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Process for the double impregnation of wood using mineral salts and rectified coal tar oil.

The instant invention concerns a process for treating wood, intended to ensure its optimal preservation, characterised by the fact that it consists of double impregnation in a pressurized tank: one effected with mineral salts, which impregnate all the fibres of the wood to be treated (from the heart, to the outer surface), the other by means of rectified coal tar oil, which is intended to impregnate only the fibres nearer the surface.

Process for the double impregnation of wood, aimed at ensuring optimal preservation, using mineral salts and rectified coal tar oil.

This patent application for an industrial invention concerns a process for the double impregnation of wood intended to ensure its optimal preservation, effected with mineral salts and rectified coal tar oil. As is known, wood, as a construction material for outside works, has become of considerable importance of late, not only because of its technical characteristics, as concerns resistance, elasticity, and workability, but also and above all, for environmental and aesthetic reasons.

In fact, since wood is an exclusively natural product, it blends very well with the rest of the landscape making any construction less heavy and even attractive. Besides these undeniable qualities which often make wood preferable to all other construction materials, when utilised in outside works wood often comes up against problems connected with its ability to last in time and with the preservation of its original characteristics.

In order to solve these practical problems, it is necessary to preserve the wood from fungi and insect attacks which are the cause of its deterioration; to this end, wood to be used in outside constructions is usually subjected to impregnation treatments which do not allow harmful agents to penetrate its fibres.

Current techniques prescribe that such treatments be carried out according to two alternative methods.

In the first instance, an impregnation treatment is carried out on the wood in a pressure tank, using coal tar oils or derivatives; this technique for the treatment of wood is, as a rule carried out using a process known in the field as "Simple Ruepling" or "empty cell".

On the basis of this methodology, once the timber has been placed inside the tank, the following steps are carried out :

- air pressure of up to 3,5 bar is exercised;
- said pressure, once reached must be maintained for at least 15 minutes;
- while maintaining this pressure, the tank is filled with coal tar oil or its derivatives at a temperature which varies according to the type of oil;
- the oil is compressed up to a pressure value of 10-12 bar, while maintaining a constant temperature;
- once pressure has been reached, this is maintained until there is an apparent absorption in proportion to the real absorption established according to the type of wood and the use for which it is intended;
- antiseptic is discharged;
- depression is exercised at not less than 60 cm/Hg for at least 20 minutes;

- a vacuum is attained and the timber is extracted.

It should, in any case be noted, concerning this method of wood impregnation that at the present time the traditional coal tar oils for example creosote are no longer used on a large scale for environmental and sanitary reasons. Moreover these oils bestow a very dark colour on the wood which is not particularly attractive in appearance and they also present the problem of being subject to washout (namely they continue to ooze from the impregnated wood even after some time); as a consequence the hands and garments of those who have to work or position the constructions made of this treated wood are invariably soiled.

In order to solve these problems the said process is now carried out with so-called light oils made up of fractional and rectified coal tar oils which do not possess the negative aspects of Creosote and which offer the same level of preservation to the wood.

As an alternative to the above impregnation process current techniques can provide a different method of treating wood distinguished above all by the fact that it is performed using an aqueous solution of salts, containing copper-chrome-arsenic; said method is normally identified as the Bethel or full cell process.

This second procedure entails the following steps, once the timber has been placed inside the tank:

- depression of not less than 64 cm/Hg is obtained and maintained for 30 minutes;
- while maintaining said depression the tank is filled with the aforementioned salt solution;
- the solution is compressed up to a pressure value of 10-12 bar and this is maintained until the desired level of absorption is reached;
- the solution is discharged;
- a depression of not less than 64 cm/Hg is obtained and maintained for 20 minutes;
- a vacuum is attained and the timber is extracted.

On this consolidated technological background the invention at reference in the instant patent application is developed.

It concerns a totally new process for treating wood which for the first time, involves double impregnation; one carried out with mineral salts, the other with rectified coal tar oil preferably rectified coal tar oil which was created by the same Company requesting the instant industrial patent, and which has been protected in its turn by the Italian patent application N° 17496 A/90.

This new process comprises the following operational phases:

- the positioning of the timber in a tank, where it is subjected to an initial impregnation based on a conventional saline solution; it being provided in this phase that the mineral salts can pene-

trate the wood in depth, impregnating all the fibres;

- the extraction of the saline solution from the tank;
- the drying by means of natural or forced evaporation of the fibres which had been dampened by the solution in which the mineral salts were dissolved;
- the introduction of the light rectified coal tar oil into the tank and regulation of the temperature (30-60°C), the pressure (8-12 bar) and time (10-60 mins), in order to ensure that the oil penetrates the surface fibres of the wood, giving rise to a peripheral "jacket", in which rectified coal tar oil and mineral salts will be present at the same time.

In other words, on conclusion of the above new double treating process the wood extracted from the tank will prove to be impregnated with mineral salts throughout all its fibres (from the heart to the surface) while the fibres nearer the surface will have been doubly impregnated by the mineral salts and by the light rectified coal tar oil.

Obviously the temperature and pressure values and also the duration of the oil impregnation phase vary within the minimum and maximum values indicated above, according to the type of wood being treated.

This new combined impregnation process was conceived and perfected in the absolute certainty that it is considerably more economical, reliable and efficient than the conventional single impregnation process.

The main advantages of the invention can be summarized as follows:

A) In view of the double impregnation to which the wood is to be subjected it proves possible to use a lower saline concentration than the one currently used in conventional full cell processes and in any case a concentration such as to be able to conform without doubt to the limits set by the relevant current sanitary and ecological norms; evidently, the weaker level of preservation caused by the lower quantity of mineral salts on the wood is more than adequately made up for by the presence of rectified coal tar oil;

B) The process in question provides the possibility of using rectified oils even if these are extremely costly due to the fact that these oils can be used in smaller doses namely only the amount required to impregnate the surface fibres of the wood, as a result of the combined in depth impregnation using mineral salts;

C) In the process in question the surface area of the wood which is definitely the most exposed to any deteriorating agents, receives optimal protection, not only by impregnation with oil (which, for the external areas of the wood must without

doubt be considered the best protection available), but also and above all because in this same area this impregnation with oil is combined with impregnation with mineral salts;

D) The simultaneous presence in the wood of mineral salts and oil results in a considerable increase in the stability of the oil which is longer lasting and consequently any washing away is limited; this being at the present time as mentioned previously one of the major problems to be present in timber which has been impregnated with non-rectified coal tar oils, using the traditional single impregnation processes;

E) The presence of rectified coal tar oil in the surface areas of the wood bestows it with a brownish colour which is particularly stable and long lasting and above all very attractive; a colour therefore, which is much more pleasing to the eye than the dark shade resulting from impregnation with non-rectified coal tar oil and also the faded green hue which remains on the wood after it has been impregnated with salts;

F) The use of rectified coal tar light oil permits the impregnation process to be carried out in a tank at much lower temperature values (30-60°C) than those required (about 100°C) in the impregnation process with heavy non-rectified oils; this obviously results in considerable energy saving which consequently leads to a substantial reduction in the effective cost of the entire process.

Moreover, on the basis of what was expressed at point A) above, it can be noted that the process in question could have just as satisfactory results should it be decided to use a solution of mineral salts recently put on the market which contains no chrome or arsenic, instead of the conventional saline solution (copper-chrome-arsenic).

In fact, said new salts, which are definitely to be preferred compared to the old salts in that they are more suited to the current ecological climate, could prove however to be less effective as concerns their antiseptic potential; in spite of this they could in any case be used to advantage in the process according to the invention, given the fact that any limited antiseptic capacity could be more than adequately compensated by the rectified coal tar oil which would be mixed with the salts in the wood fibres.

In conclusion it is specified that the second phase of the process in question, could be carried out with traditional oils if the heavy type while remaining within the scope of the instant invention, although the use of rectified coal tar oils (oils of the light type) is of course the optimal solution.

Claims

1) Process for the double impregnation of wood,

aimed at ensuring optimal conservation, using mineral salts and rectified coal tar oil, characterised by the fact that it comprises the following phases in the ordained sequence:

- positioning of timber in the tank where it will be subjected to an initial impregnation consisting of a low concentration saline solution (copper-chrome-arsenic); it being provided, in this phase, that the mineral salts penetrate the wood in depth, investing all the fibres; 5
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- extraction of the saline solution from the tank;
- drying, by means of natural or forced evaporation, of the wood fibres which had been dampened by the solution in which the mineral salts were dissolved; 15
- introduction of the rectified coal tar light oil to the tank and regulation of the temperature (30-60°C), the pressure (8-12 bar) and time (10-60'), in such a way that the oil can penetrate the surface fibres of the wood, thereby creating a peripheral "jacket" in which rectified coal tar oil and mineral salts will be simultaneously present; 20

2) Process for the double impregnation of wood, aimed at ensuring optimal preservation, using mineral salts and rectified coal tar oil, according to claim 1), characterised by the fact that in a preferred embodiment, impregnation with salts could be carried out using a saline solution not containing chrome or arsenic; 25

3) Process for the double impregnation of wood, aimed at ensuring optimal preservation, using mineral salts and rectified coal tar oil, according to claim 1), characterised by the fact that in a preferred form of embodiment, impregnation with oil could be carried out using traditional non rectified coal tar oils (oils of the heavy kind). 30
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EUROPEAN SEARCH REPORT

Application Number

EP 93 83 0086

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-1 523 925 (W.R.WHEATON) * page 1, line 76 - line 90 * * page 1, line 103 - line 106 * ---	1-3	B27K3/08
X	FR-A-2 392 786 (FOREST PRODUCTS UTILISATION LABORATORY) * page 16, line 9-18 * * page 17, line 5-15 * * claims 1-5,17 * ---	1-3	
X	GB-A-2 044 311 (B.O.HÄGER) * page 2, line 62 - line 93 * ---	1-3	
X	GB-A-1 512 549 (HAGER AKTIEBOLAG) * page 1, line 43 - line 65 * * claims * ---	1-3	
A	GB-A-1 181 246 (HAGER AKTIEBOLAG) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B27K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 05 JULY 1993	Examiner DALKAFOUKI A.
CATEGORY OF CITED DOCUMENTS 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 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 ----- & : member of the same patent family, corresponding document			

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