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D E C I S I O N
of 30 May 2000

Case Number: T 0781/97 - 3.3.5

Application Number: 92902508.8

Publication Number: 0558675

IPC: C04B 35/66

Language of the proceedings: EN

Title of invention:
Heat activated repair agent

Patentee:
MINTEQ INTERNATIONAL INC.

Opponent:
RHI AG

Headword:
Repair agent/MINTEQ

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes"
"Non-obvious solution of a technical problem - ground of
insufficiency raised for first time in appeal proceedings
against amended claims - not pertinent"

Decisions cited:
G 0009/91, G 0010/91

Catchword:
-



Case Number: T 0781/97 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 30 May 2000

Appellant: MINTEQ INTERNATIONAL INC.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 12 May 1997
revoking European patent No. 0 558 675 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: R. K. Spangenberg
Members: G. J. Wassenaar
M. B. Günzel

Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division to revoke European patent No. 0 558 675, which was granted in response to European patent application No. 92 902 508.8. The opposition grounds were lack of novelty and lack of inventive step.

II. The decision under appeal was based on claims 1 to 20 as granted as main request and two amended sets of claims as auxiliary requests 1 and 2. It was held that the subject-matter of claim 1 as granted lacked novelty over

D1: US-A-2 499 729.

The auxiliary requests were rejected on the ground that they contained claims which were not based on the application as originally filed (Article 123(2) EPC).

III. In the statement of the grounds of appeal, the appellant (proprietor) maintained that the product of claim 1 as granted was new and not obvious in view of D1. During oral proceedings, which were held on 30 May 2000, the appellant filed a new main request and an auxiliary request. Claim 1 of the main request read as follows:

"A dry refractory composition for the coating and repair of an interior refractory lining of a furnace and the like, comprising a MgO or MgO equivalent containing refractory aggregate and 15-50 wt% of the total composition of a hydrated material containing chemically bound water in crystalline form, said hydrated material being present in a sufficient amount,

with respect to the amount of bound water contained therein, to provide moisture to said composition to cause self-flowability thereof when said composition is applied to a surface in a furnace and the like, upon which a new refractory lining is to be coated or an existing damaged refractory lining is to be repaired, with said furnace being maintained at an elevated temperature sufficient to cause thermal activation of said refractory composition, whereby release and liquefaction of said chemically bound water from said hydrated material occurs such that said composition becomes self-flowable and is capable of flowing from a place on said surface to which it was initially applied to another proximal place on said surface where it completely coats said surface with a new refractory lining, or fills-in defects and effects the repair of an existing refractory lining, said composition containing from 0.1 to 10 wt% of the composition of calcium carbonate and from 0.1 to 5 wt% of the composition of a compound selected from the group consisting of phosphate glass both untreated and treated with a compound selected from the group consisting of phosphoric acid and a hydrophobic agent."

The appellant's arguments with respect to inventive step can be summarized as follows.

The cited prior art document did not disclose a dry refractory composition which on heating became self-flowable in the sense that it formed a slurry which could flow over the heated surface to a place different from the place of deposition. The claimed composition had as main advantage that a refractory lining could be more easily repaired because it was no longer necessary to bring the composition exactly into the defects by

hand or with a manually controlled gunning apparatus. A composition having the claimed properties and providing significant improvement in furnace maintenance was nowhere foreshadowed in the art.

- IV. The respondent (opponent) contested the appellant's arguments and maintained that the composition according to claim 1 of the main request lacked an inventive step over D1 in combination with common general knowledge in the art. The latter was supported by two textbook citations (Schulle "Feurfeste Werkstoffe", pages 330, 373, 374 and 377; Harders und Kienow "Feuerfestkunde" (1960), page 714). The respondent's arguments can be summarized as follows:

D1 disclosed refractory repair compositions which, apart from the presence of phosphate, were identical to the compositions as now claimed. Since the self-flowable property of the claimed composition was not due to the presence of the phosphate glass, the compositions of D1 also had this property. The use of phosphates as binding agent was well known in the art so that the addition thereof in small amounts as now claimed was obvious to a skilled person. That the prior art compositions had the same properties followed also from the fact that they could be applied with the same means such as a shovel. If the compositions of D1 were not self-flowable, the invention was not sufficiently disclosed because it was not clear what selections should be made in order to obtain the required property; the claimed composition comprised millions of possible combinations.

- V. The appellant requested that the decision under appeal be set aside and that the patent be maintained with the

claims of the main request filed at the oral proceedings. As auxiliary request the appellant requested that the patent be maintained with the claims of the auxiliary request filed at the oral proceedings.

The respondent requested that the appeal be dismissed.

Reasons for the Decision

Main request

1. It is undisputed that the composition according to claim 1 is new. It remains to be decided whether the provision of the claimed composition involves an inventive step.

2. It is also undisputed that D1 is the closest prior art document. It discloses dry refractory compositions for use in foundry for lining moulds and furnace walls, consisting of a powdered mixture of 42 to 85% by weight of a comminuted dry refractory substance of a specified group of materials and 15 to 58% of sodium silicate nonahydrate (claim 1). These compositions are used to repair the lining of a furnace, whereby the composition is deposited by means of a shovel or a trowel and preferably rammed. The repair takes place automatically by the action of the heat stored in the wall. The product can also be projected by means of a compressed air tool or gun into fissures or erosions. When the temperature reaches the melting point of the hydrate an aqueous solution of sodium silicate is formed, which imparts to the mass the desired degree of moisture. The solution is uniformly distributed in the dry products in such an amount that it impregnates the whole mass,

without excess, whereby setting takes place gradually, starting from the hot part; thus are avoided the difficulties connected with the application of a water-tempered product, caused by the formation of steam which becomes interposed between the hot wall and the product and produces swellings and blisters (column 2, line 3 to column 3, line 2 and column 4, lines 10 to 37).

3. In agreement with the patent in suit, the problem underlying the invention can be seen in providing a refractory lining composition forming a durable lining after setting which can be more easily applied so that productivity can be improved (page 3, lines 7 to 10 of the description). According to the patent in suit this problem is solved by a composition according to claim 1 which becomes self-flowable when applied to the hot furnace wall. According to example 2 of the patent in suit 1 metric ton of a refractory composition according to present claim 1 was deposited by crane in a furnace maintained at a temperature of 800°C to coat and fill-in the damaged surface area in the furnace. The repair material became self-flowable and was directed to the damaged areas by tilting the furnace so that the refractory material flowed to fill-in the eroded and damaged areas. According to example 3 the durability of the so repaired furnace lining was substantially better than furnace lining repaired with conventional self-flowing repair compositions comprising a pitch binder or a thermosetting resin binder. These results were not contested. The Board is therefore satisfied that compositions according to present claim 1 actually solve the above-mentioned problem. It remains to be decided whether the claimed solution is obvious to a person skilled in the art.

4. In the Board's opinion D1 does not contain any suggestion to provide a composition with self-flowable properties. On the contrary, the indication that the solution set free impregnates the whole mass, without excess in order to avoid the formation of steam (column 2, line 48 to column 3, line 2) is in the Board's view a clear indication that a self-flowable mixture was not envisaged in D1.

5. The respondent's argument that since the compositions of D1 are essentially the same as those of present claim 1 the known compositions are also self-flowable, cannot be accepted. The Board agrees that D1 discloses magnesia mixed with sodium metasilicate nonahydrate (column 3, lines 57 to 65). Although refractory aggregate may be present, D1 is essentially concerned with powdered mixtures, (claim 1 and the examples). There is no specific disclosure of the use of magnesia aggregate and certainly not in combination with 15 to 50 wt% of the total composition of hydrated material. The respondent's argument that since according to the patent in suit 15 wt% of hydrated material can be sufficient to provide self-flowability, an amount of 58 wt%, as mentioned in claim 1 and example 5 of D1, certainly provides self-flowability, cannot be accepted either. The property of self-flowability is very much dependent upon the surface properties and the particle size of the refractory material. Small and porous particles absorb much more water than coarse solid particles. Thus from the amount of hydrated material alone it cannot be derived whether a composition is self-flowable or not. Moreover, the appellant has demonstrated by comparative examples that the composition of example 5 of D1 is not self-flowable. Although the respondent questioned the results of the comparative examples, no counter-evidence was provided.

6. The further argument that, since in D1 and the patent in suit the same means, such as a shovel, are used to apply the repair composition the compositions must have the same properties, cannot be accepted either. In the patent in suit shovelling is mentioned as a means for depositing the refractory repair composition into a furnace to be repaired, whereby the furnace is tilted

to direct the flow of the refractory composition to the place to be coated (claims 18 and 19 as published). In this case the workman handling the shovel needs not to enter the furnace. In the method according to D1 the refractory repair composition is deposited with a shovel directly at the repair spot (column 4, lines 15 to 20). From Figure 1 and its description in D1 it is clear that the repair composition does not flow to another proximal place. Thus the fact that both in D1 and the patent in suit a shovel can be used to bring the repair composition into the furnace does not imply that the properties of the composition under the influence of heat are the same.

7. It follows from the above that D1 does not disclose or suggest the functional feature of claim 1 that aggregate and hydrated material should be chosen so that the composition becomes self-flowable by the heat of the furnace wall. In the absence of any other relevant prior art document the solution of the above-mentioned problem comprising said functional feature according to claim 1 was therefore not obvious to a person skilled in the art. The two textbook citations disclose that phosphates are known as binding agents for refractory ceramic compositions and that magnesite comprises small amounts of calcium oxide. These facts are undisputed but do not affect the inventive step argumentation. For the matter of inventive step it is irrelevant whether or not magnesia always contains calcium carbonate at its surface, as alleged by the respondent, or whether it was obvious to add phosphate glass to the compositions disclosed in D1.

8. The respondent's argument that, if the compositions according to present amended claim 1 were considered as

a selection from the compositions disclosed in D1, the patent in suit did not provide sufficient information how to select the suitable ones from the almost unlimited combinations of aggregates and hydrated materials, is also not convincing. In view of the Enlarged Board of Appeal decisions G 9/91 and G 10/91 (OJ EPO 1993, 408 and 420; see in particular points 18 and 19 of the reasons) it could be questioned whether this ground of insufficiency, which was not put forward in the notice of opposition and which could arguably already have been raised against claim 1 as granted, could be considered by the Board without the consent of the appellant. In the present case this may, however, remain undecided because the Board sees no reason why the skilled person would have any problems to select the proper compositions. The patent in suit contains two basic compositions for guidance and the skilled person, being aware of the relationship between particle size and water absorption, knows that the particle size of the main component in the composition must not be very small. Moreover, the functional feature of self-flowability can be easily determined by routine experimentation.

9. Claims 2 to 11 are dependent on claim 1. Process claim 12 and dependent claim 13 are limited to the use of the refractory composition according to claims 1 to 11. The subject matter of claims 2 to 13 thus involves an inventive step for the same reasons as given above for claim 1. Process claim 14 is drafted independently from claim 1 but contains the above-mentioned functional limitation together with further limitations which are not disclosed in D1. The reasons for acknowledging an inventive step for the subject-matter of claim 1 given above, therefore, equally apply to

claim 14 and dependent claims 15 and 16. The respondent has not provided additional arguments with respect to the said process claims. Therefore the main request is allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Opposition Division with the order to maintain the patent with claims 1 to 16 of the main request filed at the oral proceedings and a description to be adapted.

The Registrar:

The Chairman:

S. Hue

R. Spangenberg