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Datasheet for the decision of 16 April 2018

Case Number: T 0995/15 - 3.3.06

Application Number: 08706982.9

Publication Number: 2107939

IPC: B01J19/22, B65G15/00, C08F2/01

Language of the proceedings: EN

Title of invention:
Production of super absorbent polymers on a continuous belt reactor

Patent Proprietor:
BASF SE

Opponent:
NIPPON SHOKUBAI KABUSHIKI KAISHA

Headword:
Continuous belt reactor / BASF SE

Relevant legal provisions:
EPC Art. 52(1), 54, 56, 83
RPBA Art. 12, 13(1)

Keyword:
Admissibility of an English translation of a Japanese document filed in opposition proceedings (yes)
Admissibility of documents filed with the statement of grounds (yes) : reply to the reasoning of the decision under appeal
Admissibility of documents filed with the statement of grounds (no) : prima facie not relevant for novelty or inventive step
Sufficiency of disclosure (yes)
Novelty (yes)
Inventive step - Main Request : no - Auxiliary Request 2 : yes

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 0995/15 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 16 April 2018

Appellant: (Opponent)	NIPPON SHOKUBAI KABUSHIKI KAISHA 1-1, Koraibashi, 4-chome, Chuo-ku Osaka-shi, Osaka-fu 541-0043 (JP)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Respondent: (Patent Proprietor)	BASF SE Carl-Bosch-Strasse 38 67056 Ludwigshafen am Rhein (DE)
Representative:	BASF IP Association BASF SE G-FLP-C006 67056 Ludwigshafen (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 19 February 2015 rejecting the opposition filed against European patent No. 2107939 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	P. Ammendola
Members:	L. Li Voti
	S. Fernández de Córdoba

Summary of Facts and Submissions

I. The appeal lies from the decision of the Opposition Division to reject the opposition against European patent no. 2 107 939.

II. Claim 1 as granted reads as follows:

"*1. A process for production of superabsorbent polymers on a continuous belt reactor, comprising*

i) a continuous polymerization belt (2) and
ii) at least one continuous support belt (3),

wherein the continuous polymerization belt i) (2) rests at least partly upon the upper surface of the at least one continuous support belt ii) (3) and the continuous polymerization belt i) (2) comprises a carcass and a cover."

Dependent claims 2 to 17 concern particular embodiments of the process of claim 1.

In particular dependent claims 3 and 4 read as follows:

"*3. The process according to claim 1 or 2 wherein the lateral edges of the continuous polymerization belt i) (2) are curved upwardly from the horizontal plane by at least one fixed support means.*"

"*4. The process according to any of claim 1 to 3 wherein the first section of the continuous polymerization belt i)(2) forms a trough.*"

III. The Opponent had opposed the patent invoking lack of novelty and inventive step (Article 100(a) EPC) and insufficiency of disclosure (Article 100(b) EPC).

The Opponent relied inter alia on the following evidence:

D1: EP 1 683 813 A2;
D3: US 4,893,999 A;
D6: EP 1 754 725 A2;
D9: EP 370 646 A2;
D11: DE 199 28 896 A1;
D28: JP 2005-36100 A and machine English translation thereof (D28a).

IV. In the decision under appeal rejecting the opposition the Opposition Division found in particular that the invention was sufficiently disclosed, that the claimed subject-matter was novel over documents D1, D6 and D9 and that it involved an inventive step over D3 in combination with various documents of the prior art or taking D28 as closest prior art or over documents D1, D6 or D9.

As regards novelty the Opposition Division concluded in particular (reasons, 4.1-4.3) that "the process of claim 1 of the patent is novel ... because the reactor comprises - in addition to the continuous polymerization belt - at least one continuous support belt upon whose upper surface the polymerization belt rests at least partly"; in fact in the Division's view

- D1 discloses in figures 3 and 4 "a single belt, which is composed by several parties connected to each other, i.e. a pair of chain (70), a gauze (72) and a

fluororesin sheet (74). The single parties of the belt are integral to and forms a belt as an entity...";

- In examples 3 and 8 of D6, a not pre-published document cited in virtue of Article 54(3) EPC, "the fluorinated adhesion tape containing glass fibers and the endless steel belt forms an integral entity, i.e. a single belt composed by several parties.";

- In D9 (Figures 1 and 2; embodiments 2 and 7) "the lower belt (1B) cannot act and does not act as a support for the upper belt (1A)...D9 discloses a process for production of superabsorbent polymers on a continuous belt reactor comprising two continuous polymerization belts" and not one having "at least one continuous support belt upon whose upper surface the polymerization belt rests at least partly".

As regards inventive step the Opposition Division decided inter alia (reasons, point 5.6) that the skilled person would not have combined the teaching of D3 with e.g. D11.

V. The Appellant filed with its statement of grounds the following new documents:

D30: US 6,565,768 B1;
D31: US 3,967,720;
D32: US 4,267,921 A;
D33: HANDBOOK OF INDUSTRIAL DRYING by A.S. Mujumdar, second edition, volume 1, 1995, pages 525 to 528 and 535; and
D34: Modern Superabsorbent Polymer Technology, edited by F.L. Buchholz and A.T. Graham, 1998, pages v to x, 69 to 84 and 223 to 236.

The Appellant argued in its statement of grounds that the invention was not sufficiently disclosed and that the claimed subject-matter lacked novelty and inventive step.

VI. The Respondent rebutted in its reply all the Appellant's objections. Moreover it contested the admissibility of D28a, filed before the Opposition Division.

VII. In a further letter dated 7 March 2016 the Appellant inter alia maintained its objections against the patentability of the claimed subject-matter.

VIII. The parties were summoned to oral proceedings. In a communication in preparation for oral proceedings expressing the Board's provisional opinion on the points at issue, the Board stated inter alia:

- that D30, D33 and D34 did not appear to be admissible under Article 12(4) RPBA;
- that the Board was instead inclined to admit D31 and D32 into the proceedings;
- that D28a had been admitted by the Opposition Division in virtue of its power of discretion to admit late filed documents on the basis of their relevance;
- that the Board agreed with the conclusion of the Opposition Division that the invention was sufficiently disclosed;
- that the Board agreed with the reasoning given in the decision under appeal that the claimed subject-matter was novel over the cited prior art;
- that document D1 appeared to be the only cited document addressing all the technical problems identified in the patent in suit and it appeared to qualify as suitable closest prior art;

- that it should be discussed at the oral proceedings inter alia if it was obvious for the skilled person to use a continuous support belt for conveying goods as known from the prior art (D11, D31, D32) in a process as disclosed in D1.

IX. In reply to the Board's communication the Respondent filed with letter of 16 February 2018 five sets of amended claims as first to fifth auxiliary requests.

The set of claims according to the second auxiliary request differs from that according to the Main Request (patent as granted) insofar as claim 1 reads:

"*1. A process...(2) comprises a carcass and a cover,* ***wherein the first section of the continuous polymerization belt i)(2) forms a trough and the lateral edges of the continuous polymerization belt i) are curved upwardly from the horizontal plane by at least one fixed support means***." (amendments made apparent by the Board).

Dependent claims 2 to 15 relate to particular embodiments of the claimed process.

X. With letter of 14 March 2018, the Appellant informed the Board that it "will neither attend nor be represented at the oral proceedings."

XI. Oral proceedings were held before the Board as scheduled in the absence of the Appellant.

During oral proceedings the Board prompted inter alia a discussion on inventive step of the claimed subject-matter of the main request based on the combination of document D1 with documents D11, D31 and/or D32.

In the course of the proceedings it withdrew its first auxiliary request.

XII. Requests

The Appellant requested in writing that the decision under appeal be set aside and that the patent be revoked.

The Respondent requested that the appeal be dismissed or, in the alternative, that the patent be maintained on the basis of one of the sets of claims filed as second to fifth auxiliary requests with letter of 16 February 2018.

XIII. The arguments submitted by the parties and of relevance for the decision can be summarised as follows:

The Appellant's case submitted in the statement of grounds and in the letter of 7 March 2016

(a) The English translation D28a of Japanese document D28 is admissible.
(b) D30 to D34 should be admitted since they are prima facie relevant regarding the issues of lack of novelty and/or inventive step.
(c) The invention is not sufficiently disclosed because (statement of grounds, point 3, passage bridging pages 4 and 5) "the skilled person is faced with a lack of information on how to implement the belt polymerizer and in particular the feature of a polymerization belt when wanting to put the invention into practice" and (statement of grounds, page 5, second full paragraph) "the invention as defined in the claims cannot be performed by a

person skilled in the art throughout the whole area claimed without undue burden, in particular not in the case of using the preferred belt material silicone...the opposed patent fails to provide any guidance in the form of examples on how to put the claimed invention into practice".

(d) The subject-matter of claim 1 as granted lacks novelty (point 4 and appendices 1 and 2) over D1 (examples 1 and 2), D6 (examples 3 and 8) and D30 (example 2).

(e) The subject-matter of claim 1 as granted lacks inventive step (statement of grounds, point 5.1, point 5.2, page 16, third full paragraph and appendices 3 and 4; letter of 07.03.16, point 4) over the combinations of D3 with various documents of the prior art, such as for example D11, D31 and D32; alternatively, it would lack inventive step also taking D28 as closest prior art or over the combination of D1 or D6 with D11.

(f) The subject-matter of dependent claims 3 and 4 lacks inventive step in the light of the combination of D3 with D11 since the additional feature of claim 3 is already known from D3 and that of claim 4 is also known from D3 and from other cited documents (Appendix 3, IIIa, fourth full paragraph as well as IIIa/B, third full paragraph and IIIa/C; Appendix 4, point 4, third full paragraph and page 35, last paragraph; Appendix 5, pages 36-37, IIIc, IIId).

The Respondent's case presented in writing and at the oral proceedings

(a) The English translation D28a of the Japanese document D28 is unclear and should not be admitted.

(b) The Appellant did not provide any evidence that the invention is not sufficiently disclosed and that it lacks novelty or inventive step.

(c) In particular, the description contains sufficient information enabling the skilled person to carry out the invention.

(d) The subject-matter of claim 1 as granted is novel over D1, D6 and D30.

(e) The closest prior art is in this respect represented by D1/ex.2. The technical problem, seen in the light of the closest prior art, can be defined as the provision of a further process of the same kind as that of D1 and able to solve at the same extent the problems of improving stability of the polymerization belt in terms of reduction of sagging compared to the use of idlers.

(f) The skilled person, faced with the technical problem posed, would have not considered any of documents D11, D31 or D32, concerning very different technical fields and different technical problems.

(g) Therefore, it would not have been obvious for the skilled person to modify the embodiment of the closest prior art by adding a continuous support belt upon which the polymerization belt rests at least partly.

(h) The subject-matter of claim 1 as granted thus involves an inventive step.

(i) The only inventive step objection raised against the subject-matter of claim 1 of the Second Auxiliary Request is based on the combination of D3 with D11 (and possibly other documents).

(j) Starting from D3 as closest prior art and faced with the technical problem posed, it would not have been obvious to the skilled person to refer to the teaching of a document as D11.

(k) If the skilled person would have relied on the teaching of D11, it would not have been obvious to replace the support means used in the process of D3 for deforming the polymerization belt into a trough-like shape throughout almost the entire upper run of the belt with a horizontal continuous support belt as disclosed in D11, which was not apt to bring about such a trough-like shape.

(l) Moreover, it would not have been obvious, because of the limited space available, to replace the support idler used at the end of the upper run of the construct of D3 with a continuous support belt.

(m) Therefore, the skilled person could not arrive at the claimed subject-matter starting from the teaching of D3.

Reasons for the Decision

Admissibility of document D28a

1. In its communication issued in preparation for oral proceedings (see point 8) the Board had expressed its preliminary opinion that inter alia the English translation of document D28, i.e. D28a, filed by the Appellant before the Opposition Division, appeared to be admissible.

Since the Respondent did not reply to the Board's communication and did not contest the admissibility of this document during oral proceedings, the Board has no reason to depart from its preliminary opinion.

Therefore, for the Board the English translation D28a is admissible (Article 12 RPBA).

Admissibility of documents D30 to D34

2. The Board, in its communication issued in preparation for oral proceedings (see points 10 to 10.2) had expressed its preliminary opinion
- that D30 was no more relevant than the other documents cited against the novelty of claim 1 (in fact, its cited example 2 concerns only a continuous polymerization belt having a polymeric layer as a cover: see 5.1-5.2, *infra*);
- that documents D33 and D34 did not add relevant essential information to some of the documents already cited before the Opposition Division;
- that the filing of D30, D33 and D34 could thus not be considered a reaction to the decision under appeal.

2.1 Therefore and in the absence of response of the Appellant to the Board's communication, the Board has decided not to admit D30, D33 and D34 into the proceedings (Article 12(4) RPBA).

3. For the Board documents D31 and D32 were instead clearly filed as a reaction to the decision under appeal (reasons, point 5.6) that the skilled person would have not combined the teaching of the closest prior art with e.g. D11.

3.1 The admissibility of these documents was also not contested by the Respondent.

3.2 Therefore, D31 and D32 were admitted by the Board into the proceedings (Article 12(4) RPBA).

Main request (patent as granted)

4. Sufficiency of the disclosure

4.1 Claim 1 (full text under II, *supra*) concerns a process for the production of superabsorbent polymers on a continuous belt reactor, comprising a continuous polymerization belt and at least one continuous support belt, wherein the continuous polymerization belt rests at least partly upon the upper surface of the at least one continuous support belt and the continuous polymerization belt comprises a carcass and a cover.

4.2 The Board had already informed the parties in its communication in preparation for oral proceedings (see points 11 to 11.3) of its provisional opinion that it agreed with the conclusion of the Opposition Division (reasons, point 3) that the claimed invention was sufficiently disclosed.

4.2.1 As noted in its communication, for the Board, it is undisputed that processes for the production of superabsorbent polymers in a continuous belt reactor comprising a continuous polymerization belt were well known to the skilled person at the priority date of the patent in suit. Moreover, it is also undisputed that continuous support belts were also known to the skilled person.

4.2.2 Thus, the step of resting, i.e. supporting (see page 2, lines 56-57 of the patent in suit), at least partly a known continuous polymerization belt on the upper surface of a known continuous support belt did not present any technical difficulty for the skilled person and was sufficiently disclosed in the description. The same applies to the provision of a carcass and a cover to the continuous polymerization belt.

4.2.3 Moreover, even accepting arguendo the Appellant's statement that some of the embodiments encompassed by the ambit of claim 1 might jeopardize the achievement of some of the goals identified in the patent in suit, like reduced sagging and tension of the continuous polymerization belt (paragraphs [0015] and [0016]), the claimed invention would have still to be considered as being sufficiently disclosed as the claimed process does not require **any particular effect** or **polymerization efficiency** to be achieved.

4.3 Therefore, for the Board, the skilled person would have found in the patent in suit sufficient information for implementing the belt polymerizer of the claimed process without undue burden throughout the whole area claimed when wanting to put the invention into practice.

4.4 The Appellant did not reply to the Board's communication. Therefore, the Board has no reason to depart from its preliminary opinion.

4.5 The Board thus concludes that the invention is sufficiently disclosed and comply with the requirements of Article 83 EPC.

5. Novelty

5.1 The Board had already informed the parties in its communication in preparation for oral proceedings (see points 12 to 12.2) of its provisional opinion that it agreed with the conclusion of the Opposition Division (reasons, point 4) that the claimed subject-matter was novel over the cited prior art, i.e. D1, D6 and D9.

5.2 In particular, the Board remarked that "the process of claim 1 involves the use of two separate continuous belts. Therefore, the continuous polymerization belt must be able by itself to support and transport the polymerized materials.

Therefore, in the Board's understanding, a construct comprising a polymeric tape or layer bonded onto a continuous polymerization belt does not represent two separate continuous belts but it represents rather a continuous polymerization belt having a polymeric tape or layer as a cover as disclosed in paragraph [0014] of the patent in suit.

The cited documents of the prior art disclosing this type of construct cannot thus be considered to destroy the novelty of claim 1 at issue."

5.3 The Board thus agrees with the differences between the claimed subject-matter and the disclosures of the prior art documents D1, D6 and D9 identified in the decision under appeal (see IV, *supra*).

5.4 The Appellant did not reply to the Board's communication. Therefore, the Board has no reason to depart from its preliminary opinion.

5.5 The Board thus concludes that the claimed subject-matter is novel over the cited prior art and complies with the requirements of Articles 52(1) and 54 EPC.

6. Inventive step

6.1 The invention

6.1.1 The present invention concerns a process for production of superabsorbent polymers on a continuous belt reactor, wherein the continuous polymerization belt rests at least partly upon the upper surface of at least one continuous support belt (paragraph [0001] and claim 1, full wording of the claim under II, *supra*).

6.1.2 The description of the patent states that "*It is an object of the present invention to provide an improved process for production of superabsorbent polymers on a continuous belt reactor*" (paragraph [0010]).

6.1.3 As regards the alleged improvement obtained by means of the claimed process the description states
- that "*the supported continuous polymerization belt i) shows a reduced sagging compared to the prior art continuous belt reactors using idlers as support means*" (paragraph [0015]); and
- that "*the necessary tension of the continuous polymerization belt i) can be reduced. Thus,... [it] has a highly improved serviceable life*" (paragraph [0016]).

7. Closest prior art

7.1 As already indicated in its communication (point 13.2, lines 3 to 6), for the Board, document D1 is the only document addressing all these technical problems.
In fact, D1 states
- that "In the reaction device provided with a continuously conveyable endless belt, it is preferable to use as the contact portion a flexible material such as a film or a sheet... However, in this case, a driving tension at the time of conveyance is entirely exerted to the film or the sheet, so that the film or the sheet may be broken. Thus, it is difficult to carry

out continuous production for an extended period of time. Moreover, also when a larger device is provided in consideration for the productivity (particularly, when the device is enlarged in a longitudinal direction), this raises a problem in terms of durability of the film or the sheet. Thus, it is desired to solve these problems in order to improve the productivity" (paragraph [0009]).

Moreover, the Respondent accepted during oral proceedings that the embodiment of example 2/figures 3 and 4 (in the following **D1/ex.2**), i.e. a process for the production of superabsorbent polymers wherein the continuous polymerization belt consists of a pair of chain 70 respectively positioned left and right and connected to each other by a stainless gauze 72 (carcass) coated with a fluororesin sheet 74 (cover) (page 11, lines 52-53 and figure 4), concerns a process which

- **does not need support idlers and does not show sagging** (by sufficient driving tension) and,
- **distributes the entire driving tension** onto the chains thus **increasing** the durability of the fluororesin sheet and **the serviceable life of the polymerization belt**. This appears evident also from those parts of the description wherein this embodiment of D1 is referred to as "the second embodiment" (see page 4, paragraphs [0015] and [0017] and page 8, paragraph [0045]).

The Board remarks, for the sake of completeness, that the embodiment of example 1 of D1 (page 10, lines 42-46 and figure 1), wherein the polymerization belt is an endless strip-shaped belt 10 made of a glass fiber base material having a fluororesin layer 12 coated thereon, is less relevant and concerns "the first embodiment" of

the invention of D1 (paragraphs [0010], [0014] and [0016]) dealing with the problem of securing high productivity and keeping easiness to detach the hydrogel formed by polymerization but not with that concerning the tension exerted onto the film and sagging.

Therefore, also for the Board, the embodiment D1/ex.2, in view of the similarities with the process of claim 1 at issue and of the technical problems solved, is a very suitable starting point for the evaluation of inventive step.

7.2 As regards the other documents cited by the Appellant, the Board remarks

- that **D6** is a document published 21 February 2007, after the priority date of the patent in suit (16 January 2007), the validity of which was not contested. Therefore, it is not prior art under Article 54(2) EPC and cannot be used in the evaluation of inventive step (see decision under appeal, reasons, 5.10, fourth full paragraph);

- that **D3** (column 3, lines 3-9) has the object to improve upon the continuous process for the production of polymers or copolymers of water-soluble monomers by polymerization on endless conveyor belts, especially with regard to the space-time yield of the process, reduction of the degree of agglutination of the polymer gel on the conveyor belt, and process economy; moreover the process needs the presence of supporting elements (column 7, lines 1-4; figures 3 and 4) but it does not concern the problem of reducing sagging of the polymerization belt with respect to the use of idlers;

- that **D28** concerns (D28a, Abstract on page 1:PROBLEM TO BE SOLVED and paragraph [0010] on page 4) a method for producing a high-quality water-absorbing resin at low cost.

7.3 Therefore, for the Board, D3 and D28 are less suitable starting points for the evaluation of inventive step.

7.4 The Board thus takes D1/ex.2 as closest prior art.

7.5 The embodiment of D1/ex.2 differs from the subject-matter of claim 1 at issue only insofar as it does not comprise the use of at least one continuous support belt upon whose upper surface the polymerization belt rests at least partly. This is not in dispute.

8. The technical problem effectively solved

8.1 Since the closest prior art (D1/Ex.2) had already provided a process for production of superabsorbent polymers on a continuous belt reactor that solved all the technical problems addressed in the patent in suit, the Respondent formulated during oral proceedings the technical problem posed as the provision of a further process of this kind and able to solve at the same extent the problems of improving stability of the polymerization belt in terms of reduction of sagging compared to the use of idlers.

8.2 In the Board's view, the technical problem posed above cannot be considered to have been solved by the subject-matter of claim 1 at the same extent as the process of D1/ex.2. In fact, claim 1 at issue does not specify which proportion of the continuous polymerization belt should rest on the at least one continuous support belt. Therefore, in the absence of

an indication of the localization and length of the at least one support belt with respect to the main polymerization belt, claim 1 still encompasses embodiments according to which the main polymerization belt is only partially supported by the continuous support belt. For such embodiments, at variance with the closest prior art, some idlers (or other means of support) will still be necessary.

8.3 However, it is plausible that for whatever portion of the polymerization belt actually supported by the support belt, the sagging of such portion is reduced more than when the same portion is supported by idlers. The Board is thus convinced that the claimed process solves instead the less ambitious technical problem of providing a further process for production of superabsorbent polymers on a continuous belt reactor able, **at least partially**, to improve stability of the polymerization belt in terms of reduction of sagging compared to the use of idlers.

8.4 The Respondent also agreed during oral proceedings with this reformulation of the technical problem.

9. Obviousness of the solution

9.1 It remains thus to be decided if, for the skilled person, starting from the closest prior art represented by D1/ex.2 and faced with the technical problem posed, would have been obvious to modify the known embodiment of D1 so that the polymerization belt rests at least in part upon a continuous support belt.

9.2 In the Board's view, it would be immediately apparent to the skilled person that the physical stability of the polymerization belt of D1/ex.2 is conferred by the

pair of chains 70 present on both sides of the stainless gauze 72 (see 7.1, *supra*).

As indicated in the description of D1 (page 4, line 10) this kind of construct can be, for example, "an endless chain conveyor used to carry baggage in an airport".

Therefore, the skilled person, looking for alternative means able to provide support and physical stability to the polymerization belt superior to that achievable using idlers, would have looked for possible alternatives disclosed in the prior art, not limiting himself to the technical field of polymerization belts but also including that of conveyor belts used for carrying baggages in an airport and other conveyor belts having similar characteristics.

For the Board, D11, D31 and D32 are representative of such a prior art.

9.3 In this respect it would have been directly apparent to the skilled person that the problem of sagging, caused by the weight of the transported goods, was a well known problem in the relevant technical field of continuous conveyor belts for the transport of goods and that one of the solution amply described in the prior art was the use of a continuous support belt instead of idlers.

9.3.1 This is evidenced for example in the following parts of these documents:

- **D11** teaches (column 1, lines 12 to 21) that in endless belts only limited tension can be hold so that a certain amount of sagging is unavoidable: "...da nur begrenzte Vorspannungen bei solchen Transportbändern

möglich sind, zu einem gewissen Mass an **Durchhang [sagging]** kommen kann" (emphasis added) and provides a second continuous support belt for supporting the main belt which in the supported region does not need idlers (claim 1, figure 1; column 2, lines 61-67; column 3, lines 40-62);

- **D31** teaches (column 1, lines 5-16, 27-31 and 49-55) that "It is known that any conventional endless conveyor belt constantly undergoes more or less considerable deformation in operation, and requires adequate tensioning to enable it to be driven by a drive drum... It is for this reason that the belt is generally guided and supported along its path by **series of rollers**, the spacing between which is selected in dependence upon the tension of the belt, its rigidity, the load to be supported, etc. so as to reduce deformation to acceptable limits...there is an **obvious advantage in reducing the number of rollers** associated with a conveyor belt as far as possible while, at the same time, avoiding any increase in the deformation of the conveyor belt...conveyors comprising a main endless belt intended for conveying loads and driven by one or more auxiliary belts, have been in use for some time. **The auxiliary belts enable...limiting the tensile stresses to which the belt is subjected.**" (emphasis added);

- **D32** contains an explicit teaching (column 2, lines 42-48) that "Conventional conveyor systems generally utilize a plurality of idler rollers ...to provide support to the belt in the area between the pulleys... This invention provides a belt ... such that the requirement for some if not all of the idlers ... may be obviated."

According to D32 (column 2, line 58 to column 3, line 1 and figure 12) this is achieved by means of a secondary continuous belt, as shown in figure 12, supporting the main belt. D32 states in this respect: "Referring to FIG. 12, a primary conveyor is generally indicated by reference numeral 22 and the system includes... a belt 28. Mounted within the inside pathway of the belt 28 is **a secondary conveyor 10a** ...and its purpose is **to support the belt 28** ... The secondary conveyor 10a **thus eliminates a plurality of idler rollers 18 in its area of influence** on the belt 28...the belt of this invention may be applied to various type conveyors..."(emphasis added).

9.4 The Board concludes that, in the light of the teaching of the prior art, would have been obvious to the skilled person, looking for alternatives to improve at least partially the physical stability of a continuous polymerization belt in terms of reduction of sagging compared to the use of idlers, to try the solution indicated explicitly in the prior art discussed above and realized, for example, in D32, by using a continuous support belt, which eliminates the need of idlers in the area of influence.

Therefore, it would have been directly apparent to the skilled person that one possible alternative to the embodiment of D1/ex.2 would be to replace the pair of chains 70 used to support the stainless gauze 72 of D1/ Ex.2 with a continuous support belt as disclosed, for example, in D32 or (by a reduced driving tension on the polymerization belt causing sagging) to add such a known support belt to a construct as represented in D1/ ex.2.

9.5 The Board thus concludes that the subject-matter of claim 1 does not involve an inventive step (Articles 52(1) and 56 EPC).

10. The Main Request is thus not allowable.

Second Auxiliary Request

11. The set of claims according to the second auxiliary request differs from that according to the Main Request insofar as claim 1 reads:

"*1. A process...(2) comprises a carcass and a cover,* ***wherein the first section of the continuous polymerization belt i)(2) forms a trough and the lateral edges of the continuous polymerization belt i) are curved upwardly from the horizontal plane by at least one fixed support means.***" (amendments made apparent by the Board).

11.1 Therefore, claim 1 at issue consists in a combination of granted claim 1 with the features of claims 3 and 4 as granted (see II, *supra*).

12. Article 123(2) EPC

12.1 Claim 1 at issue consists in a combination of the features of claims 1, 3 and 4 as originally filed. Therefore, it complies with the requirements of Article 123(2) EPC. This is not in dispute.

13. Sufficiency of disclosure

13.1 As regards sufficiency of disclosure no additional arguments were submitted by the Appellant with respect

to the invention of claim 1 according to the Second Auxiliary Request.

Therefore, for the Board, the same reasoning as put forward with respect to the Main Request (from 4.2 to 4.3, *supra*) applies also to the Second Auxiliary Request.

13.2 The Board thus concludes that the invention of claim 1 of the Second Auxiliary Request is sufficiently disclosed (Article 83 EPC).

14. Novelty

14.1 Since, for the Board, the subject-matter of claim 1 of the Main Request is novel over the cited prior art (5.5, *supra*), the subject-matter of the more limited claim 1 of the Second Auxiliary Request is also necessarily novel over the cited prior art (Articles 52(1) and 54 EPC).

15. Inventive step

15.1 Closest prior art

15.1.1 As regards the subject-matter of claim 1 at issue, the Board remarks that the only objections against inventive step of this combination of features put forward by the Appellant are based on a combination of prior art documents wherein document D3 is taken as closest prior art (see XIV, *supra*).

Therefore, the Board, in the absence of further objections raised by the Appellant to the inventive step of claim 1 at issue, will consider this argumentation only.

15.1.2 In fact, as regards the dependent claims of the patent as granted, the Appellant had stated in its statement of grounds (page 15, second full paragraph) that "the argumentation for lack of inventiveness of the subject matter covered by the dependent claims as presented in the Notice of Opposition and appended hereto also applies".

15.1.3 In the appendices to the statement of grounds, D3/ example 12 was identified as the closest prior art with respect to the subject-matter of claim 1 (Appendix 3, IIIa, fourth full paragraph and Appendix 4, 4, third full paragraph).

The subject-matter of claim 1 was thus considered to lack inventive step on the basis of the combination of D3 with, for example, D11 (Appendix 3, IIIa/B, third full paragraph and IIIa/C; Appendix 4, page 35, last paragraph).

15.1.4 As regards the dependent claims 3 and 4 it was stated (Appendix 5, IIIc) that D3, representing the closest prior art, already disclosed the additional feature of dependent claim 3, which thus "cannot serve to establish obviousness" whilst the additional feature of dependent claim 4 was already disclosed also in D3 and in other cited documents (Appendix 5, IIId).

15.1.5 Therefore, in the absence of other inventive step attacks against claim 1 at issue, the closest prior art is, for the Board, represented by that explicitly indicated by the Appellant, i.e. D3/ex. 12.

15.2 Technical problem solved

15.2.1 As explained above (point 7.2), D3 (column 3, lines 3-9) has the object to improve upon the continuous process for the production of polymers or copolymers of water-soluble monomers by polymerization on endless conveyor belts, especially with regard to the space-time yield of the process, reduction of the degree of agglutination of the polymer gel on the conveyor belt, and process economy.

Moreover, the belt system of D3 includes (column 7, lines 1-4) "an endless moving conveyor belt passing over supporting elements".

15.2.2 The Board accepts, for the sake of argument in the Appellant's favour, that the technical problem of the invention in the light of the closest prior art can be formulated as stated by the Appellant (Appendix 4, page 33, first full paragraph), "as provision of a (further) process for producing polymers which provides an alternative means for supporting the polymerization (belt)".

15.2.3 Since idlers are not necessary where the support belt supports effectively the polymerization belt, the Board is convinced that the process of claim 1 at issue solves the above mentioned technical problem.

15.3 Non-obviousness of the solution

15.3.1 D3, example 12, discloses a process for production of superabsorbent polymers (based on acrylic/acrylamide monomers) on a continuous belt reactor, comprising a continuous polymerization belt having a surface coating (cover) of silicone rubber. Moreover, the description states (column 5, lines 48-51) that the mechanical requirements for the conveyor belt can be satisfied,

for example, by a rubber belt with fabric inserts of natural and/or synthetic fibres, i.e. comprising a carcass as required in claim 1 at issue.

It is moreover not in dispute that the process disclosed in D3 differs from that of claim 1 at issue only insofar as it does not comprise, in addition to the continuous polymerization belt, at least one continuous support belt upon whose upper surface the polymerization belt rests at least partly.

In fact, the additional features of granted claims 3 and 4, now part of claim 1, are also known from D3 itself as its description states (column 3, lines 13-15) that the continuous polymerization belt used is such that "the liquid reaction components are introduced into a trough that is formed continuously in the conveyor belt" and that (column 6, lines 18-22) according to the invention, "in order to form this trough-like shape, the side edges of the conveyor belt in its longitudinal direction are curved upwards from the horizontal plane before forwardly of the region in which the reaction components are introduced".

15.3.2 It remains thus to be decided whether it was obvious for the skilled person starting from D3 and faced with the technical problem posed, to modify the construct disclosed in this document by adding at least one continuous support belt upon whose upper surface the polymerization belt rests at least partly.

15.3.3 As explained in the description of D3 (column 7, lines 26-43), according to the invention "the conveyor belt is supported **in the vicinity of the supply system** for the reaction components by a plurality of trough-shaped supporting and bearing elements that form a deep

trough-like or dish-like configuration for the reaction components that are introduced. **The desired trough-like shape is determined by the shape and arrangement of the supporting elements** along the length of the path of the upper run... Both the angle of inclination of the supporting elements and the cross-section of the supporting elements can be varied in order to flatten out the initially deep trough towards the end of the polymerization section and once again bring it to an extended state" (emphasis added).

These characteristics of the construct of D3 can be derived also from the figures of D3 and the corresponding parts of the description (figures 1 and 4; column 10, lines 1-3) wherein it is stated (column 10, lines 6-13) that "The trough-like deformation of the upper run 21 from the flat and extended state of conveyor belt 2 begins shortly before the supply and metering system for the reaction components 1... At the end of the polymerization section, the trough 23 of the conveyor belt once more reverts to the flat, extended state." and (column 11, lines 38-40) "the trough shape 23 of the conveyor belt can be determined by the formation and configuration of the side support rollers 14".

15.3.4 It is also directly derivable from figure 3, representing the basic construction of a belt system similar to that of figure 1 (column 10, lines 46-47), that the "conveyor belt, which passes over the guide rollers 5, 7, is supported in the area of the upper run by horizontal support roller 11 and is tensioned in the area of the lower run 22 by horizontal roller 52. **The formation of the trough is effected by side support rollers 14, which impart the trough shape to the belt.** The conveyor belt 2 which passes over the support

rollers 11 and the side support rollers 14 is raised along the edges 26 and thus forms the trough 23." (emphasis added, column 10, lines 50-59).

As apparent from figure 3, the polymerization belt of D3 in its basic construction is thus supported additionally by a horizontal support roller 11 positioned at the end of the area of upper run, just before guide roller 7, whilst the part of the belt in trough-like form is supported by different support rollers which may have, for example, the form of those of figure 4 (column 11, lines 13-14).

15.3.5 For the Board, as argued by the Respondent during oral proceedings, it can be derived from the drawings and description of D3 that the construct of D3 needs particularly shaped supporting means for deforming the polymerization belt and supporting the trough-like form obtained, which extends throughout almost the whole length of the upper run. The skilled person would have thus not envisaged to replace these supporting means by horizontal conveyor supporting belts as used in the cited prior art, such as for example in D11 or D32, discussed above, since it would not have considered them to be apt to support such a through-like shape.

15.3.6 Moreover, even though the replacement of support idlers with known continuous belts could have been an obvious step for the skilled person (9.3, *supra*), he would not have considered the replacement of the single horizontal support roller (idler) 11 used in D3 with a much more cumbersome continuous conveyor support belt to be a reasonable alternative because of the very limited space available in that region of the construct of D3 (see figure 3).

Therefore, the skilled person would not have considered the teachings of D11, D31 and D32 discussed above in looking for an alternative to the support means used in D3.

15.3.7 Hence, the skilled person, faced with the technical problem posed, could not have envisaged without the use of hindsight to use a polymerization belt construct as claimed for carrying out the process of D3/Fig.12. The skilled person, starting from D3 as closest prior art, thus could not arrive at the claimed subject-matter.

15.4 The Board thus concludes that the subject-matter of claim 1 (and of dependent claims 2-15) at issue involves an inventive step (Articles 52(1) and 56 EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent with the claims according to the second auxiliary request as filed with the letter dated 16 February 2018 and a description and figures to be adapted where appropriate.

The Registrar: The Chairman:

D. Magliano P. Ammendola

Decision electronically authenticated