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**Datasheet for the decision
of 6 December 2012**

Case Number: T 1268/09 - 3.3.05

Application Number: 03769912.1

Publication Number: 1609518

IPC: B01D 39/16

Language of the proceedings: EN

Title of invention:

Filter element and process for producing the same

Applicant:

NITTETSU MINING CO., LTD.

Headword:

Filter element/NITTETSU

Relevant legal provisions:

EPC Art. 123(2), 84, 52(1), 54(1)(2)(3), 56

Keyword:

"Inventive step (yes, after amendment): non obvious improved filter element"

Decisions cited:

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Catchword:

-



Case Number: T 1268/09 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 6 December 2012

Appellant: NITTETSU MINING CO., LTD.
(Applicant) 3-2, Marunouchi 2-chome
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Tokyo 100-8377 (JP)

Representative: Grünecker, Kinkeldey
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 14 January 2009
refusing European patent application
No. 03769912.1 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: E. Waeckerlin
Members: B. Czech
P. Guntz

Summary of Facts and Submissions

- I. The appeal is from of the decision of the examining division refusing European patent application No. 03769912.1.
- II. The examining division found that the subject-matter of *inter alia* the independent claims 1 and 4 according to the sole request then on file was not inventive in view of document

D6: JP 08 155233 A.

- III. Under cover of its statement of grounds of appeal the appellant filed amended independent claims 1 and 4, arguing *inter alia* that these claims overcame the objection that had led to the refusal of the application by the examining division. In this connection, the appellant also referred to document

D8: Handbook of Powder Machines and Apparatus, first edition, 1995, published by "The Daily Industrial Press" (Nikkan Kogyo Shinbusha); page 219, Table 3.4.3 labelled "Comparison of dust collectors".

The appellant also requested the reimbursement of the appeal fee, arguing that his right to be heard had been violated by the refusal of the application after only one communication of the examining division.

- IV. The board considered the newly filed amended claims to be objectionable on various grounds and therefore summoned the appellant to oral proceedings in accordance with the latter's auxiliary request. In the

annex to the summons to oral proceedings, the board, taking into account the arguments of the appellant, questioned the clarity of the claims at issue. The board also expressed a negative provisional opinion concerning the request for reimbursement of the appeal fee.

V. In response to the summons and said communication of the board, the appellant filed a new request consisting of a set of further amended claims. It also submitted arguments in support of patentability of the claimed subject-matter having regard to the following prior art, referred to either in the application itself or in the two search reports:

D0: JP 61 502 381 A, corresponding to WO 85/04595 A1;

D1: JP 5 285 323 A;

D2: US 5 804 074 A;

D3: US 5 508 095 A;

D4: US 5 547 481 A;

D5: JP 2003-126627 A;

D6: JP 08 155 233 A; and

D7: EP 1 005 891 A1.

VI. Clarity issues with regard to said amended claims were addressed in a first telephone conversation on 6 December 2012 between the appellant's representative

(Mr Dropmann) and the board's technical member (rapporteur).

VII. In response, on the same day, the appellant submitted a reply (see fax received by the EPO at 12:59 hours) comprising a new set of further amended claims together with additional comments relating to clarity issues and to the object of the invention. Furthermore, the appellant withdrew its request for reimbursement of the appeal fee.

VIII. Said new claims were considered by the board. Subsequently, some remaining issues were addressed, on the same day, in a second telephone conversation between the appellant's representative and the board's technical member. In response thereto, the appellant faxed a second written submission (see fax received at the EPO at 16:12 hours on 6 December 2012) comprising an new set of amended claims 1 to 4, replacing all previous claims and having the following wording:

"1. A method for producing a filter element (24) for separating solid particles from a fluid containing them,
- wherein ultrahigh molecular weight polyethylene fine powder (D), which has an average molecular weight of 3,000,000 to 11,000,000 and a bulk specific gravity of 0.15 to 0.29, and consists of particles, which are aggregates of connected primary particles, which aggregates have voids (B) of 1 to 5 μm in the parts wherein the primary particles are connected, is dispersed in water together with at least a water dispersible binder, to form an aqueous suspension;
- wherein said aqueous suspension is coated onto the surface of a filter element base made of an open-

cell porous molded body prepared by heating and sintering synthetic resin powder (A), a non-woven fabric or a felt, to thereby fill the ultrahigh molecular weight polyethylene fine powder (D) into the pores on the surface of the open-cell porous molded body;

and

- *wherein the coated filter element (24) is heated to fix the ultrahigh molecular weight polyethylene fine powder on the surface of the open-cell porous molded body by the binder."*

"2. The method according to claim 1, characterized in that the ultrahigh molecular weight polyethylene fine powder (D) particles have an average particle size of from 3 to 150 μm ."

"3. The method according to claim 1, characterized in that the ultrahigh molecular weight polyethylene fine powder (D) particles are impregnated with an antioxidant for providing heat resistance to the filter element."

"4. A filter element (24) obtainable by a method according to any of the claims 1 to 3."

- IX. The oral proceedings appointed for 10 December 2012 were cancelled by the board.

- X. The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of claims 1 to 4 filed under cover of its second written submission dated 6 December 2012 and received by the EPO at 16:12 hours.

Reasons for the Decision

Admissibility of the appellant's new request

1. The request at issue represents an attempt to overcome objections raised by the board.

In the exercise of the discretion conferred on it by Article 13(1) and (3) RPBA, the board admitted this request into the proceedings despite its late filing.

Admissibility of the newly filed evidence (document D8)

2. The appellant filed document D8 in order to establish, in the context of its argumentation concerning inventive step, typical properties of "filtration dust collectors". D8 can be considered to illustrate common general knowledge in the technical field concerned.

In the exercise of the discretion conferred on it by Article 12(4) RPBA, the board admitted document D8 into the proceedings despite its late filing.

Allowability of the amendments

3. The board is satisfied that the amendments made to the claims as originally filed find a basis in the application as filed as understood by a skilled person, in particular in the following parts thereof: Claims 1 to 4; Figure 1; page 13, first two paragraphs; page 18, second paragraph; page 25, last paragraph; page 26, first paragraph.

The amended claims do not define subject-matter extending beyond the content of the application as filed. Hence, the amendments meet requirements of Article 123(2) EPC.

Clarity

4. The board is satisfied that the present claims clearly define the starting materials used in the preparation of the filter element (24), including the properties and morphology of the fine powder (D) used (Article 84 EPC). More particularly, the board accepts that the claims now clearly express that the individual particles of the fine powder (D) consist of aggregates of connected (smaller) primary particles, and that the voids (B) referred to in claim 1 are present within the individual powder particles as a consequence of this aggregate structure.

Novelty

5. None of the prior art documents discloses a method for producing a filter element comprising filling the surface pores of a porous filter element base and fixing thereto a fine powder of ultrahigh molecular weight polyethylene (hereinafter "UHMWPE") having, in combination, all the properties recited in claim 1 at issue, i.e. an average molecular weight (hereinafter "MW") in the range of from 3,000,000 to 11,000,000, a bulk specific gravity in the range of from 0.15 to 0.29, as well as the specific particle morphology recited in claim 1 (aggregates of primary connected particles; voids of 1 to 5 μm). Neither does the prior art disclose filter elements having a morphology/structure

that could be considered to qualify as being obtainable by the method according to claim 1.

The subject-matter of claims 1 to 4 is thus novel (Articles 52(1) and 54(1)(2)(3) EPC).

Inventive step

6. The application in suit is concerned with the provision of filter elements for separating solid particles from a fluid containing them, which filter elements comprise a porous base having its surface pores filled with fine powder particles.

7. Document D6, which has not been acknowledged in the application as filed, discloses a filter element of the same type and can thus be considered to represent the closest prior art. As acknowledged by the appellant, D6 discloses a filter element comprising a filter element base which is an open-cell molded body prepared by heating and sintering synthetic resin powders, a non-woven fabric or a felt. The surface pores of said filter element base body are filled with a fine powder of a polyolefin, preferably polyethylene, having a mean particle size of less than 100 μm , preferably 3 to 50 μm , by coating the body with an aqueous dispersion comprising said fine powder and a binder. The bulk specific gravity of the fine polyolefin powder used according to D6 is in the range of from 0.30 to 0.50 and the average MW of the polyolefin is in the range of from 1 to 5 million. The two UHMWPE fine powders used according to the working examples of D6 have an average MW of 2 million and 2.4 million, and a bulk specific gravity of 0.4 and 0.45, respectively. As stated in D6,

such a fine polyolefin powder can be easily dispersed in water and is thus well-suited for forming an even coating and, moreover, does not form toxic off-gases when the spent filter element is incinerated. Reference is made to the PAJP abstract (in English) of D6 and to the machine translation of D6, in particular the translated claims and sections [0010] to [0014] of the translated description.

8. The board accepts that starting from D6 as representing the closest prior art, the technical problem can be seen in providing filter elements which are improved in terms of a lower pressure loss and a higher particle retention, and a method for their production, as submitted by the appellant.

9. As a solution to this technical problem, the application in suit proposes the preparation method according to claim 1 at issue, which is *inter alia* characterised in particular in that the "*ultrahigh molecular weight polyethylene fine powder (D)*" which is filled into the surface pores of the filter element base, "*has an average molecular weight of 3,000,000 to 11,000,000 and a bulk specific gravity of 0.15 to 0.29, and consists of particles, which are aggregates of connected primary particles, which aggregates have voids (B) of 1 to 5 µm in the parts wherein the primary particles are connected*" (emphasis added by the board).

10. The board has no reason to doubt that the technical problem stated under point 8 above is indeed solved by the proposed preparation method.

- 10.1 In the statement of grounds of appeal, the appellant juxtaposed performance data for one of the filters exemplified in document D6 (pressure loss 250 mm H₂O; dust collecting efficiency 97,75 %) and for the filter exemplified in the application in suit (pressure loss 133 mm H₂O) dust collection efficiency 99,999%). The two examples are not strictly comparable due to differences in dust loading of the air and to the particle and pore sizes of the filtering materials involved. However, the juxtaposed data show that the method according to claim 1 of the application in suit is suitable for obtaining a dust filter with a filtration performance to be rated as very good considering the criteria (collection efficiency 99 to 99.9 %; pressure loss 100 to 200 mm H₂O) recited in table 3.4.3 of document D8, which summarised common general knowledge.
- 10.2 For the board it is, moreover, plausible that a gradual relative improvement in terms of a reduced pressure loss across the filter element and of an increased particle retention capacity will generally be obtained when replacing a fine filling powder of a given average particle size by a fine powder of individual particles having the same average particle size but having the specific morphology required by claim 1 at issue, i.e. consisting of aggregates of even finer primary particles and comprising voids of 1 to 5 µm. As argued by the appellant, to said specific morphology of the individual powder particles,
- the layer filled into the surface pores will be less dense and will therefore have a reduced hydraulic flow resistance resulting in a lower pressure drop,

- the filtering layer comprises a greater number of tortuous flow channels, and therefore to a higher specific surface area and a higher particle retention.

11. Hence, it remains to be decided whether, starting from the disclosure of document D6, the proposed solution to the technical problem stated under point 8 above is obvious in view of the cited prior art. For the following reasons, the board is satisfied that this is not the case:

11.1 Document D6 itself does not mention or suggest using a UHMWPE fine powder of individual particles having the morphology required by claim 1 at issue (see point 9 above). Moreover, the fine UHMWPE powders used in the examples of D6 have average MWs and bulk specific gravity values which all lie outside the numerical ranges prescribed by claim 1 at issue. The skilled person was thus not induced by the disclosure of D6 to replace the fine UHMWPE powder disclosed therein by a specific fine powder as defined in claim 1.

11.2 Neither does one of the other cited prior art documents mention or suggest filling the surface pores of a porous filter element base with fine powder particles having said specific morphology, let alone with UHMWPE fine powder consisting of particles having an MW and a bulk specific gravity in the required respective ranges.

11.3 For the sake of completeness, the board observes in this respect that document D5 is a national application of the appellant published after the priority date of the application in suit. D5 relates to filter elements wherein a porous base element is coated in order to

fill the surface pores thereof with fine particles of a fluororesin, preferably PTFE. The corresponding European application D5' (EP 1 449 573 A1) has a filing date (28.02.2002) which is earlier than the priority date of the application in suit (24.12.2002) and thus only belongs to the prior art pursuant to Article 54(3) EPC, which is irrelevant to inventive step considerations.

12. The subject-matter of claims 1 to 4 thus 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 grant a patent on the basis of
 - claims 1 to 4 filed by fax under cover of the appellant's second written submission dated 6 December 2012 and received by the EPO at 16:12 hours;

 - figures 1 to 11 of the published European application; and

 - a description to be adapted to said claims.

The Registrar

The Chairman

C. Vodz

E. Waeckerlin