 (WOLMAN) * Claim; column 5, lines 5-15 *	1	B 27 K
A	L. VORREITER "Holztechnologisches Handbuch", Band I: Allgemeines, Holzkunde, Holzschutz und Holzvergütung, 1949 VERLAG GEORG FROMME & CO, Wien pages 425-427 * Page 425, line 39 - page 427, line 2 *	1	
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 20-03-1985	Examiner SCHÄFER
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			