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**Datasheet for the decision
of 20 November 2013**

Case Number: T 2195/10 - 3.3.05

Application Number: 01963922.8

Publication Number: 1317317

IPC: B01D46/52, B01D46/24, B01D39/16

Language of the proceedings: EN

Title of invention:
AIR FILTRATION ARRANGEMENT HAVING FLUTED MEDIA CONSTRUCTION
AND METHOD FOR FILTERING AIR

Patent Proprietor:
DONALDSON COMPANY, INC.

Opponents:
Neenah Gessner GmbH
MANN + HUMMEL GmbH

Headword:
FLUTED AIR FILTER/DONALDSON

Relevant legal provisions:
EPC Art. 56, 123(2)
RPBA Art. 13

Keyword:

Inventive step - main request and auxiliary requests 1 and 2
(no) - obvious alternative - auxiliary request 3 (yes) -
unexpected effect

Amendments - auxiliary request 3 - deletion of a feature -
broadening of the claimed subject-matter beyond the content of
the application as filed (no)

Decisions cited:

Catchword:



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Case Number: T 2195/10 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 20 November 2013

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 20 August 2010
revoking European patent No. 1317317 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman: G. Rath
Members: J.-M. Schwaller
C. Vallet

Summary of Facts and Submissions

- I. The present appeal lies from the decision of the opposition division revoking European patent No. 1 317 317 under Articles 56 and 84 EPC.

Claim 1 of the main request read as follows:

"1. A filter element arrangement comprising:
(a) an air filter media pack (140) having a substrate comprising first and second opposite flow faces (148, 150);
(b) wherein said media pack (140) has a plurality of flutes (158), wherein in said media pack
(i) each of said flutes have a first end portion adjacent to said first flow face (148) and a second end portion adjacent to said second flow face (150); and
(ii) selected ones of said flutes being open at said first end portion (169) and closed at said second end portion (178); and the remaining ones of said flutes being closed at said first end portion (181) and open at said second end portion (184); and characterised in that
(c) said substrate is at least partially covered by a layer comprising fine fiber comprising a fiber with a diameter of about 0.01 to 0.5 microns, the fiber comprising:
a polyvinylidene fluoride;
a polyvinyl alcohol, wherein the polyvinylalcohol is crosslinked with about 1 to 40 wt.% of a crosslinking agent; or
a polyurethane."

- II. Among the documents cited in the opposition procedure, the following are of relevance for the present decision:

- D2: Invoice M 140445
- D3: Test report filter element Power Core M 140445
dated 2 May 2000
- D12: Delivery note for filter element AM130295 (M
140045)
- D13: Internal note concerning comparison analysis of M
140445 and M 140045
- D14: US 5 672 399
- D15: US 4 650 506
- D16: DE 29 907 699 U1
- D24: Affidavit by Ms Sabine WAGNER
- D25: Affidavit by Ms Sabine WAGNER
- Annex I: Test report (filed in December 2008 by the
proprietor)

III. In the contested decision, the opposition division held the content of documents D2, D3, D12, D13, D24 and D25 to provide evidence for the prior use of filter elements M 140045 and M 140445. These filter elements comprise all the features of claim 1 with the exception of the specific material of the fine fibres, which consists of a polyamide material. Starting from these filter elements as representing the closest prior art, an improvement could not be identified in the claimed subject-matter, in particular in its version where the material of the fine fibre was defined as being

polyurethane. This particular configuration of the claimed filter was not held to be inventive because the skilled person seeking an alternative to the polyamide material of the closest prior art was aware of the content of document D16, which disclosed a filter bag carrying a layer of polyurethane fine fibres.

- IV. With the grounds of appeal, the patentee (hereinafter "the appellant") contested the decision and filed ten sets of claims as a main request and auxiliary requests 1 to 9.

The appellant's arguments against the decision can be summarised as follows:

Starting from the prior-use filter elements M 140045 and M 140445, the problem to be solved was to be seen in the provision of a fluted filter capable of filtering particles with improved filtering performance at high temperature and high humidity. The prior-use filter elements, sold for use on a lawn motor tractor marketed in northern Europe, would not have been exposed to high heat and humidity, and the degradation problem had not become evident. The filter in D16 was intended as a dust filter bag for a standard vacuum cleaner, which was not typically exposed to harsh heat or humidity conditions. It followed that even if the skilled person had recognised the problem underlying the prior-use filter, he had no reason to look at D16, which did not address the problem and furthermore disclosed the wrong filter type.

- V. With a letter dated 17 May 2011, opponent I (hereinafter "respondent I") argued that because of the word "comprising" and the missing quantity of fine fibres needed in claim 1 at issue, the claimed subject-

matter only required that one of the three materials defined in claim 1 had to be present in at least one fibre. It followed that the ambitious problem defined in the patent could not be solved, and so the problem boiled down to the provision of an alternative filter element. The solution was obvious from D16, which disclosed a filter bag made in particular of water-insoluble fibres.

VI. On 17 May 2011, opponent II (hereinafter "respondent II") filed new documents, in particular

D34b,c: Electron microscopy photographs of crosslinked PVA fine fibres (diameter 147 nm) before and after a THC test at 160°F and 100% humidity for 16 hours.

Respondent II contested the allowability of claim 1 of the main request under Articles 123(2) and 56 EPC. The deletion from claim 1 as originally filed of the feature "*such that the fiber, when tested under conditions of exposure for a test period of 16 hours to test conditions of 140°F air at a relative humidity of 100%, retains greater than 30% of the fiber unchanged for filtration purposes*" represented a broadening of the claimed subject-matter and an extension beyond the content of the application as filed. Claim 1 of the main request lacked inventive step because in the absence of direct comparison with the closest-prior-art filter - which comprised polyamide fine fibres - an improvement could not be identified, and so the problem boiled down to the provision of an alternative filter element. Owing to the fact that the filter materials defined in claim 1 were known from documents D14 to D16, the solution was obvious for the skilled person seeking for an alternative filtering material.

- VII. With letter dated 28 May 2013, the appellant submitted a tenth auxiliary request, arguing that this request was filed in response to the filing of the above new documents.
- VIII. With letter of 18 October 2013, respondent II requested the board not to admit the tenth auxiliary request because of its late filing. Annex I of the appellant's letter of 8 December 2008 should also not be admitted into the proceedings because of its illegibility, which rendered impossible the reworking of the tests summarised in said annex.
- IX. With letter dated 20 October 2013, respondent I objected to claim 1 of the main request under Article 123(2) EPC, because polyurethane was not disclosed in the application as filed as a material of the fine fibres. Further, polyvinylalcohol when crosslinked with 1 to 40 wt.% of a crosslinking agent was disclosed in the application as filed (see claims 1, 2, 6, 8 and 9) only in the form of an addition polymer; the feature "addition polymer" however was missing from claim 1.
- X. With letter of 12 November 2013, the appellant filed a legible version of Annex I. Further, it withdrew the requests on file and submitted six sets of claims as a main request and as auxiliary requests 1 to 5.

Claim 1 of the main request reads as follows:

*"1. A filter element arrangement comprising:
(a) an air filter media pack (140) having a substrate comprising first and second opposite flow faces (148, 150);*

(b) wherein said media pack (140) has a plurality of flutes (158), wherein in said media pack
(i) each of said flutes have a first end portion adjacent to said first flow face (148) and a second end portion adjacent to said second flow face (150); and
(ii) selected ones of said flutes being open at said first end portion (169) and closed at said second end portion (178); and the remaining ones of said flutes being closed at said first end portion (181) and open at said second end portion (184); and characterised in that
(c) said substrate is at least partially covered by a layer comprising fine fiber comprising a fiber with a diameter of about 0.01 to 0.5 microns, the fiber comprising:
a polyvinylidene fluoride;
a polyvinyl alcohol, wherein the polyvinyl alcohol is crosslinked with about 1 to 40 wt.% of a crosslinking agent."

Claim 1 of the first auxiliary request corresponds to claim 1 of the above main request with the fine fibres being defined as "consisting of" one of the above two materials, instead of "comprising".

Claim 1 of the second auxiliary request corresponds to above claim 1 of the main request, with the crosslinked polyvinylalcohol being further defined as being "crosslinked using a polyacrylic acid having a molecular weight of about 1000 to 3000 or using a melamine-formaldehyde resin having a molecular weight of about 1000 to 3000."

Claims 1 and 8 of the third auxiliary request read as follows (differences to the main request emphasised by the board):

"1. A filter element arrangement comprising:
(a) an air filter media pack (140) having a substrate comprising first and second opposite flow faces (148, 150);
(b) wherein said media pack (140) has a plurality of flutes (158), wherein in said media pack
(i) each of said flutes have a first end portion adjacent to said first flow face (148) and a second end portion adjacent to said second flow face (150); and
(ii) selected ones of said flutes being open at said first end portion (169) and closed at said second end portion (178); and the remaining ones of said flutes being closed at said first end portion (181) and open at said second end portion (184); and characterised in that
(c) said substrate is at least partially covered by a layer comprising fine fiber comprising a fiber with a diameter of about 0.01 to 0.5 microns, the fiber **consisting of:**
a polyvinylidene fluoride; or
a polyvinyl alcohol, wherein the polyvinyl alcohol is crosslinked with about 1 to 40 wt.% of a crosslinking agent, **wherein the polyvinyl alcohol is crosslinked using a polyacrylic acid having a molecular weight of about 1000 to 3000 or using a melamine-formaldehyde resin having a molecular weight of about 1000 to 3000.**"

"8. A method for filtering air, the method being characterized by
(a) directing the air through a media pack (140) at a rate of 8.5 to 17,000 m³/h (5 to 10,000 cfm), the pack (140) comprising a substrate having first and second opposite flow faces (148, 150), and comprising a plurality of flutes (158), wherein in said media pack

- (i) *said flutes have a first end portion adjacent to said first flow face and a second end portion adjacent to said second flow face;*
- (ii) *selected ones of said flutes being open at the first end portion (169) and closed at the second end portion (178); and selected ones being closed at the first end portion (181) and open at the second end portion (184);*
- (iii) *the media composite including a substrate at least partially covered by a layer comprising the fiber comprising a fiber with a diameter of about 0.01 to 0.5 microns, the fiber **consisting of:***
 - a polyvinylidene fluoride; or*
 - a polyvinyl alcohol, wherein the polyvinyl alcohol is crosslinked with about 1 to 40 wt.% of a crosslinking agent, **and wherein the polyvinyl alcohol is crosslinked using a polyacrylic acid having a molecular weight of about 1000 to 3000 or using a melamine-formaldehyde resin having a molecular weight of about 1000 to 3000.***

Claims 2 to 7 and 9 to 19 represent particular embodiments of claims 1 and 8, respectively, on which they depend.

Auxiliary requests 4 and 5, both restricted to polyvinylidene fluoride, need not be reproduced here since auxiliary request 3 succeeds.

XI. At the oral proceedings, which took place on 20 November 2013, the respondents contested the admissibility of the requests dated 12 November 2013 and reiterated their request that Annex I filed by the proprietor during the opposition proceedings should not be admitted into the proceedings. They further contested the allowability of the claimed subject-matter of the requests on file under Articles 56 and

123(2) EPC. Respondent I nevertheless no longer contested under Article 123(2) EPC the missing expression "addition polymer" in the definition of the crosslinked polyvinylalcohol. Further, no objections were raised under Articles 54, 83 or 84 EPC.

XII. After closure of the debate, the chairman established the requests as follows:

The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of one of the sets of claims dated 12 November 2013.

The respondents requested that the appeal be dismissed.

Reasons for the Decision

1. Admissibility

1.1 In the board's view, the claims submitted with letter of 12 November 2013 are admissible under Article 13 RPBA because they correspond in essence to subject-matter which was already present in the requests filed with the grounds of appeal.

The subject-matter of claim 1 of the main request corresponds in particular to that of claim 1 of the main request filed with the grounds of appeal, with the difference that "polyurethane" has now been deleted from the list of polymers comprised in the fine fibers. The respondents having contested the presence of this particular polymer in claim 1 of this request under Article 123(2) EPC, its deletion from the claimed subject-matter thus cannot be held as a surprise for the parties.

Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the expression "*consisting of*" has been substituted for the term "*comprising*". This amendment is also not a surprise for the parties, since it was already proposed in particular in the second auxiliary request filed with the grounds of appeal.

Claim 1 of the second auxiliary request corresponds to claim 1 of the third auxiliary request filed with the grounds of appeal and the third auxiliary request corresponds to the fourth auxiliary request filed with the grounds of appeal. The claims of these requests are therefore also clearly admissible.

1.2 Regarding Annex I dated 8 December 2008 that the respondents objected to because it was illegible and so the tests summarised therein could not be reproduced, the board observes that the telefax submitted on 8 December 2008 was indeed partly illegible however the letter dated 10 December 2008, which also comprised Annex I, was perfectly legible. The technical details accompanying annex I furthermore were perfectly legible (see point 4.5 of both the telefax and the letter) and so the tests could be reproduced. It follows that Annex I is clearly admissible.

2. Disclosure of the invention

This issue was no longer contested by the respondents. The board also does not have any concern in this respect, as there are sufficient details in the examples of the contested patent showing the skilled person how the claimed subject-matter is to be carried out.

3. Main request - Inventive step

Applying the problem-solution approach, the board came to the following conclusions:

- 3.1 The alleged invention concerns a filter element arrangement and a filtration method for filtering particulate material from a gas flow stream, with the filter element comprising a substrate having a fine fibre layer made of polymer materials (see paragraphs [0001] and [0003] of the patent).
- 3.2 Such a filter element is in particular disclosed in the prior-use filter elements M 140045 and M 140445 that the parties acknowledged as representing the closest prior art. In these prior-art filter elements the fine fibres were made of a polyamide material.
- 3.3 According to the patent (paragraph [0008]), the problem lies in the provision of filtering structures having improved properties for filtering gas flow streams with higher temperatures, higher humidities and high flow rates.
- 3.4 As a solution to this problem, the patent proposes the filter element arrangement according to claim 1 at issue which is characterised in particular in that the fine fibre comprises:
a polyvinylidene fluoride; or
a polyvinyl alcohol crosslinked with about 1 to 40 wt.% of a crosslinking agent.
- 3.5 As to whether or not the problem has been plausibly solved by the solution proposed above, the board notes that no objective comparison exists in the file between

the prior-art filter elements and the claimed subject-matter. It is thus not possible to assess whether the substitution of the polyamide material with one of the above-claimed polymeric materials gives rise to an improvement, as alleged in the contested patent.

Since the contested patent was revoked in particular because of this critical issue, the appellant had the burden of proving that the conclusions of the opposition division were wrong. However, the appellant failed to provide any evidence in this respect, so that the problem is to be reformulated in less ambitious terms.

The appellant stated that the problem was to be seen in the provision of an alternative filter element for filtering gas flow streams with higher temperatures, higher humidities and high flow rates. In the board's view this problem is manifestly not solved over the whole scope of protection of claim 1 at issue because, due to the presence of the word "comprising" in the claimed subject-matter, the fine fibres may contain a high amount of a low-melting and/or water-soluble polymeric material, with the consequence that the fine fibres would collapse at high temperature and/or high humidity.

Under these circumstances, the problem boils down to the provision of another filter element for filtering gas flow streams at high flow rates.

- 3.6 The board has no reason to believe that the problem reformulated in these less ambitious terms would not be satisfactorily solved by the claimed filter element.

3.7 As to whether or not the solution proposed in claim 1 at issue is obvious from the state of the art, the board observes that document D16 (claim 1) discloses a dust filter bag comprising a carrier layer and at least one non-woven fibre layer comprising a layer of non-woven nanofibres with a diameter of from 10 to 1000 nm, preferably 50 to 500 nm (page 4, lines 3 to 5). The nanofibre layer is directly deposited on the carrier layer (claim 2) and made from thermoplastic polymers, water-soluble polymers or polymers soluble in organic solvents. Polyvinyl alcohol is in particular disclosed among the list of potential water-soluble polymers, polyamide among the polymers soluble in organic solvents and polyvinylidene fluoride among the thermoplastic polymers (D16; page 4, lines 6 to 25).

D16 however does not disclose a filter having a plurality of flutes.

The skilled person faced with the problem as reformulated above and seeking another filter element for filtering gas flow streams at high flow rates knows that the filter of D16, which is intended for use in domestic vacuum cleaners, fulfils this requirement. The appellant contested that the filter bags according to D16 could be used on a lawn motor tractor, like the prior-use filters M 140045 and M 140445. The board cannot follow this argument because filter elements used in vacuum cleaners have also to retain dust particles in gas flow streams with high flow rates and so they are clearly suitable for filtering particles on a lawn motor tractor.

It follows that the filter according to D16 has the same purpose as the closest-prior-art filters, with the consequence that the polymeric materials used in these

filters are clearly interchangeable. The skilled person seeking for an alternative for the polyamide material of the fine fibres in the prior-use filter elements has thus simply to make a choice among the list of fine fibre materials disclosed in D16 and so arrive - by choosing in particular polyvinylidene fluoride - at the subject-matter of claim 1 at issue, which thus lacks inventive step under Article 56 EPC.

4. Auxiliary request 2 - Inventive step

For the sake of expediency, this request is dealt with before auxiliary request 1 because its claim 1 also recites the word "comprising", and so the same arguments as in point 3 above apply to claim 1 of this request, which also defines "polyvinylidene fluoride" as one of the specific polymers of the fine fibres.

5. Auxiliary request 1 - Inventive step

Applying the problem-solution approach, the board came to the following conclusions:

5.1 Identical with point 3,1 above.

5.2 Identical with point 3.2 above.

5.3 Identical with point 3.3 above.

5.4 As a solution to this problem, the patent proposes the filter element arrangement according to claim 1 at issue, which is in particular characterised in that the fine fibre **consists of:**
a polyvinylidene fluoride; or
a polyvinyl alcohol crosslinked with about 1 to 40 wt.% of a crosslinking agent.

5.5 As to whether or not the problem has been plausibly solved by the solution proposed above, no comparison having been made between the prior-use filter elements and the claimed subject-matter, an improvement over the polyamide material used in the prior-use filter elements cannot be acknowledged. It follows that the problem is to be reformulated in less ambitious terms.

The appellant stated that the problem could be seen in the provision of an alternative filter element for filtering gas flow streams with higher temperatures, higher humidity and high flow rates as stated in paragraph [0008] of the patent in suit.

The respondent argued that this problem was not solved over the whole scope of protection of claim 1 at issue. It referred in this respect to its submissions of 17 May 2011, in particular documents D34b and D34c, which showed that crosslinked PVA fine fibres with a diameter of 147 nm collapsed during the THC test at 160°F and 100% humidity for 16 hours. The appellant contested these tests because the amount and the type of crosslinking agent were missing.

In the board's view, the type of crosslinking agent is of no importance for the present issue since claim 1 of this request is not limited to any specific type of crosslinker. As to the missing amount, the respondent stated that the tests were carried out with an amount of crosslinking agent within the claimed range, but it could not be more precise because the tests had been made by one of its fibre suppliers. In the board's view, the respondent's tests are acceptable because they have the same credibility and probative force as those in Annex I submitted by the appellant in

December 2008, which also do not indicate the specific amount of crosslinking agent used. It follows that the tests in Annex I are also acceptable.

Owing to the fact that the tests in D34b and D34c undeniably show that certain (undefined) crosslinking agents are not suitable for providing PVA fine fibres with high temperature and high humidity resistance, the problem boils down to the provision of another filter element for filtering gas flow streams at high flow rates.

- 5.6 As to whether or not the solution proposed in claim 1 at issue is obvious from the state of the art, the board observes that the skilled person knows from document D16 (see point 3.7 above) that *inter alia* polyvinyl alcohol and polyvinylidene fluoride are suitable as the material for constituting the fine fibres of a dust filter bag comprising a carrier layer having deposited thereon a layer of non-woven nanofibres with a diameter of from preferably 50 to 500 nm. In the board's view, it is common general knowledge that such polymers can be crosslinked, and so using the above polymers in a crosslinked form cannot be held to involve an inventive step insofar as the crosslinking does not provide for any particular advantage or effect. This is precisely the case since, as evidenced by documents D34b and D34c, certain fine fibres made from crosslinked PVA do not withstand high temperatures and/or high humidity (see item 5.5 above).

As explained in point 3.7 above, the polymeric material of the fine fibres according to document D16 are clearly interchangeable with the polyamide of the prior-use filter elements. It follows that the skilled person seeking for an alternative polymer for the

polyamide material has the choice among the list of fine fibre materials disclosed in D16, in particular the polyvinyl alcohol, and so arrives - in combination with common general knowledge that this particular polymer can be crosslinked - at the subject-matter of claim 1 at issue, which thus lacks inventive step under Article 56 EPC.

6. Auxiliary request 3 - Amendments

6.1 In the board's view, the amendments to claim 1 of this request, namely:

- the deletion from claim 1 of the desiderata "*such that the fiber, when tested [...] retains greater than 30% of the fiber unchanged for filtration purposes*"; and
- the restriction by which the fine fibers are now defined as "*consisting of: a polyvinylidene fluoride, or a polyvinylalcohol, wherein the polyvinylalcohol is crosslinked with about 1 to 40 wt.% of a crosslinking agent, and wherein the crosslinked polyvinylalcohol is crosslinked using a polyacrylic acid having a molecular weight of about 1000 to 3000 or a melamine-formaldehyde resin having a molecular weight of about 1000 to 3000.*"

fulfil the requirements of Article 123(2) EPC for the following reasons:

6.2 In claim 1 as originally filed, the layer of fine fibres was defined as "*comprising a fiber with a diameter of about 0.01 to 0.5 microns such that the*

fiber, when tested under conditions of exposure for a test period of 16 hours to test conditions of 140°F air at a relative humidity of 100%, retains greater than 30% of the fiber unchanged for filtration purposes", without defining however the type of polymer to be used as the fibre material.

In claim 1 at issue, the type of polymeric material has now been defined and limited to two specific polymer types.

During the opposition proceedings, the appellant stated (see letter of 8 December 2008, paragraph 2.1) that the selected specific polymeric materials undeniably fell within the scope of independent claim 1 as filed and so implicitly fulfilled the above desiderata, which thus could be deleted.

The respondents contested this statement, without however providing any counter-evidence in support of their allegations.

In the absence of counter-evidence, the board holds the deletion of said desiderata not to extend the scope of protection of claim 1 beyond the content of the application as filed.

- 6.3 The restriction to the above specific polymeric materials has a basis in claims 5 and 6 of the application as filed, and the feature that the polyvinylalcohol "is crosslinked with about 1 to 40 wt. % of a polyacrylic acid having a molecular weight of about 1000 to 3000 or a melamine-formaldehyde resin having a molecular weight of about 1000 to 3000" has a basis in claims 8 to 10 of the application as filed.

6.4 The other features in claim 1 and the other claims at issue have not been contested under Article 123 EPC. The board also does not have any concern as to their allowability under Article 123(2) and (3) EPC.

7. Third auxiliary request - Novelty

Novelty was not contested and the board does not have any concern over this issue, the differentiating feature to the closest prior art being in particular the type of polymer used as the fine fibre material.

8. Third auxiliary request - Inventive step

Applying the problem-solution approach, the board follows the same reasoning as in points 3.1 to 3.3 above.

8.1 As a solution to the problem identified in item 3.3, the patent proposes the filter element arrangement according to claim 1 at issue, which is in particular characterised in that the fine fibre **consists of:**
a polyvinylidene fluoride; or
a polyvinyl alcohol crosslinked with about 1 to 40 wt.% of a polyacrylic acid having a molecular weight of about 1000 to 3000 or a melamine-formaldehyde resin having a molecular weight of about 1000 to 3000.

8.2 As to whether or not the problem has been plausibly solved by the solution proposed above, no comparison has been made between the prior-use filter elements and the claimed subject-matter, and so an improvement over the polyamide material used in the closest prior art cannot be acknowledged. It follows that the problem is to be reformulated in less ambitious terms.

The appellant referred to the results in Annex I and stated that the problem was to be seen in the provision of an alternative filter element for filtering gas flow streams with high temperatures, high humidities and high flow rates (reformulated problem). The board observes in this respect that - as explained in point 5.5 above - the results summarised in Annex I, although having been contested by the respondents, are accepted as evidence in the present appeal proceedings. As to the merits of the results, reference is made to point 8.3 below.

- 8.3 Annex I shows that filter elements carrying fine fibres made from the specific polymeric materials claimed have improved resistance to high temperatures and high humidity in comparison with filter elements carrying fine fibres made from PVC or polyvinylidene chloride.

The respondents contested the validity of the results in Annex I because the tests were not made on fluted filter elements as claimed, but on flat filter elements. Furthermore, the tests for the fine fibres made from polyvinylalcohol crosslinked with a polyacrylic acid having a molecular weight of about 1000 to 3000 were carried out differently from the other tests, since a different substrate was used.

In the board's view these arguments do not succeed because there is no reason to believe that the resistance to high temperature and high humidity of the fine fibres would be impacted by the type of substrate, since the fine fibres are deposited on top of the substrate and so their resistance to the above critical conditions should be substantially independent of the substrate type.

8.4 It follows that it is credible from the results in Annex I that the problem as reformulated above (see 8.2) has been satisfactorily solved by the claimed filter element.

8.5 As to whether or not the solution proposed in claim 1 at issue is obvious from the state of the art, the skilled person is aware of the content of document D16, which discloses a list of polymers suitable as specific materials for the fine fibres of a dust filter bag comprising a carrier layer having deposited thereon a layer of non-woven nanofibres with a diameter of from preferably 50 to 500 nm. Among the list of polymers, the following in particular are disclosed: polyvinyl chloride, polyvinylidene chloride, polyvinyl alcohol and polyvinylidene fluoride.

In the board's view, as none of these polymers is described as preferred over the others, the skilled person holds them to be technically equivalent. It follows that the skilled person faced with the above problem and seeking for an alternative filter element for filtering gas flow streams with higher temperatures, higher humidities and high flow rates has the choice among the list of polymers disclosed in D16.

Owing to the fact that the fine fibres have to withstand high humidity, he has however no particular reason to select polyvinyl alcohol, which in D16 is described as water-soluble.

As to whether the skilled person would select polyvinylidene fluoride, this polymer is disclosed in the exhaustive list of specific polymers of document D16 and so the skilled person cannot overlook it. The teaching of D16 being however that the different

polymers of the list are merely technical equivalents, the skilled person has no reason to preferentially choose polyvinylidene fluoride.

In view of the results in Annex I that fine fibres made from polyvinylidene fluoride are particularly more resistant to high temperatures and high humidity than fine fibres from other polymers from the above list such as polyvinyl chloride or polyvinylidene chloride, this unexpected effect is surprising, and the choice of polyvinylidene fluoride among the above list of polymers is to be held to involve an inventive step, the particular resistance to high temperatures and high humidity of polyvinylidene fluoride being neither disclosed nor suggested by D16, or by any other document cited by the parties to the opposition and appeal proceedings.

From the above considerations, it follows that the skilled person would not arrive at the subject-matter of claim 1 at issue by combining the prior-use filter elements with the teaching of document D16, or of any other documents cited in the opposition and appeal proceedings, as none of these documents discloses the improved resistance to high temperatures and high humidity of the specific polymers defined in claim 1 at issue. It follows that the skilled person faced with the above problem does not find any hint in any of these documents to the solution of this specific problem. So he would not arrive in an obvious manner at a filter element comprising the air filter media pack (140) having a plurality of flutes according to claim 1 of this request.

It follows from the above considerations that the subject-matter of claim 1, and by the same token that

of claims 2 to 7 which include all the features of claim 1, involves an inventive step and therefore meets the requirements of Article 56 EPC.

The method according to claim 8, and by the same token the method according to claims 9 to 17 which include all the features of claim 8, also involves an inventive step for the same reasons as above, because these claims merely relate to a method for filtering air by directing the air through the inventive media pack defined in claim 1.

Claims 1 to 17 of this request therefore meet the requirements of Article 56 EPC.

9. It follows from the considerations in points 6 to 8 above that the objections raised by the respondents do not prejudice the maintenance of a patent on the basis of the claims according to the third auxiliary request.

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 on the basis of the set of claims of auxiliary request 3 (claims 1 to 17) filed with the letter dated 12 November 2013, the description and the figures having to be adapted where necessary.

The Registrar:

The Chairman:



C. Vodz

G. Rath

Decision electronically authenticated