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(54) **Method for artificial ageing of wood materials and the like**

(57) Method for the artificial ageing of wood materials and the like which envisages, in sequence, the steps of taking, in a predetermined first time interval (h_1), the piece of wood material to be treated to a first reference temperature (T_1) higher than 100°C, while the same piece of wood material is brushed on by hot air; then maintaining for a predetermined second time interval (h_2) the

piece of wood material to be treated in contact with hot and humid air at a predetermined second reference temperature (T_2) and at a pressure (P_2) higher than ambient pressure; and finally of taking, in a predetermined third time interval (h_3), the piece of wood material to be treated again to ambient temperature; the hot and humid air at the second reference temperature (T_2) being vapour-saturated air.

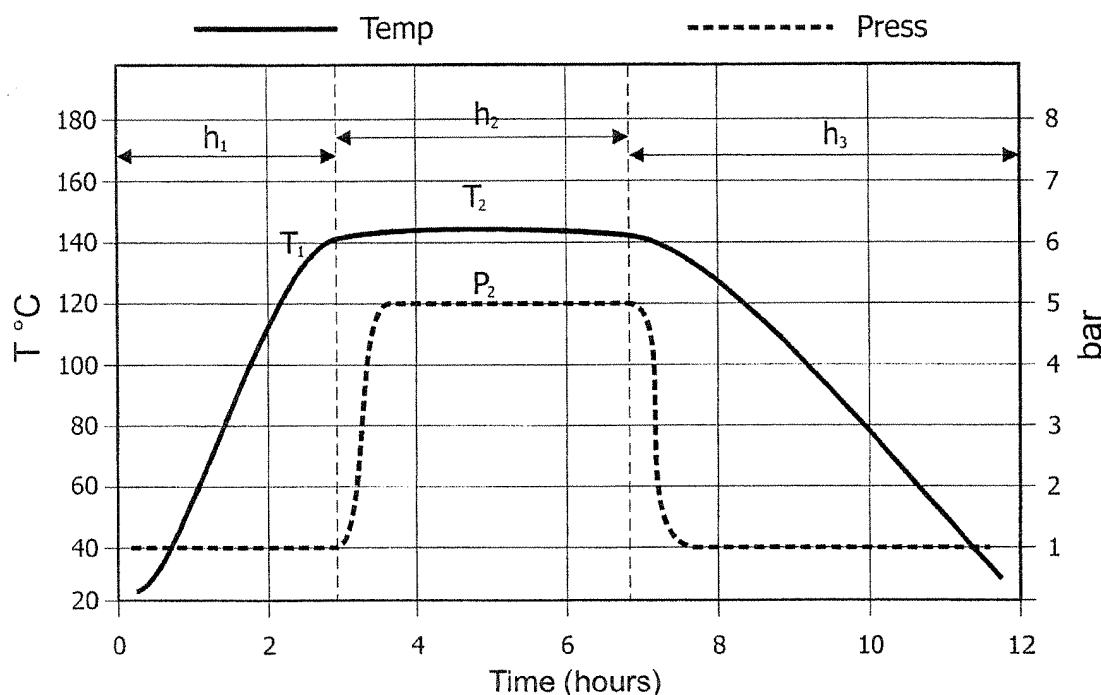


Fig. 1

Description

[0001] The present invention relates to a method for the artificial ageing of wood materials and the like.

[0002] As known, the colour of recently cut wood, i.e. of green timber, depends essentially on two factors: the colour of the cellular wall itself and the colour deriving from the other substances present in the cellular wall, such as extractives and tannins. The first is virtually constant in all types of wood taken into consideration, while the second presents a high degree of variability which depends not only on the type of wood taken into consideration, but also on the area of origin of the material and on many other environmental and non-environmental factors.

[0003] The progressive variation in the colour of wood as time goes by, traditionally called wood ageing, derives instead from the numerous chemical-physical reactions which are developed in the material because of the prolonged exposure to air, to sunlight and to variations in humidity.

[0004] For example, in light-coloured wood, the prolonged exposure to sunlight initially produces a rapid yellowing and/or browning of the colour on the surface of the material, followed by dye toning to light brown and finally to uniform grey due to the progressive decrease in colour saturation.

[0005] This phenomenon is mainly due to a process of photochemical oxidation in which both ultraviolet wavelengths (wood absorbs ultraviolet light very well, and even better when immersed in water) and infrared wavelengths, which have a considerable thermal degrading action on the surfaces, are relevant.

[0006] Overall, it is now certain that the onset of yellowing is due to the absorption of light by lignin which is degraded and oxidised. If the wood is exposed to bad weather conditions, the washing action of rain water which accelerates the disappearance of the yellowish colour due to the degradation of lignin is also added to photochemical degradation, causing the outermost layer of wood to become light grey.

[0007] It is also known that the colour of wood is also appreciably altered when the material is subjected to the thermal drying treatment traditionally employed to stabilise the cellular structure of wood in order to reduce the risks of dimensional instability of the material.

[0008] In this regard, it must be specified that the permanence of wood in a dry air environment at a temperature normally comprised from 190°C to 220°C must be carefully calibrated so as to prevent the superficial carbonation of the material and/or the possible alternations of the structure of the material, which could irreparably compromise the mechanical resistance of the same.

[0009] It is the object of the present invention to find a method for rapidly and long-lastingly taking the colour of wood to the typical shades of aged wood without compromising in any way the mechanical properties of the material.

[0010] According to the present invention a method for the artificial ageing of wood materials and the like as explained in claim 1 and preferably, but not necessarily, in any on the dependent claims, is provided.

[0011] The present invention will now be described with reference to the accompanying drawings illustrating a non-limitative embodiment example, in which:

- figure 1 shows a possible trend of the temperature and pressure obtained for the artificial ageing of wood materials and the like as a function of time, obtained according to the dictates of the present invention; while
 - figure 2 shows the trend of the saturation vapour pressure as a function of temperature.
- With reference to figures 1 and 2, the present method for the artificial ageing of wood materials and the like finds particularly advantageous application in the treatment of pieces of green timber, i.e. recently cut, of any type and geographic origin.
- The method according to the present invention essentially envisages
- taking, in a predetermined time interval h_1 , the piece of wood to be treated gradually to a first reference temperature T_1 higher than 100°C, while the same piece of wood is brushed on by hot air at a pressure preferably, but not necessarily, equal to ambient pressure;
 - then maintaining for a predetermined time interval h_2 the piece of wood to be treated in contact with hot and humid air at a second reference temperature T_2 preferably, but not necessarily, higher than reference temperature T_1 , and at a pressure P_2 higher than ambient pressure; and finally
 - taking, in a predetermined time interval h_3 , the piece of wood to be treated again to ambient temperature while the same piece of wood is brushed on by air at a pressure preferably, but not necessarily, equal to ambient pressure.

[0012] More in detail, the method according to the present invention envisages to maintain the piece of wood to be treated in contact with hot humid air at a reference temperature T_2 higher or equal to reference temperature T_1 , and at a pressure P_2 essentially equal to the saturation vapour pressure corresponding to the reference temperature T_2 itself.

[0013] In other terms, the method according to the present invention envisages to maintain the piece of wood to be treated in contact with vapour-saturated hot air, the pressure P_2 and the temperature T_2 of which meet Clausius-Clapeyron's mathematical relation and the trend of which is shown by the curve in figure 2.

[0014] In addition to the above, the method according to the invention envisages that the vapour-saturated hot air which brushes on the piece of wood to be treated has in any case a pressure P_2 higher than or equal to 1.8 bars, which corresponds to a reference temperature T_2

of approximately 117°C.

[0015] In the example shown, in particular, the piece of wood to be treated is maintained in contact with the vapour-saturated hot air within an airtight container of the known type, in which the hot air is maintained at pressure P_2 and the correct temperature T_2 is reached and maintained by keeping water boiling within the same container.

[0016] As known, indeed, water reaches boiling point at a given temperature if, and only if, the saturation vapour pressure at that temperature is equal to ambient temperature.

[0017] With reference to figures 1 and 2, in the example shown, in particular, the method according to the present invention envisages to gradually take the piece of wood to be treated to a reference temperature T_1 of approximately 140°C in a time interval h_1 of approximately 3 hours, maintaining the same piece of wood in contact with hot air at ambient temperature, i.e. at a pressure of approximately 1 bar.

[0018] Having reached reference temperature T_1 of approximately 140°C, the method according to the present invention envisages to maintain the piece of wood to be treated for a time interval h_2 of approximately 4 hours in contact with vapour-saturated hot air at a pressure P_2 of approximately 4 bars and at a reference temperature T_2 of approximately 143°C.

[0019] After time interval h_2 , the method according to the present invention envisages to gradually return the piece of wood to be treated to ambient temperature, employing for this operation a time interval h_3 equal to approximately 5 hours.

[0020] Obviously, reference temperature T_1 , reference temperature T_2 and pressure P_2 , as time interval h_1 , time interval h_2 and time interval h_3 are a function of both the type of wood to be treated and the colour of the wood to be obtained.

[0021] In this regard, it is important to specify that, for example, maintaining a piece of green red-spruce in contact with vapour-saturated hot air at a pressure P_2 of 4 bars, for a time interval h_2 of approximately 4 hours, will alter the original colour of the wood making it practically the same as the colour that the same type of wood would have after ageing at least ten years or so.

[0022] Highly appreciable results have also been obtained by maintaining the piece of wood in contact with vapour-saturated hot air at pressure P_2 of approximately 6 bars for a time interval h_2 of approximately 1 hour.

[0023] Experimental tests have finally demonstrated that the method according to the present invention may also be validly applied to the treatment of pieces of damp wood with internal humidity balanced with that of the external environment, i.e. pieces of wood being seasoned.

[0024] The advantages deriving from the adoption of the method for artificial ageing of wood materials and the like according to the present invention are apparent: by using the method described above, it is possible to give green wood the typical appearance of aged wood in very

short times and at extremely competitive costs.

[0025] Comparative analyses have also revealed that the cellular wall of wood exposed to vapour-saturated hot air modifies its cellular structure becoming more parasite-resistant and more flame-resistant.

[0026] Obviously, the method for the artificial ageing of wood materials and the like described and illustrated above also allows to stabilise the cellular structure of wood, reducing the risks of dimensional instability of the material.

[0027] It is finally apparent that changes and variants can be made to the method for the artificial ageing of wood materials and the like described and illustrated herein without departing from the scope of the present invention.

[0028] For example, the heating of the piece of wood to reference temperature T_1 may occur in contact with hot air at a pressure higher than ambient pressure, similarly the cooling of the piece of wood to ambient temperature may occur in contact with hot and humid air, at a pressure higher than ambient pressure.

Claims

1. Method for the artificial ageing of wood materials and the like **characterised in that** it comprises the steps of:
 - taking, in a predetermined first time interval (h_1), the piece of wood material to be treated to a first reference temperature (T_1) higher than 100°C, while the same piece of wood material is brushed on by hot air;
 - then maintaining for a predetermined second time interval (h_2) the piece of wood material to be treated in contact with hot and humid air at a predetermined second reference temperature (T_2) and at a pressure (P_2) higher than ambient pressure; and finally
 - taking, in a predetermined third time interval (h_3), the piece of wood material to be treated again at ambient temperature.
2. Method according to claim 1, **characterised in that** the hot and humid air which is at said second reference temperature (T_2) and brushes on said piece of wood material, has a pressure (P_2) essentially equal to the saturation vapour pressure corresponding to said second reference temperature (T_2).
3. Method according to claim 1 or 2, **characterised in that** said second reference temperature (T_2) is higher than or equal to said first reference temperature (T_1).
4. Method according to any one of the preceding claims, **characterised in that** the hot and humid air

which is at said second reference temperature (T_2) and brushes on said piece of wood material, has a pressure (P_2) higher than 1.8 bars.

5. Method according to any one of the preceding claims, **characterised in that** the hot and humid air which is at said second reference temperature (T_2) and brushes on said piece of wood material, has a pressure (P_2) essentially equal to 4 bars. 5
6. Method according to claim 5, **characterised in that** said second time interval (h_2) is approximately 4 hours. 10
7. Method according to any one of the preceding claims from 1 to 4, **characterised in that** the hot and humid air which is at said second reference temperature (T_2) and brushes on said piece of wood material, has a pressure (P_2) essentially equal to 6 bars. 15
8. Method according to claim 7, **characterised in that** said second time interval (h_2) is approximately 1 hour. 20

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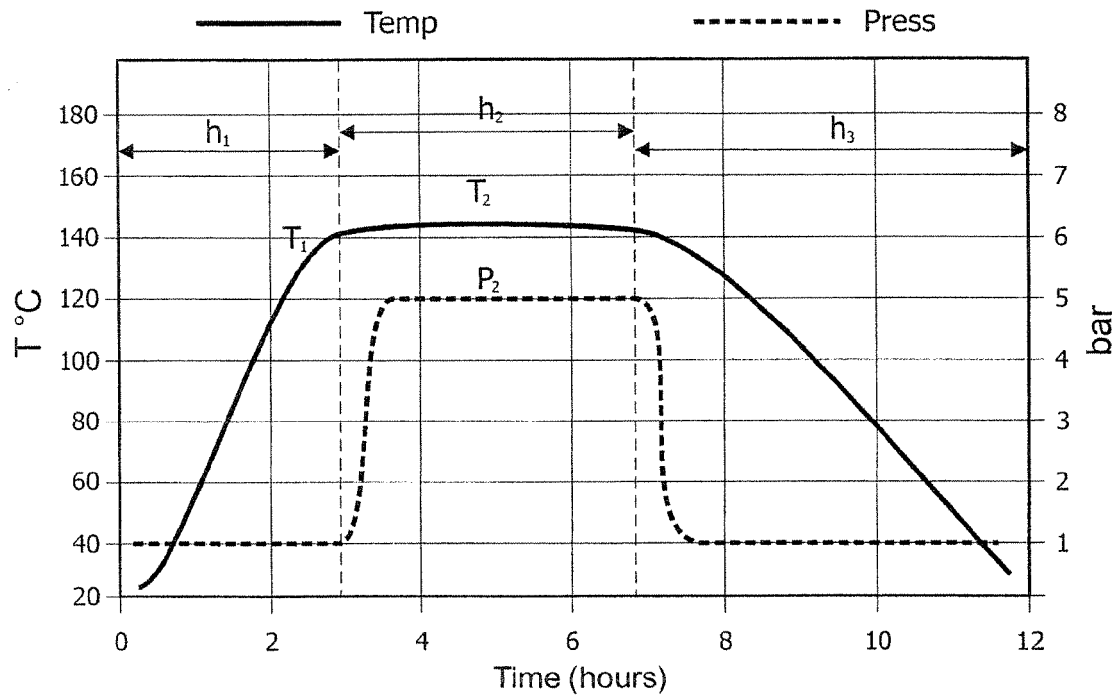


Fig. 1

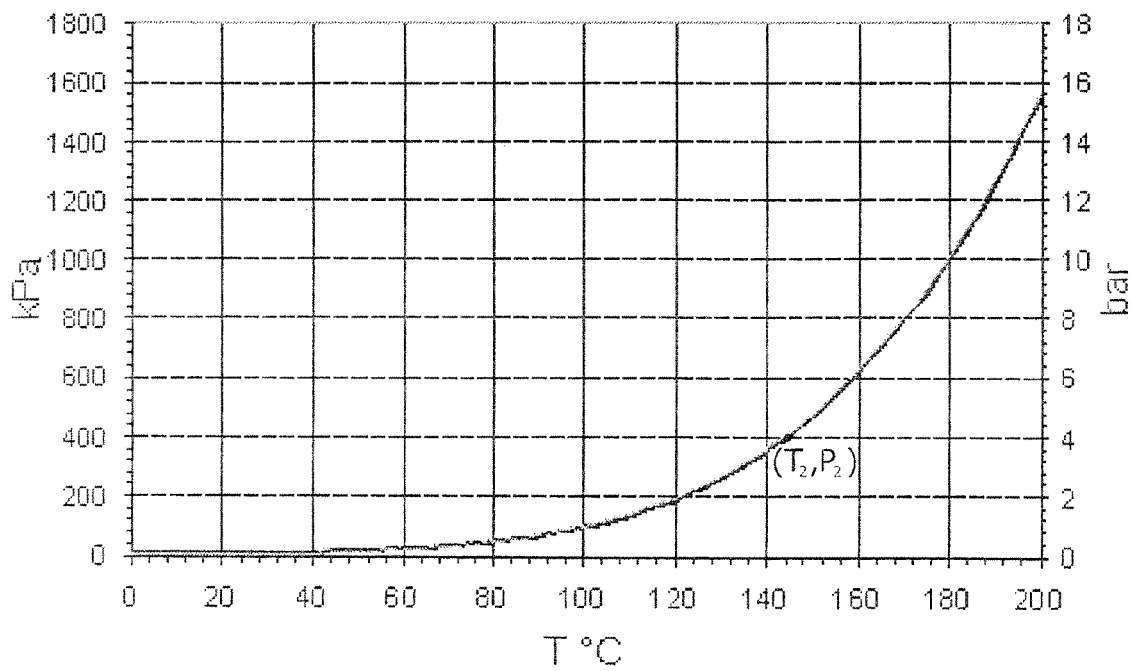


Fig. 2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 12 0023

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			TECHNICAL FIELDS SEARCHED (IPC)
			B27K F26B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 November 2006	Examiner Bjola, Bogdan
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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 06 12 0023

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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