Internal distribution code:

(A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 11 January 2024

Case Number: T 1110/22 - 3.3.05

Application Number: 11794440.5

Publication Number: 2646208

IPC: B27K3/15, D21H17/14, D21H17/15, D21H17/64, D21H17/65, D21H21/34, D21H21/36

Language of the proceedings: EN

Title of invention:
ENVIRONMENTALLY FRIENDLY WOOD TREATMENT PROCESS

Patent Proprietor:
OrganoWood AB

Opponent:
Lapuan Saha Oy

Headword:
Wood treatment/OrganoWood

Relevant legal provisions:
EPC Art. 100(b), 100(a), 56

Keyword:
Grounds for opposition - insufficiency of disclosure (no)
Inventive step - (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1110/22 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 11 January 2024

Appellant: (Opponent)	Lapuan Saha Oy Honkimetsäntie 9 62100 Lapua (FI)
Representative:	Laine IP Oy Porkkalankatu 24 00180 Helsinki (FI)
Respondent: (Patent Proprietor)	OrganoWood AB Ritarslingan 20 187 66 Täby (SE)
Representative:	Bergenstråhle & Partners AB P.O. Box 17704 118 93 Stockholm (SE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 22 February 2022 rejecting the opposition filed against European patent No. 2646208 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	E. Bendl
Members:	S. Besselmann
	O. Loizou

Summary of Facts and Submissions

I. The opponent's (appellant's) appeal is against the opposition division's decision to reject the opposition against European patent EP 2 646 208 B1. The patent in suit concerns an environmentally friendly wood treatment process.

II. The following documents cited in the impugned decision are of relevance:

D1 US 4,612,050 A

D4 "Sodium and Potassium silicates", brochure by PQ Europe, October 2004

D5 C. A. Giudice and A. M. Pereyra, "Fire Resistance of Wood Impregnated with Soluble Alkaline Silicates", Research Letters in Materials Science, vol. 2007, Hindawi Publishing Corporation, Article ID 31956, 4 pages

III. Claim 1 of the patent as granted reads as follows:

"*Method for treatment of wooden materials to improve the flame-retardant properties and also the resistance to rot, fungus, mold and insects of the wooden material, wherein a wooden material is treated with a water-based formulation, characterized in that said method consists of the steps of:*
a) providing a wooden material;
b) providing a water-based formulation which has a shelf life for more than one month in temperatures ranging from 15-35 °C, and containing:
- an alkali metal silicate,

- water, and
- an insolubilizing agent which is selected from an organic acid, an inorganic acid or an inorganic polyvalent ion selected from Al^{3+}, Mg^{2+}, Fe^{2+}, Fe^{3+}, Ca^{2+}, Ba^{2+}, or with counter ions $CaCl_2$, $MgCl_2$, $FeCl_2$ or combinations thereof, added in an amount which is at least 10 weight % lower than the amount of insolubilizing agent needed for the formulation to reach the gelling point; and wherein the weight % of alkali metal silicate compared to the total weight % of the water-based formulation can be from 1 % w/w to 50 % w/w, more preferably from 5 % w/w to 30 % w/w and most preferably from 10 % w/w to 20 % w/w;

c) applying the water-based formulation on the wooden material;
d) drying the wooden material treated with said water-based formulation at a temperature from 15 °C to 70 °C in order to remove excess of water; and
e) curing the dried wooden material at an elevated temperature from 40 °C to 150 °C in order to insolubilize the alkali metal silicate."

Claims 2-20 relate to particular embodiments.

IV. The appellant argued in essence as follows.

The claimed invention was insufficiently disclosed. The requirement regarding the amount of insolubilising agent could not be verified where the insolubilising agent was a polyvalent ion, having regard to the common general knowledge as reflected in D4.

The claimed method lacked an inventive step starting from D5 as the closest prior art. The skilled person

would have combined the teaching of D1 with D5, bearing in mind the common general knowledge on the gelling of silicate solutions by acidification as reflected in D4.

V. The patent proprietor's (respondent's) arguments are reflected in the reasons for the decision.

VI. The opponent (appellant) requested that the decision under appeal be set aside and the patent be revoked.

The patent proprietor (respondent) requested that the appeal be dismissed (main request), alternatively that the patent be maintained on the basis of one of auxiliary requests 1-7 resubmitted with the reply to the appeal.

Reasons for the Decision

Main request (patent as granted)

1. Sufficiency of disclosure, Article 100(b) EPC

1.1 The appellant's objection concerns the alternative in which inorganic polyvalent ions such as Ca^{2+} are used as the insolubilising agent. According to the appellant, these led to the formation of insoluble forms of silicate. It was thus not possible to measure an amount of e.g. $CaCl_2$ that is at least 10 wt% lower than the amount needed to reach the gelling point. In support of their argument, the appellant relied on D4 (commercial brochure).

1.2 It is established case law that a successful objection of lack of sufficiency of disclosure presupposes that there are serious doubts, substantiated by verifiable

facts; in opposition proceedings, the burden of proof is initially on the opponent (Case Law of the Boards of Appeal of the EPO, 10th edition, 2022, II.C.9).

The patent in suit includes an example in which 0.3 wt% $CaCl_2$ is used as the insolubilising agent (Example 1, Formulation 2). This example involves a higher curing temperature (190°C) than the one specified in the claim. Nevertheless, in line with the opposition division's view, the temperature of the subsequent curing step is irrelevant to whether the exemplified solution meets the other requirements of the claim, in particular, the $CaCl_2$ concentration.

The appellant did not attempt to rework the indicated example. There is no proof that the $CaCl_2$ amount would not be "*at least 10 wt% lower than the amount needed to reach the gelling point*", i.e. that gelling would occur if this amount were increased accordingly. It is not seen why the skilled person should be unable to verify this experimentally.

D4 (page 7, left-hand column, second paragraph) generally mentions precipitation reactions of solutions of sodium silicate with dissolved polyvalent cations such as Ca^{2+} to form insoluble forms of silicate for use as pigments, extenders, fillers, etc. This general disclosure in D4 cannot be regarded as evidence that it would not be possible to rework Example 1, Formulation 2 of the patent in suit, which has an entirely different purpose and involves a rather low $CaCl_2$ concentration. Furthermore, the precise nature of the "*insoluble forms of silicate*" is not specified in D4. It does not follow from this disclosure in D4 that there cannot be any gel formation as soon as (low concentrations of) Ca^{2+} ions are present.

1.3 The objection of insufficient disclosure is therefore not convincing.

2. Inventive step

2.1 The appellant held that the subject-matter of claim 1 lacked inventive step in view of D5 as the closest prior art.

According to the appellant, D5 taught the same functionalities of the silicate coating as the patent in suit and also provided resistance to leaching. Samples A14-A17 and B14-B17 in D5 were particularly relevant because they involved acid treatment of the impregnated silicates in combination with subsequent curing at 90°C and led to the best results.

2.2 The patent in suit relates to a method for treating wood using a wood preservative (paragraphs [0001], [0007]).

D5 relates to the same general purpose (first page, abstract/aim of the paper). In line with the appellant's view, D5 is therefore a suitable starting point for assessing inventive step.

2.3 The board also agrees with the appellant that the silicate coating of D5 provides the same functionalities as the one in the patent in suit.

The method known from D5, in particular when it involves the treatment with a catalyst and curing (see especially samples B14-B17 in Table 1), already results in the formation of polymeric silicates having low

water-dissolution rates and provides the wooden material with fire resistance (page 4, left-hand column; see also section 5.1). It may therefore be expected that the treated wood, as an inherent property, also has some rot resistance, in line with the teaching of the patent in suit that rot resistance derives from the water resistance of the insolubilised alkali metal silicate (paragraph [0037]). There is no evidence that the claimed method would inevitably result in improved properties of the treated wood, compared with D5.

2.4 It was acknowledged by the appellant that D5 did not disclose the presence of an insolubilising agent in the silicate solution (statement of grounds of appeal, point 6). Instead, D5 teaches impregnating the wood with alkali metal silicate in a first step and then treating the impregnated wood with a catalyst solution (10% alcoholic solution of dibutyl amine phosphate) in a separate step (page 2, left-hand column, third and fourth paragraphs; fourth series).

2.5 The technical problem is thus to be seen as providing a simpler method while still avoiding the problem of leaching, as argued by the appellant (statement of grounds of appeal, point 7; see also paragraphs [0009] and [0033] of the patent in suit).

2.6 As the solution to this problem, the claimed method is proposed in which the alkali metal silicate solution comprises an insolubilising agent selected from an organic acid, an inorganic acid or an inorganic polyvalent ion selected from Al^{3+}, Mg^{2+}, Fe^{2+}, Fe^{3+}, Ca^{2+} and Ba^{2+} added in an amount which is at least 10 wt% lower than the amount needed for the formulation to reach the gelling point.

2.7 It is accepted that the above-mentioned technical problem (point 2.5) is solved having regard to the experimental section and the figures of the patent in suit and considering that fewer steps are needed.

2.8 The appellant was of the opinion that the proposed solution was obvious in view of D1. The skilled person would turn to D1 because it was directed to the same purpose to improve the flame-retardant properties of wood by treatment with a silicate solution. It was known from D1 that the acid could be contained in the silicate solution. D1 disclosed an alkali metal silicate solution acidified to the incipient gelling condition to a degree causing gelling after penetrating the wood.

Further according to the appellant, the skilled person would attribute the presence of separate steps in D5, being a scientific paper, to the aim of studying each step individually, and would simplify the method to apply it in an industrial context, as known from D1.

The appellant submitted that it was common general knowledge that any acid could be used to induce gelling of a silicate solution. This was clear from D4, which referred to reactions with acids without even specifying the acid, meaning that any acid could be used (page 6, left-hand column, bottom paragraph), and even mentioned reactions with acid-forming products (page 7, first paragraph). This was also clear from D1, which taught that many acids were available and that even fruit juices could be used (column 1, line 2 to column 2, line 2). It was thus irrelevant that D5 described using an alcoholic solution of dibutyl amine phosphate which hydrolysed slowly to liberate

phosphoric acid in contact with the alkaline solution (D5, page 2, left-hand column, third paragraph). The skilled person would understand on the basis of their common general knowledge that what was relevant was that it lowered the pH of the silicate solution and that any acid could alternatively be used.

The appellant concluded that it would have been obvious for the skilled person to replace the two-step method known from D5 with a single-step method as known from D1 while retaining the curing step of D5.

2.9 The appellant's arguments cannot be accepted.

There is no indication that the application of the catalyst in a separate step in D5, subsequent to the impregnation with the silicate solution, was merely for being able to study it separately. It also has the consequence that the gelling of the silicate solution is only induced subsequently to the impregnation step, the impregnation step allowing the solution to penetrate into the pores of the wood.

Group B in D5, i.e. the samples exposed to ageing in a humidity and temperature controlled chamber to verify leaching, is particularly relevant in view of the problem posed. In this group, the second series samples (subsequent heating for 24 hours at 90°C in a forced draft oven) slightly improved the performance of those of the first series (impregnation with sodium silicate or potassium silicate solution and drying; Samples B6-B9)(see page 2, right-hand column, second paragraph). However, the treatment at 90°C for 24 hours was insufficient to drive the silicates to insolubility (page 4, left-hand column, second paragraph). In D5, it was found that the catalyst led to the formation of

insoluble polymeric silicates and that the best behaviour was obtained in the fourth series samples (B14-B17; catalyst application followed by 90°C heat treatment) (page 4, left-hand column, subsequent paragraphs). In light of this teaching in D5, the skilled person would understand that the catalyst application step is key to forming the desired insoluble polymeric silicates. The skilled person aiming to provide a simpler method involving less treatment steps *while avoiding the problem of silicate leaching* would thus not have omitted the catalyst application step.

Moreover, the catalyst application step in D5 is a very specific way of inducing gelling of the silicate solution, namely the application of an alcoholic solution of dibutyl amine phosphate which hydrolyses slowly to liberate phosphoric acid in contact with the alkaline solution (D5, page 2, left-hand column, third paragraph). While the skilled person would readily understand that the phosphoric acid acts to lower the pH of the silicate solution to induce gelling, they would not conclude from this that the choice of dibutyl amine phosphate in D5 was arbitrary and that any acid could alternatively be used, let alone that an acid could directly be added to the alkali metal silicate solution. By contrast, the explanation in D5 that dibutyl amine phosphate *hydrolyses slowly* to liberate phosphoric acid shows that it has been purposively chosen for this property, which would not be obtained if an acid were added directly to the silicate solution.

2.10 D1 teaches an entirely different method in which wood is treated with a sodium silicate solution which comprises mineral water and which is acidified to an

"*incipient jelling condition*" (column 1, lines 29-32). This solution will gel upon impregnation in the wood due to the acids inherently present in the wood, although evaporation may play its part (column 3, lines 30-35). In D1, there is no need for, nor mention of, any measure to drive the polymerisation of the silicate once the silicate solution has been applied to the wood.

There is nothing in D1 to suggest that the acidification of the silicate solution to the incipient gelling condition could be equivalent to or exchangeable with the catalyst application step in D5.

Furthermore, D1 is silent as to a curing step.

2.11 In light of the above, the skilled person starting from D5 as the closest prior art and faced with the problem to provide a simpler method involving less treatment steps while avoiding the problem of silicate leaching would not have been prompted to omit the catalyst application step in D5 and to instead replace the alkali metal silicate solution of D5 with the alkali metal silicate solution containing citric acid known from D1, adjusted to an amount which is at least 10 wt% lower than the amount needed for the solution to reach the gelling point, while retaining the curing step taught in D5.

2.12 The objection of lack of inventive step is therefore not convincing.

2.13 Claims 2-20 directly or indirectly depend on claim 1 so that the same conclusion applies.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated