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Datasheet for the decision of 22 September 2015

Case Number: T 0745/13 - 3.3.09

Application Number: 01101070.9

Publication Number: 1118633

IPC: C08J3/12

Language of the proceedings: EN

Title of invention:
Process for storing a particulate water-absorbent resin

Patent Proprietor:
NIPPON SHOKUBAI CO., LTD.

Opponent:
BASF SE

Headword:

Relevant legal provisions:
EPC Art. 56, 114(2)
EPC R. 99(2), 101(1)

Keyword:
Appeal: admissible
Late-filed documents: inadmissible (not prima facie relevant)
Inventive step: no (none of the requests)

Decisions cited:
T 1291/08, T 0719/05

Catchword:

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Case Number: T 0745/13 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 22 September 2015

Appellant: (Opponent)	BASF SE 67056 Ludwigshafen (DE)
Respondent: (Patent Proprietor)	NIPPON SHOKUBAI CO., LTD. 1-1, Koraibashi 4-chome Chuo-ku Osaka-shi, Osaka 541-0043 (JP)
Representative:	Schlauch, Michael Henkel, Breuer & Partner Patentanwälte Maximiliansplatz 21 80333 München (DE)
Decision under appeal:	**Decision of the Opposition Division posted on 21 November 2012 rejecting the opposition filed against European patent No. 1118633 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	W. Ehrenreich
Members:	N. Perakis
	D. Prietzel-Funk

Summary of Facts and Submissions

I. This is a decision on the second appeal concerning European patent No. 1 118 633. In the first appeal, this board, in a different composition, decided that the subject-matter of the claims as granted did not extend beyond the content of the application as filed, and remitted the case to the opposition division for further prosecution (see T 1291/08 of 8 November 2011). The second appeal was filed by the opponent, BASF AG (now BASF SE), against the decision of the opposition division, announced orally at the oral proceedings of 31 October 2012 and issued in writing on 21 November 2012, to reject the opposition. Claim 1 as granted reads a follows:

"1. A process for storing a particulate free-flowing surface-crosslinked water-absorbent resin, which comprises a step of storing a particulate water-absorbent resin obtained by pulverizing a dry water-absorbent resin product,
wherein the particulate water-absorbent resin has an absorption capacity under load of not less than 18 g/g, with the process being characterised by carrying out all of the following features:
(1) heating at least one portion of a surface getting contact with the particulate water-absorbent resin from the outside,
(2) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin at 40 to 90°C, and
(3) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin above a temperature that is lower

than the temperature of the particulate water-absorbent resin by 20°C,
when storing the particulate water-absorbent resin."

II. The documents filed by the opponent included the following:

D1: Modern Superabsorbent Polymer Technology, F.L.Buchholz and A.T. Graham, Wiley-VCH, 1997, ISBN 0-471-19411-5, pages 97-103;
D2: EP 0 855 232 A2;
D3: EP 0 480 031;
D4: Edana, Particle size distribution 420.0-02, 2002, pages 285-289;
D5: Staatsanzeiger für das Land Hessen, 24 February 1992, ISSN.0724-7885, pages 501-502;
D6: Extract from a permission request of the company Cassella AG, dated 30 October 1991;
D7: Ullmanns Enzyklopädie der technischen Chemie, 4th edition, Volume 22, 1982, pages 65, 108, 109, 155 and 159;
D8: Extract from Internet http://www.google.de/search?hl=de&q=Kesselblech+HII&btnG=Suche&meta=

III. According to the opposition division:

- Late-filed documents D3, D4 and D6 (submitted with letter of 9 February 2009) were not *prima facie* relevant and thus were not admitted into the proceedings.

- The subject-matter of claim 1 involved an inventive step:
  - starting from D1 as closest prior-art document, which was silent regarding a method of storing a particulate water-absorbent resin;

- considering as technical problem the provision of a process for storing particulate water-absorbent resin which generated less agglomerated material during storing;
- in view of the disclosure of D2, which did not relate to the storage of resin particles but to the classification of such particles and thus did not contain any pointer to the storage of surface-crosslinked water-absorbent resins; and
- in view of the difference between an open system in motion (classifier) according to D2 and a closed system in a static state (storage tank) according to the patent.

The opposition division was not convinced by the opponent, who had argued that the formation and transport of moisture within the resin as well as the consequences of the moisture regarding clumping were not different in classification and storing, and that the problem of clumping due to condensed moisture occurred in any process step during the manufacture of water-absorbent resins, with the consequence that the skilled person would take the solution suggested in D2 into consideration if he wanted to prevent clumping during other process steps such as storing.

IV. On 26 January 2013 the opponent (in the following the appellant) filed an appeal against the decision of the opposition division and paid the appeal fee. The statement setting out the grounds of appeal was filed on 20 March 2013. The appellant requested that the decision of the opposition division be set aside and that the patent be revoked in its entirety.

V. By letter dated 30 August 2013 the patent proprietor (in the following the respondent) filed observations on

the appeal. The respondent requested that the appeal either be considered inadmissible or be dismissed. Alternatively, it requested that the patent be maintained on the basis of one of auxiliary requests 1 to 7, already filed before the opposition division with letter of 27 September 2012.

VI. On 15 June 2015 the board issued a communication in preparation for the oral proceedings.

VII. The respondent filed auxiliary request 8 with a letter dated 3 August 2015.

VIII. On 22 September 2015 oral proceedings were held before the board.

IX. Claim 1 of the respondent's auxiliary requests each reads as follows (the board has highlighted the distinguishing features over the main request):

Auxiliary request 1

"1. A process for storing a particulate free-flowing surface-crosslinked water-absorbent resin, which comprises a step of storing **in a storage tank** a particulate water-absorbent resin obtained by pulverizing a dry water-absorbent resin product, wherein the particulate water-absorbent resin has an absorption capacity under load of not less than 18 g/g, with the process being characterised by carrying out all of the following features:
(1) heating at least one portion of a surface getting contact with the particulate water-absorbent resin from the outside,

(2) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin at 40 to 90°C, and
(3) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin above a temperature that is lower than the temperature of the particulate water-absorbent resin by 20°C,
when storing the particulate water-absorbent resin."

Auxiliary request 2

"1. A process for storing a particulate free-flowing surface-crosslinked water-absorbent resin, which comprises a step of storing **in a storage tank in a heated and thermally insulated state** a particulate water-absorbent resin obtained by pulverizing a dry water-absorbent resin product,
wherein the particulate water-absorbent resin has an absorption capacity under load of not less than 18 g/g,
with the process being characterised by carrying out all of the following features:
(1) heating at least one portion of a surface getting contact with the particulate water-absorbent resin from the outside,
(2) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin at 40 to 90°C, and
(3) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin above a temperature that is lower than the temperature of the particulate water-absorbent resin by 20°C,
when storing the particulate water-absorbent resin."

Auxiliary request 3

"1. A process for storing a particulate free-flowing surface-crosslinked water-absorbent resin, which comprises a step of storing **in a storage tank in a heated and thermally insulated state** a particulate water-absorbent resin obtained by pulverizing a dry water-absorbent resin product,
wherein the particulate water-absorbent resin has an absorption capacity under load of not less than 18 g/g,
wherein the dry water-absorbent resin product is a dry product obtained by drying at 160 to 250°C
with the process being characterised by carrying out all of the following features:
(1) heating at least one portion of a surface getting contact with the particulate water-absorbent resin from the outside,
(2) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin at 40 to 90°C, and
(3) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin above a temperature that is lower than the temperature of the particulate water-absorbent resin by 20°C,
when storing the particulate water-absorbent resin."

Auxiliary request 4

"1. A process for storing a particulate free-flowing surface-crosslinked water-absorbent resin, which comprises a step of storing **in a storage tank having an internal surface made of metal in a heated and thermally insulated state** a particulate water-absorbent

resin obtained by pulverizing a dry water-absorbent resin product,
wherein the particulate water-absorbent resin has an absorption capacity under load of not less than 18 g/g,
wherein the dry water-absorbent resin product is a dry product obtained by drying at 160 to 250°C
with the process being characterised by carrying out all of the following features:
(1) heating at least one portion of a surface getting contact with the particulate water-absorbent resin from the outside,
(2) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin at 40 to 90°C, and
(3) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin above a temperature that is lower than the temperature of the particulate water-absorbent resin by 20°C,
when storing the particulate water-absorbent resin."

Auxiliary request 5

"1. A process for storing a particulate free-flowing surface-crosslinked water-absorbent resin, which comprises a step of storing **in a storage tank having an internal surface made of metal in a heated and thermally insulated state** a particulate water-absorbent resin obtained by pulverizing a dry water-absorbent resin product,
wherein the particulate water-absorbent resin has an absorption capacity under load of not less than 18 g/g,
wherein the dry water-absorbent resin product is a dry product obtained by drying at 160 to 250°C
with the process being characterised by carrying out all of the following features:

(1) heating at least one portion of a surface getting contact with the particulate water-absorbent resin from the outside,
(2) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin at **50 to 80°C**, and
(3) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin above a temperature that is lower than the temperature of the particulate water-absorbent resin by **10°C**,
when storing the particulate water-absorbent resin, **which has a temperature of 50 to 80°C**."

Auxiliary request 6

"1. A process for storing a particulate free-flowing surface-crosslinked water-absorbent resin, which comprises a step of storing **in a storage tank having an internal surface made of metal in a heated and thermally insulated state** a particulate water-absorbent resin obtained by pulverizing a dry water-absorbent resin product,
wherein the particulate water-absorbent resin has an absorption capacity under load of not less than **21 g/g, under a load of 4.9 kPa,**
wherein the dry water-absorbent resin product is a dry product obtained by drying at 160 to 250°C
with the process being characterised by carrying out all of the following features:
(1) heating at least one portion of a surface getting contact with the particulate water-absorbent resin from the outside,
(2) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin at **50 to 80°C**, and

(3) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin above a temperature that is lower than the temperature of the particulate water-absorbent resin by **10°C**,
when storing the particulate water-absorbent resin, **which has a temperature of 50 to 80°C .**"

Auxiliary request 7

"1. A process for storing a particulate free-flowing surface-crosslinked water-absorbent resin, which comprises a step of storing **in a storage tank having an internal surface made of metal in a heated and thermally insulated state** a particulate water-absorbent resin obtained by pulverizing a dry water-absorbent resin product,
wherein the particulate water-absorbent resin has an absorption capacity under load of not less than 18 g/g **and wherein the surface-crosslinked particulate water-absorbent resin contains at least a polyhydric alcohol, wherein the dry water-absorbent resin product is a dry product obtained by drying at 160 to 250°C**
with the process being characterised by carrying out all of the following features:
(1) heating at least one portion of a surface getting contact with the particulate water-absorbent resin from the outside,
(2) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin at **50 to 80°C**, and
(3) maintaining the temperature of at least one portion of a surface getting contact with the particulate water-absorbent resin above a temperature that is lower than the temperature of the particulate water-absorbent resin by **10°C**,

when storing the particulate water-absorbent resin, **which has a temperature of 50 to 80°C .**"

Auxiliary request 8

"1. A process for storing a particulate free-flowing surface-crosslinked water-absorbent resin, which comprises a step of storing **in a storage tank in a heated and thermally insulated state** a particulate water-absorbent resin obtained by pulverizing a dry water-absorbent resin product **dried at 160 to 250°C**, wherein
(a) the particulate water-absorbent resin has a water content of 3 to 15 %, a particulate size of not greater than 850 µm, and an absorption capacity of not less than 21 g/g under a load of 4.9 kPa, and
(b) the storage tank is a silo or a hopper, and comprises means for heating its internal surface from the outside, said internal surface being made of metal,
with the process being characterised by carrying out all of the following features:
(1) heating at least one portion of **a storage tank's internal surface** getting contact with the particulate water-absorbent resin from the outside,
(2) maintaining the temperature of at least one portion of **the storage tank's internal surface** a surface getting contact with the particulate water-absorbent resin at **50 to 80°C**, and
(3) maintaining the temperature of at least one portion of **the storage tank's internal surface** getting contact with the particulate water-absorbent resin above a temperature that is lower than the temperature of the particulate water-absorbent resin by **10°C**,
when storing the particulate water-absorbent resin, **which has a temperature of 50 to 80°C .**"

X. The arguments put forward by the appellant in its written submissions and during the oral proceedings may be summarised as follows:

Main request

- The subject-matter of claim 1 of the patent as granted did not involve an inventive step. D2 could be considered as the closest prior-art document. Claim 1 was novel over D2 on the basis of the surface-crosslinking step, which provided a water-absorbent resin with an absorption capacity under load of not less than 18 g/g, and the storing step under specific heating conditions. However, surface-crosslinking was known to improve the absorption under load (D1, page 97), and therefore its use in the claimed process was obvious to the skilled person. The storing step was a normal one when manufacturing water-absorbent resin at an industrial scale and thus obvious to apply to surface-crosslinked resin particles. Regarding the thermal conditions during storage, they solved the problem of resin-particle agglomeration. These conditions were disclosed in D2 as a way to avoid agglomeration in a sieving/classifying device. The skilled person aiming to prevent particle agglomeration in a storing device would obviously use the thermal conditions of D2. In both cases the agglomeration was due to the water content of the particles.

- The argument of the respondent that storing and sieving/classifying was not comparable because the resin particles had a different water content was not correct, firstly because claim 1 did not

define any water content and secondly because dependent claim 2 required a water content identical to the water content disclosed in paragraph [0010] for the dried hydrogel, namely 3-15 wt%.

- Nor did the temperature used in surface-crosslinking, namely 195°C, guarantee a reduced water content; that temperature was necessary only to remove the solvent used in the cross-linking.

- Despite the fact that, depending on the charge size and the storing device dimensions, compacting of the resin particles could occur, such compacting would not necessarily take place in the process of claim 1, as claim 1 did not contain any requirement regarding the charge size and the storing device dimensions. Even if compacting occurred, the skilled person would be aware that at the side-walls of the storing device, where the resin particles contacted these side-walls, a temperature gradient was formed which led to water condensation and to particle agglomeration. The skilled person would also in this case have applied the thermal measures disclosed in D2 with a reasonable expectation of success.

Auxiliary requests 1 and 2

- Claim 1 of auxiliary requests 1 and 2 also did not involve an inventive step, since the additional feature of storing in a storage tank and doing so in a heated and thermally insulated state, respectively, did not provide any additional technical effect.

Auxiliary request 3

- Claim 1 of this request, which additionally defined the intermediate dry water-absorbent resin product as a product-by-process (obtained by drying at 160 to 250°C) did not provide any technical effect. Thus this claim also lacked inventive step.

Auxiliary request 4

- Claim 1 of this request additionally required that the storage tank had an internal surface made of metal. Metal tanks were known from D5 to D8, which should be admitted into the proceedings, and the skilled person would use them for storing resin particles without having to exercise any inventive skill. It was obvious that the internal surface of the known metal tanks was made of metal, otherwise this would have been specified in the disclosure.

Auxiliary request 5

- Claim 1 of this request additionally required a narrower temperature range for storing the resin, a narrower temperature range for the storage tank surface in contact with the resin, and a smaller temperature difference between the resin and the contacting surface of the storing tank. This was either disclosed in or obvious from D2. Consequently, claim 1 of this request lacked inventive step.

Auxiliary request 6

- Claim 1 of this request additionally required a higher absorption capacity under load, which was an obvious alternative in view of D1 (page 101, table 3.6). Thus, claim 1 of this request lacked inventive step.

Auxiliary request 7

- Claim 1 of this request additionally required that the surface-crosslinked resin contained at least a polyhydric alcohol. This was, however, disclosed in D1 (page 98, line 4) and represented an obvious alternative for the skilled person. Thus, claim 1 of this request lacked inventive step.

Auxiliary request 8

- Claim 1 of this request additionally required that the storage tank was a silo or a hopper. However, silos and hoppers were common storage tanks and their use did not involve an inventive step. Thus also this claim lacked inventive step.

XI. The arguments put forward by the respondent in its written submissions and during the oral proceedings may be summarised as follows:

- The appeal was not admissible because the notice of appeal and the statement setting out the grounds of appeal did not indicate the reasons for setting aside the impugned decision, and the facts and evidence on which the appeal was based. Specifically, the appellant neither referred to the decision of the opposition division nor

provided any reasons why the decision was wrong in law and fact.

Main request

- The subject-matter of claim 1 as granted involved an inventive step. It differed from the disclosure of D2 in that the classified resin particles were surface-crosslinked and then stored under specific thermal conditions. The skilled person aiming at preventing the resin particles from agglomerating would not find any motivation in the art to apply the thermal conditions of a sieving device to a storage device. The status of the particles was different in each of these devices (falling *vs* static), and the origin of the agglomeration was also different. During storing it was due partly to the rest of the solvent used in surface-crosslinking and partly to the compaction of the resin particles in the storage device. Regarding the water content of the resin particles, it was lower after surface-crosslinking in view of the high temperature used in this step (see patent, paragraph [0059]).

Auxiliary requests 1-3

- Claim 1 of each of these requests specified the storing device to be used in the process. The subject-matter of each of these claims involved an inventive step.

Auxiliary request 4

- Claim 1 of this request further required that the internal part of the storage tank was made of

metal. This was not disclosed in the prior art. D5 to D8, submitted late by the appellant, should not be admitted into the proceedings because they were *prima facie* not relevant. The claimed internal metal surface provided abrasiveness and electrification properties to the particulate water-absorbent resin (see patent, paragraph [0040]). As this was not obvious from the prior art, the subject-matter of claim 1 involved an inventive step.

Auxiliary request 5

- Claim 1 of this request additionally required more restricted temperature range for both the resin and the storage tank surface, and a more restricted difference between these two temperatures. D2 did not disclose the more restricted difference which rendered the process more economical. As this was not obvious in view of the prior art, claim 1 involved an inventive step.

Auxiliary requests 6-8

- Claim 1 of each of these requests further required a specific limitation, concerning either the absorption capacity under load of the resin particles or the inclusion of a polyhydric alcohol in the absorbent resin, or even a storage tank which was a silo or a hopper. These features were not obvious and each claim 1 involved an inventive step.

XII. The final requests of the parties were as follows:

The appellant requested that the decision under appeal be set aside and that the European patent be revoked.

The respondent requested that the appeal be rejected as inadmissible or dismissed as unallowable, or, alternatively, that the patent be maintained on the basis of the claims of auxiliary requests 1 to 7 submitted with the letter dated 30 August 2013 or on the basis of auxiliary request 8 submitted with the letter dated 3 August 2015. It also requested that documents D3 to D8 not be admitted into the appeal proceedings.

Reasons for the Decision

1. Admissibility of the appeal

The respondent contested the admissibility of the appeal since the reasons for it did not properly set out why the impugned decision was wrong.

However, in the notice of appeal and the statement setting out the grounds of appeal the appellant objected to the decision under appeal at least to the extent that the opposition decision did not admit documents D3, D4 and D6 into the opposition proceedings, and referred to decision T 719/05 which revoked European patent No. EP 0 855 232, corresponding to D2, namely a patent with a technical teaching identical to the patent at hand, in view of the same documents cited as D3 and D4 in the present case. The argument of the appellant in the grounds of appeal regarding inventive step relied mainly on D1 and D3, the latter not being admitted into the opposition proceedings.

The Board took the view that these arguments form if little but still sufficient reasons for the appeal to be regarded as substantiated and thus considered the appeal admissible.

2. Admissibility of late-filed documents

2.1 A decision on the admissibility of D3, D4 and D8 was redundant, because they were not relevant for the outcome of this decision.

2.2 D5-D7 were submitted in order to show that it was known to use storing containers with metal surfaces when processing water-absorbent resins. Thus these documents were *prima facie* relevant for the inventive step of auxiliary requests 4 to 8 relating to a storage tank having an internal surface made of metal, which had not been considered by the opposition division. Therefore they were admitted into the proceedings.

3. Main request

3.1 The invention

The claimed invention relates to a process for the storage of particulate free-flowing surface-crosslinked water-absorbent resins under conditions that prevent the particles' agglomeration. These resins find various uses, *inter alia* as absorbents for sanitary materials such as sanitary napkins and disposable diapers (description, paragraph [0001]). The resins are manufactured by polymerising monomers to provide a hydrogel polymer, which is dried to a water content of 3 to 15%, then pulverised/classified to a particle diameter of not greater than 1000µm, preferably not

greater than 850µm, and finally surface-crosslinked to achieve an absorption capacity under load of not less than 18 g/g (paragraphs [0010], [0019], [0020], [0025] and [0038]; examples 3 and 4).

3.2 Closest prior art

3.2.1 D2 is an earlier patent application of the respondent. It concerns the manufacture of particulate hydrophilic polymer resins to be used also as absorbing agents for sanitary materials such as sanitary napkins and disposable diapers (page 2, lines 9-12). These resins are manufactured by polymerising water-soluble monomers to provide a hydrogel which is afterwards dried, pulverised and classified in a sieving device. The resin particles have a diameter which is not greater than 850 µm (see page 3, lines 10-38; claim 4). The classification according to D2 is carried out in a sieving device which comprises:

- heating and/or thermally insulating means on its outside (see page 2, lines 52-58 and page 4, lines 22-33),
- so that the temperature of the device is in the range of 30-100°C, preferably 40-90°C, more preferably 50-80°C (see page 2, lines 56-58, and page 4, lines 2-3, 34-35 and 42), and
- the temperature of the sieving device is at or above a temperature that is lower than the temperature of the particulate resin by 20°C (see page 4, lines 3-4, 39-40; claim 3).

D2 discloses that this specific heating and/or insulating of the sieving device inhibits the formation of large cohered matters resulting from the adhesion of the resin particles to the internal sidewall of the

sieving device (page 3, lines 55-57; page 4, lines 4-11 and 43-45; page 5, lines 10-11 and 30-33). D2 has identified the cause of such cohered matter to be the water content of the resin particles (see page 2, lines 45-47).

Thus D2 is considered to represent the closest prior art. It discloses the formation of agglomerated resin particles when in contact with a device's inner surface and provides a solution to prevent it - despite the fact that it occurs in a device used for classification/sieving, which is different from the device of the claimed invention which is a storing device.

The patent in suit has also acknowledged the relevance of D2 by referring to it in paragraph [0007] and by including an example 3, which corresponds to the disclosure of D2.

3.2.2 The process of claim 1 of the the patent as granted is a further development of the process of D2 and concerns the storing of the resin particles of D2 which have also been subjected to a surface-crosslinking treatment after classification by sieving. Thus, the subject-matter of claim 1 differs from the disclosure of D2 at least in that:

- the resin particles are surface-crosslinked so that they have an absorption capacity under load of not less than 18 g/g (the load is not specified);

- the process comprises a storing step (the storing device is not specified); and

- the storing takes place under specific temperature conditions which are the following:

(1) heating at least one portion of a surface which is in contact with the particulate water-absorbent resin from the outside,

(2) maintaining the temperature of at least one portion of a surface which is in contact with the particulate water-absorbent resin at 40 to 90°C, and

(3) maintaining the temperature of at least one portion of a surface which is in contact with the particulate water-absorbent resin above a temperature that is lower than the temperature of the particulate water-absorbent resin by 20°C (it is clear that the surface mentioned is the surface of a storing container).

3.3 Technical problem

3.3.1 The technical problem underlying the present invention is seen in the provision of a process for storing a particulate free-flowing surface-crosslinked water-absorbent resin, which storing is stable and prevents the resin from contamination with cohered matters without deterioration of properties (see patent, paragraphs [0009] and [0047]).

3.3.2 There is no doubt that the problem is solved by the thermal conditions of claim 1. Technical evidence of the effect of these conditions is provided in the patent, in particular example 3 (relating to the storage of resin particles which were not surface-crosslinked) and example 6 (relating to the storage of

resin particles which were surface-crosslinked), according to which, when the particles were stored in a heated and thermally insulated hopper, no cohered matters were reported. On the contrary, comparative example 1 (relating to the storage of resin particles which were not surface-crosslinked) and comparative example 2 (relating to the storage of resin particles which were surface-crosslinked), according to which the particles were stored in a hopper which was neither heated nor insulated, showed that this set-up led to the formation of cohered matters. The occurrence of cohered matters is demonstrated by the sieving results for resin particles collected on a 14-mesh (1180 µm) sieve and on a 20-mesh (850 µm) sieve.

3.4 Obviousness

3.4.1 The issue of adjusting the absorption capacity under load of the resin particles of D2 is separate from that of their storing. The skilled person is aware that surface-crosslinking - which takes place after classification/sieving of the resin particles - adjusts the absorption capacity under load of the resin particles. Reference is made to D1 (see page 97, middle paragraph, figure 3.9; bridging paragraph of pages 97/98; page 101, table 3.6). D1 discloses that particle surface-crosslinking is carried out using as cross-linking agents glycidyl compounds and alkylene carbonates under application of heat. The disclosed absorption capacity ranges between 25-35 g/g under a load of 2.0 kPa and between 18-31 g/g under a load of 3.9 kPa, whereas it ranges between 12 and 26 g/g under a load of 6.2 kPa. Thus surface-crosslinking in order to increase the absorption capacity under load of the resin particles of D2 is obvious to the skilled person.

3.4.2 Furthermore, storing the resin particles of D2 is a common step in the manufacture of such resins on an industrial scale. This has been acknowledged by the respondent (see letter of 30 August 2013, page 5, third paragraph).

3.4.3 Thus, the issue of obviousness boils down to whether it was obvious to the skilled person to transfer the means which prevent particle agglomeration in a sieving device to a storage device. The board considers that this transfer was obvious for the following reasons:

- the particles' agglomeration has the same origin, namely a liquid within the particles, which condenses upon contact with the container side-walls (see below);

- the content of condensable water in the particles, responsible for the agglomeration, is not necessarily different at the storing step compared with the classification step, and

- the agglomeration is acknowledged to occur at the same place, namely on the internal surface of a device independently of its function as a sieving/ classifying or storage device (see patent paragraphs [0004] to [0006]; respondent's letter of 30 August 2013, third paragraph).

Anyway, the simple observation of particle agglomeration within the storing device would motivate the skilled person trying to alleviate this problem to use the thermal means disclosed by D2 (heating/ insulating of the device side-walls) with a reasonable expectation of success.

3.4.4 The parties disagreed regarding the origin of the cohered matter (agglomerated resin particles) during storage. The appellant considered that this was due to the water content in the resin particles which, when in contact with the cooler inner walls of a storage device, condensed and thus gave rise to adhered matters, whereas the respondent argued that this was due to the condensation on the critical inner surfaces of the storage device of the remaining volatile compounds used during the surface-crosslinking, such as low-molecular polyols (see respondent's letter of 30 August 2013, page 5, third paragraph). Though it is not excluded that residues of these volatile compounds could contribute to the formation of adhered matters, it is also not excluded that the water content of the resin particles could also contribute to it, since the patent specification (paragraphs [0010] and [0011]) discloses that the cause of adhered matters was the water content of the resin particles. Anyway, claim 1 neither specifies the water content of the surface cross-linked resin particles nor contains any process step leading to a reduction of the water content that would normally be expected to contribute to particle agglomeration. Furthermore, dependent claim 2 specifies that the particulate water-absorbent resin has a water content of 3 to 15 wt%, which is the same as the water content of the dried hydrogel polymer (see paragraph [0010]). Thus, despite the assertions of the respondent during the oral proceedings based on the temperature of 195°C, applied during the surface-crosslinking (see patent, paragraph [0059]), water can be added afterwards, e.g. during a re-moisturising step.

In view of the above, the adhered matters formed during storage are caused by the condensable liquid(s) (water

with or without volatile components) within the particulate resin to be stored.

3.4.5 The respondent contested the obviousness of the transfer of the heating/insulation means from sieving to storing in view of their fundamental differences.

According to the respondent, air from the environment can contact the resin during sieving, whereas this should be avoided during storing. However, the argument of the respondent is based on the humidity conditions during storing, which are not features of the claimed invention. Anyway, D1 discloses that in the tropical Pacific markets dehumidified air is not commonly available in diaper manufacturing plants (page 103, last paragraph). Thus this argument must fail.

The respondent also argued that in the storage device the resin particles were static whereas in the sieving device they were falling and had more chances to contact the side-walls of the device. This argument too must fail, because even under the static conditions of a storage device there is a temperature-gradient between the device inner surfaces and the resin particles in contact with them, which leads to liquid condensation. The argument of the respondent is based on quantitative considerations whereas qualitatively there is no difference between the static and falling states.

The respondent additionally argued that the skilled person would not apply the known heating/insulating measures, because he would consider that any observed agglomeration was due to the compaction under pressure of the resin particles in the storage device. However, compaction might occur under specific storing

conditions depending on the size of the charge and on the storing device dimensions, which features are absent from the claimed subject-matter. Anyway, even in the case of particle compaction, there still exists the temperature gradient at the contact surface of particles/device side-walls, leading to agglomerate formation to be solved in an obvious manner by the heating/insulating measures disclosed in D2.

Finally, contrary to the respondent's assertion, the skilled person would not hesitate to apply the claimed heating means on the basis of economic considerations as long as it still makes sound technical sense. Such considerations also did not prevent the authors of D2 from heating the classification/sieving device. Moreover, the skilled person when considering the financial aspect of the solution would not necessarily provide the entire device with heating means. As is shown in the patent specification (see figure 3), the electric heater (76) is applied only at the outlet of the storage tank, and thus with limited economic impact.

3.5 In view of the above, the subject-matter of claim 1 of the patent as granted lacks an inventive step and the main request is not allowable.

4. Auxiliary request 1

Claim 1 of auxiliary request 1 differs from claim 1 of the granted patent only in that storing takes place in a storage tank. This feature is common so that it would not justify to conclude on an inventive step. Thus also auxiliary request 1 is not allowable.

5. Auxiliary request 2

Claim 1 of auxiliary request 2 differs from claim 1 of auxiliary request 1 only in that the storage tank is in a heated and thermally insulated state. This feature is, however, disclosed for the sieving device of D2 (see page 4, lines 2-4 and claim 1) and is an obvious alternative for a storage tank in order to avoid agglomeration of particulate resin. Thus claim 1 of this request lacks an inventive step and this request is not allowable.

6. Auxiliary request 3

Claim 1 of auxiliary request 3 differs from claim 1 of auxiliary request 2 only in that the dry water-absorbent resin product is a dry product obtained by drying at 160 to 250°C. This product-by-process feature of the resin particulate relates to an intermediate stage of the particulate manufacture process which has not been shown to contribute to the solution of the problem in any unexpected manner. Thus it does not require any inventiveness on the part of the skilled person. Since claim 1 lacks inventive step, also auxiliary request 3 is not allowable.

7. Auxiliary request 4

7.1 Claim 1 of auxiliary request 4 differs from claim 1 of auxiliary request 3 only in that the storage tank has an internal surface made of metal. D6 discloses storage tanks for surface-crosslinked SAP particles such as tanks B263A, B263B, B064A and B064B (see page 45, lines 2-5; table on page 73) made of a material codified as St37-2. This code corresponds to a specific steel as disclosed in D7 (see page 65, tables 5 and 6).

Thus the use of metallic storage tanks is an obvious alternative to the skilled person. Therefore claim 1 of this request does not involve an inventive step, with the consequence that auxiliary request 4 is not allowable.

7.2 The argument of the respondent, based on paragraph [0040] of the patent, that metallic tanks were preferable because of the abrasiveness and electrification properties of the resin particles is irrelevant, since D6 gives the skilled person the clear motivation to use metallic tanks for storing SAPs no matter the properties of the resin particles.

7.3 The argument of the respondent, that D6 does not disclose that the storage tank has internal surfaces made of metal is unfounded. There is no reason why in D6 the storage tank would have an internal surface of a different material. If it was so, then D6 would have disclosed it.

8. Auxiliary request 5

Claim 1 of auxiliary request 5 differs from claim 1 of auxiliary request 4 in the temperature conditions applied, namely in that:

- the particulate water-absorbent resin temperature ranges between 50-80°C,
- the temperature of at least one portion of the storage tank surface in contact with the resin particulate is maintained at 50-80°C, and
- the temperature of at least one portion of the storage tank surface in contact with the resin particulate is maintained above a temperature that is lower than the temperature of the particulate water-absorbent resin by 10°C.

Not only are these features not shown to provide any technical advantage, they are also disclosed by D2. Reference is made to page 4, lines 40-42, and examples 1 and 2, which disclose temperatures of the tank and the resin particles maintained within the range of 50-80°C. Moreover, example 1 discloses a resin at 60°C in a storage tank heat-insulated at 55°C. Thus the temperature of the storage tank in contact with the resin is maintained above a temperature that is lower than the temperature of the resin by 10°C.

Although example 1 does not disclose that the tank is simultaneously heated and insulated but only that it is insulated, the use of simultaneous heating and insulating of the tank is obvious in view of the general disclosure of D2 (page 4, lines 2-4 and claim 1). D2 discloses heating and/or thermal insulation of the device and thus provides the skilled person with the motivation to combine heating and thermal insulation of the storage tank at a temperature above a temperature that is lower than the temperature of the resin by 10°C.

In view of the above, claim 1 of auxiliary request 5 lacks inventive step and this request is also not allowable.

9. Auxiliary request 6

Claim 1 of auxiliary request 6 differs from claim 1 of auxiliary request 5 only in that the particulate resin has an absorption capacity of not less than 21 g/g under a load of 4.9 KPa. Such particulate resins are disclosed in D1 (page 101, table 3.6, in particular resins involving surface-crosslinkers EGDGE and

glyerol/EGDGE), with the consequence that this feature corresponds to an obvious alternative of the particulate resin which the skilled person would use without the exercise of any inventive skill. Thus claim 1 of auxiliary request 6 lacks inventive step and this auxiliary request is also not allowable.

10. Auxiliary request 7

Claim 1 of auxiliary request 7 differs from claim 1 of auxiliary request 5 only in that the surface-crosslinked particulate water-absorbent resin contains at least a polyhydric alcohol. However, D1 discloses the use of polyhydric alcohols in the surface-crosslinking of water-absorbent resins (see page 98, lines 3-4). Thus, this feature represents an obvious alternative to the skilled person with the consequence that claim 1 of this request lacks inventive step. Hence, auxiliary request 7 is also not allowable.

11. Auxiliary request 8

Claim 1 of auxiliary request 8 differs from claim 1 of auxiliary request 6 in that
(i) the particulate resin has a water content of 3 to 15% and a particle size of not greater than 850 µm, and
(ii) the storage tank is a silo or a hopper comprising means for heating its internal surface from the outside.

With regard to the particle size, D2 has already disclosed particulate resin with a particle size of not greater than 850 µm (see page 3, lines 32-33; page 5, lines 12-15; example 1; claim 5). With regard to the water content of the particles, it has not been shown that this water content has a technical effect. The

specific storage tanks, namely a silo or hopper heated from the outside, are common storage tanks and represent an obvious alternative to the skilled person. Thus claim 1 of auxiliary request 8 lacks inventive step and this request is also not allowable.

12. Since none of the requests is allowable, the patent has to be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar: The Chairman:

M. Cañueto Carbajo W. Ehrenreich

Decision electronically authenticated