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D E C I S I O N
of 11 April 2003

Case Number: T 1204/97 - 3.3.5

Application Number: 87906256.0

Publication Number: 0329659

IPC: B01D 46/24

Language of the proceedings: EN

Title of invention:

Cylindrical air filter with lightweight housing and radially directed seal

Patentee:

DONALDSON COMPANY, INC.

Opponent:

FLEETGUARD, INC.

Headword:

Air filter/DONALDSON

Relevant legal provisions:

EPC Art. 56, 99(1)

Keyword:

"Admissibility of the transfer of an appeal to a party having withdrawn its own opposition earlier in the proceedings and being the legal successor of the appellant: yes, legitimate interest in continuing the appeal proceedings not necessary"

"Proper construction of claim"

"Inventive step, no - obvious way of reducing to practice prior art teaching"

Decisions cited:

G 0003/97, G 0004/97, T 0301/87

Catchword:

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Case Number: T 1204/97 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 11 April 2003

Appellant: FLEETGUARD, INC.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 17 October 1997
rejecting the opposition filed against European
patent No. 0329659 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: R. K. Spangenberg
Members: B. P. Czech
M. B. Günzel

Summary of Facts and Submissions

I. The appeal is from the decision of the opposition division posted 17 October 1997 rejecting the opposition of opponent 2 (Nelson Industries, Inc.) against European patent 0 329 659. Opponent 1 (Fleetguard, Inc.) had withdrawn its opposition with letter dated 15 September 1997.

The independent claim 1 of the patent as granted reads as follows:

"1. An air filter arrangement comprising:
a housing (10) having first and second opposite ends and a sidewall with an air inlet opening (14) therein;
an air outlet member (20) including an inner portion sized for receipt within said housing second end; an air filter element (15) adapted to be operably received within said housing (10) and to be mounted in air flow communication with said air outlet member (20);
said air filter element (15) including:
a filter (16) defining an open, tubular filter interior;
and
a support positioned within said open, tubular filter interior;
the outlet member being positionable so that the inner portion thereof extends into the open, tubular filter interior;
the outlet member inner portion having an outer surface and an inner surface;
the filter (16) having first and second opposite ends;
the air filter arrangement including a first end cap(17) for preventing flow of unfiltered air into said filter first end, and a second end cap (25);

said second end cap (25) enclosing said filter second end;

said second end cap (25) consisting of elastomer material and having a central aperture therethrough, providing air flow communication with the open filter interior; said filter element being oriented within said housing (10) such that air, during filtering, is directed through said filter element (15) in a direction toward said inner support; the arrangement being characterized in that

- (a) it includes a sealing arrangement lining said second end cap central aperture;
said sealing arrangement including a sealing portion (25a) of the second end cap (25);
said sealing portion (25a) consisting of soft, compressible, elastomer material positioned within the filter open, tubular, interior and adjacent the support (15a) on an opposite side thereof from the filter (16), said sealing portion (25a) being compressed, within the open filter interior, between the support in the open, tubular filter interior and the outer surface of the inner portion of the outlet member (20), when the outlet member (20) is positioned with the inner portion thereof extended into the open, tubular filter interior;
said sealing portion (25a) being sized, relative to said air outlet member (20), to form a radial seal with said outlet member (20) when said air filter element (15) is mounted on said air outlet member (20); and

(b) the outlet member inner surface defines an inner wall of an air outlet passage from the filter interior."

II. The opposition division came to the conclusion that claim 1 as granted fulfilled the requirements of Article 123(2) EPC, and that the claimed subject-matter was novel and inventive over the prior art considered, which included the following documents:

D2: FR-A-1 131 647

D9: GB-A-1 499 922.

III. An appeal was filed by Nelson Industries (opponent 2). With its statement of the grounds of appeal, it inter alia filed a further prior art document:

D13 = DE-A-34 05 719.

It inter alia argued in this and further written submissions that the subject-matter of granted claim 1 was obvious in view of the disclosure of D13.

IV. In its replies, the respondent (patent proprietor) inter alia filed a translation of D13 into English, and rejected the objections based on D13. Additionally it submitted copies of industrial standards and evidence supposed to show the acceptance and commercial success of the air filters as claimed for heavy duty vehicles.

V. On 27 June 2001 a third party intervened in the proceedings claiming that the patent proprietor had instituted proceedings for infringement of the patent

against it within the meaning of Article 105 EPC. Copies of the infringement action and its notification to the patent proprietor were joined. The intervention which had been based inter alia on a new prior use was withdrawn on 23 November 2002.

- VI. The parties were summoned to oral proceedings.
- VII. With its letter dated 13 January 2003, the representative of the appellant informed the board that the appellant (opponent 2) Nelson Industries, Inc. had merged into the corporation Fleetguard, Inc., Nashville, Tennessee, and filed a copy of a certificate of merger. He requested a change of the registered opponent from formerly Nelson Industries, Inc. to the said Fleetguard, Inc.
- VIII. In preparation for the oral proceedings, the respondent submitted samples of different filter elements and a video tape. With its letter dated 28 February 2003, it filed an affidavit of Thomas G. Miller and two amended sets of claims labelled "primary move" and "1st auxiliary move". It questioned whether Fleetguard, Inc. was entitled and had a legitimate interest to resume the appeal of Nelson Industries, Inc. subsequent to the withdrawal of its own opposition during the proceedings before the opposition division. Referring to the affidavit of Mr. Miller, it inter alia commented on the proposed amendments, on the meaning of the terms used in the claims, and on the relevance of D13, D9 and D2 with respect to inventive step.
- IX. Oral proceedings took place on 11 April 2003. During these oral proceedings, the respondent presented a

further amended set of 19 claims as main request and a fresh first auxiliary request.

Claim 1 of the amended main request reads as follows:

"1. An air filter comprising:

a housing (10) having first and second opposite ends and a sidewall with an air inlet opening (14) therein; an air outlet member (20) including an inner portion sized for receipt within said housing second end; an air filter element (15) adapted to be operably received within said housing (10) and to be mounted in air flow communication with said air outlet member (20);

said air filter element (15) including:

a filter (16) defining an open, tubular filter interior; and

a supporting liner positioned within said open, tubular filter interior; the outlet member being positionable so that the inner portion thereof extends into the open, tubular filter interior;

the outlet member inner portion having an outer surface and an inner surface;

the filter (16) having first and second opposite ends; the air filter including a first end cap (17) for preventing flow of unfiltered air into said filter first end, and a second end cap (25);

said second end cap (25) enclosing said filter second end;

said second end cap (25) consisting of elastomer material and having a central aperture therethrough, providing air flow communication with the open filter interior; said filter element being oriented within said housing (10) such that air, during filtering, is directed through said filter element (15) in a direction toward said inner supporting liner; the air filter being characterized in that

(a) it includes a sealing surface (25a) lining said second end cap central aperture;

said end cap (25) consisting of a soft, compressible, elastomer urethane foam material positioned within the filter open, tubular, interior and adjacent the supporting liner (15a) on an opposite side thereof from the filter (16), said end cap (25) being compressed, within the open filter interior, between the supporting liner in the open, tubular filter interior and the outer surface of the inner portion of the outlet member (20), when the outlet member (20) is positioned with the inner portion thereof extended into the open, tubular filter interior;

said sealing surface (25a) being sized, relative to said air outlet member (20), to form a radial seal with said outlet member (20) when said air filter element (15) is mounted on said air outlet member (20); and

(b) the outlet member inner surface defines an inner wall of an air outlet passage from the filter interior."

In comparison to claim 1 of the main request, claim 1 of the first auxiliary request comprises the additional term "relatively" inserted in front of the term "soft".

During the oral proceedings, upon being questioned by the board, the appellant inter alia stated that considering the forces mentioned in D13 in connection with the pushing-onto and the pulling off of the filter element, one can assume that a radial seal is present, but that it was unclear whether this seal was located inside or on the radially outer side of the filter element.

- X. The parties' oral and written submissions, as far as they are relevant for the present decision, can be summarised as follows:

According to the respondent, claim 1 according to both requests was to be construed as being directed to air filters, wherein the filter element was radially sealed against the outlet tube by means of an inner annular region of the elastomeric end cap consisting entirely of a particularly soft PU (polyurethane) foam not previously used in the manufacture of air filter elements. This sealing region of the end cap was "distinct" or "separated" from the remainder of the end cap by means of an inner supporting liner. For the formation of the radial seal, the said region was to be compressed between the outlet tube and the supporting inner liner, the latter being necessarily sufficiently rigid to support the compressive forces exerted by the outlet upon its insertion. Such a rigid inner liner would not yield upon insertion of the outlet tube and would not permit the entire end cap to expand. Due to

the use of a particularly soft PU foam material and a rigid liner, the compressive seal was "confined to" or "contained in" the region of the end cap located between the liner and the outlet member, making the seal strong and reliable enough to be suited for heavy duty applications such as over-the-road trucks and tractors. The respondent considered this interpretation of claim 1 to be immediately apparent to the skilled person and to be justified in view of claims 1 and 2, the description and figures 1 and 3 of the application as filed. D13 did not disclose a radial seal of this type, and since it did not mention air filters suitable for use in heavy duty applications such as over-the-road trucks and tractors, it could not render the claimed subject-matter obvious.

The appellant objected to the respondent's construction of claim 1 according to both requests. More particularly, it pointed out that the respective claims 1 were silent about the rigidity of the inner liner, about measured softness values of the PU foam to be used and about any particular intended uses of the air filters. It considered that the specific meaning given by the respondent to the expressions "compressed between" and "inner supporting liner" could not be gathered from the application as filed. The appellant argued that D13 disclosed all the features relating to the seal, and that the provision of a housing as claimed was an obvious measure for a skilled person trying to provide a complete air filter on the basis of the information given in D13.

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

The respondent requested that the decision under appeal be set aside and that the patent be maintained on the basis of claim 1 of the main request filed during the oral proceedings, claims 2 - 19 and description to be adapted. As auxiliary request the respondent requested that the patent be maintained on the basis of the main request with the proviso that the word "relatively" was to be inserted in claim 1, page 2, line 1 after the word "a" and before the word "soft".

Reasons for the Decision

1. Status of the appellant and admissibility of the appeal

1.1 The appeal was filed by opponent 2, Nelson Industries. In the course of the appeal proceedings the appellant requested to record a change in the status of being opponent and appellant from the original appellant to Fleetguard, Inc., Nashville, Tennessee, on the ground that the appellant had merged into this company.

According to the established jurisprudence of the Boards of Appeal, in the event of a universal succession in law - as is the merger of legal persons - the status of opponent is transferred to the legal successor (Singer/Stauder, *Europäisches Patentübereinkommen*, second edition, Cologne 2000, Article 99, note 72).

The board had originally expressed doubts as to whether the appellant's request could be granted because according to the documents submitted the original

appellant was merged into a Fleetguard Inc. incorporated in and under the laws of the State of Indiana, whereas a Fleetguard Inc., Nashville, Tennessee had been indicated as the new opponent. The board's doubts have, however, been overcome by the appellant's explanation corroborated by an affidavit plausibly showing that Fleetguard Inc. was indeed a corporation according to the laws of the State of Indiana and the address in Tennessee was the postal address of the company's operative headquarters.

The board is therefore satisfied that the conditions for Fleetguard Inc. to be the new opponent and therefore also to be the appellant are met.

- 1.2 The respondent doubted the right of Fleetguard Inc. to now act as opponent and appellant because it had originally filed an opposition itself, but had then withdrawn this opposition during the proceedings before the opposition division to pursue a license with the patent proprietor. After having taken the license it had purchased the original appellant. The respondent's conclusion was that Fleetguard Inc. therefore lacked a legitimate interest to take legal action again on the basis of the opposition filed by the original appellant.

The board is unable to endorse this view. It is the characteristic of a universal legal succession that the legal successor acquires the legal status of the legal predecessor as it stands ie all the duties but also the rights of the legal predecessor pass over to him as of right and as they stand. Moreover, as a legitimate interest is not a requirement for an opposition to be admissible (G 3/97 and G 4/97, OJ EPO 1999, 245 and

270, points 3.2.1 et seq., see also Singer/Stauder, loc.cit., Article 99, note 17 et seq.), it can also not be required as a condition for being entitled to continue an opposition as the legal successor of the original opponent. Whether or not an opponent acts unlawfully or contrary to contractual obligations in relation to the proprietor by pursuing an opposition against its patent is, as a matter of principle, outside the opposition procedure and is not to be examined by the EPO but falls within the remit of the national courts. Even where the opponent's contractual relations with the proprietor are so strong that it is under a no-challenge obligation (which has, however, not been submitted here), this has no effect on the admissibility of an opposition filed by it with the EPO, but the proprietor must attempt to enforce its rights before the competent national authorities (G 3/97 and G 4/97, loc. cit., point 3.3.2 of the reasons).

Therefore, in the present case the appeal has not become inadmissible by the fact that it has been taken over by Fleetguard Inc..

- 1.3 In the remainder of the present decision Fleetguard, Inc. will therefore be addressed as "the appellant".

Main request

2. *Construction of claim 1*

- 2.1 In discussing the relevance of the prior art, the parties strongly disagreed on the meaning to be given to the expression characterising the seal of the air

filter according to claim 1, ie "said end cap (25) being compressed, within the open filter interior, between the supporting liner ... and ... the outlet member". The meaning of this expression therefore needs to be construed by the board in the light of the total disclosure of the application as filed and the general knowledge of the skilled person at the date of filing.

2.2 As was acknowledged by the respondent during the oral proceedings, the application as filed, like present claim 1, does not explicitly mention that the compressive forces are to be confined to or contained within the region of the end cap located between the inner liner and the outlet member. More particularly, the application as filed does not explicitly address the questions of whether or not the inner liner may yield and of whether or not the entire end cap may expand (leading to an increased outer diameter) upon insertion of the outlet member. Likewise, the application as filed does not state expressly that the supporting liner is intended to support the compressive forces occurring in the end cap material. Hence, it must be examined whether the application as filed provides sufficient implicit support for the construction of claim 1 as suggested by the respondent.

2.2.1 From the description and claims as filed it can be gathered that the compression required for achieving a radial seal is to be obtained by providing an outlet member having an outer surface with cross-sectional dimensions larger than the cross-sectional dimensions of the inwardly oriented surface of the annular end cap, see page 6, line 15 to page 7, line 5, and claim 5. The sole end cap material explicitly disclosed is a foamed

PU elastomer which is soft and hence implicitly compressible in the strict sense, ie which is reduced in volume when subjected to pressure, by virtue of the compressible gas pockets contained therein. Due to the relative dimensions of the outlet member and the central aperture of the end cap, and due to the annular shape of the PU material, the surface region of the inwardly oriented surface of the annular end cap is thus inevitably compressed, at least to a certain degree, upon insertion of the outlet tube. This compression is inevitably accompanied by an expansion, ie an increase of the cross-sectional dimensions, of the inner surface region of the annular end-cap.

- 2.2.2 The description as filed does not indicate that the inner liner mentioned in connection with the embodiment shown in the figures is of importance in achieving the said compressive radial seal, see page 5, lines 1 to 5 and page 8, line 22 to page 9, line 3. The description merely states that the end cap material is compressed at its inner surface. Moreover, the description as filed does not address the rigidity or the non-yielding of the inner liner and the confinement of the compressive seal to the region between the inner liner and the outlet member as essential features in connection with the formation of the desired radial seal. In the sole passage relating to the strength of the supporting liners to be used, it is merely said that the (axial) strength and rigidity of the known liners suitable for use in axially sealed filter elements, is **not** required, see column 6, lines 2 to 16. In connection with the discussion of D13, the respondent has pointed out that this document does not indicate whether the metallic cylindrical inner liners

disclosed therein are axially soldered or not, and hence radially yielding or not. The board notes that the same is true for the present patent: Although it is clear from the description that the preferred filter element shown in the drawings comprises a relatively heavy inner liner of perforated metal (see column 3, lines 48 to 50, and column 6, lines 2 to 8), the contested patent, like D13, is silent about whether the cylindrical liner is axially soldered or not, and hence radially yielding or not.

2.2.3 Figures 1 and 3 of the patent represent a preferred embodiment. They are of a schematic nature and not drawn on the same scale. What can clearly be taken from Figures 1 and 3 in conjunction with the corresponding description is that a radial seal is obtained by the compression due to the differing dimensions of the inwardly facing surface 25a of the annular end cap and of the exterior surface of the outlet member, the diameter of the surface 25a inevitably increasing to conform with the outer diameter of outlet member. However, the board holds that, due to their schematic nature, figures 1 and 3 **cannot**, per se or in connection with the corresponding description, present the skilled reader with the implicit information that the inner liner may not at least slightly yield or that the outer diameter of the end cap may not at least slightly increase upon insertion of the outlet member, ie that no dimensional changes occur in the end cap in the region outside of the inner liner.

2.2.4 The functional expression "compressed **between**" comprised in present claim 1 occurs only twice in the

entire application as filed, namely in claims 2 and 6 thereof.

However, like the description, claim 6 clearly refers to the compression of the inwardly facing **surface** of the end cap by virtue of the dimensioning of the end cap aperture and the outlet member. According to claim 6, the said surface is said to be compressed between the outlet member and an inner liner. However, it is not said that substantial compressive forces actually reach this inner liner, let alone that this inner liner must be so rigid as to confine the compression of the end cap material to its interior.

Claim 2 as filed specifies that the **end cap** is construed and arranged to be compressed between the air outlet member and a **supporting liner** of the filter element. As pointed out by the appellant, said claim 2 was not clearly linked or related to some other specific part of the description or to the drawings of the application as filed. Taken by itself, and unlike eg figure 1 or claim 6 as filed (see page 12, lines 13 to 14), claim 2 neither specifically refers to an inner region of the end cap to be compressed or to a specific, eg inner, position of the supporting liner. On the other hand, according to the other parts of the application as filed, the seal is merely said to be obtained by the compression of the annular end cap at its inwardly facing **surface**, which has a smaller diameter than the outer diameter of the inserted outlet tube, see page 6, lines 25 to 28, and claims 1, 5 and 6 as filed. Moreover, claim 2 as filed does not specify which part of the air filter element is actually to be supported by the liner, and for which purpose. The

respondent argued that in view of the expressions "compressed between" and "supporting liner" the skilled person could only understand from claim 2 as filed, in the context of the entire application, that it was meant that an inner liner was provided for supporting the radial compressive forces exerted by the outlet member upon its insertion into the end cap. However, the board notes that the only occurrence of the functional term "supporting" in the application as filed is in the said claim 2 itself. On the other hand, the appellant convinced the board that a skilled person not knowing the respondent's interpretation of this term, could consider that the liner mentioned in claim 2 as filed, irrespective of its location, was simply provided to support the pleated paper filter medium against collapse during filtration. The language used in prior art document D13, ie "Filterkörper, der innen von einem Stützkörper abgestützt wird" (see claim 1 and page 6, last paragraph of D13) supports this view. Consequently, the board cannot accept that the skilled person would understand the functional expression "compressed between" as used in claim 2 as filed to mean that the compressive forces must necessarily be contained in the region of the end cap which is located between the outlet member and a rigid, non-yielding liner. Hence, the board holds that said claim 2 cannot, due to its "isolation" within the application as filed and to its lack of precision as to the meaning of the functional expressions "supporting" and "end cap compressed between", be considered to represent a clear and unambiguous disclosure of such a seal.

2.2.5 The board also notes that neither claim 1 nor the application as filed comprise indications concerning a more precise meaning of the term "soft" as used in claim 1 for describing the end cap material, eg in terms of Shore A hardness values or in terms of specific, less soft, comparative materials. All the description says is that the properties of the material, including its softness, must be such "that it is capable of functioning as a seal or gasket", see page 6, lines 11 to 15. In the board's view, the fact that the application as filed also uses the term gasket when referring to the end cap 25 or its inner surface 25a see page 3, last line and page 8, line 5, cannot, in the absence of further indications, be considered necessarily to imply a reference to a compression between two hard (ie non yielding) mechanical parts.

2.2.6 In view of the above considerations, the board has serious doubts whether the parts of the application as filed discussed above may be viewed in combination and may thereby be considered to constitute a clear and unambiguous disclosure of a filter corresponding to present claim 1 as construed by the respondent.

2.3 Moreover, even accepting for the sake of argument that the preferred embodiment shown in figures 1 and 3 as filed implicitly disclosed the said type of seal by virtue of the indication "relatively heavy perforated metal liners", the dimensions shown in the figures, and the suitability of the filters for use in heavy duty applications, such as in trucks or tractors, the board still takes the view that claim 1 cannot be construed as being limited to an air filter suitable for use in trucks or tractors, with a compressive seal confined to

the space between the inner liner and the outlet member as suggested by the respondent, since neither the intended uses nor the features leading to such a seal, i.e. the use of a rigid, non-yielding inner liner in combination with a correspondingly soft end cap material are recited in present claim 1, and are not necessarily implicit to the functional expression "compressed between" as used in present claim 1, when taken in its broadest meaningful sense. As set out above, the application as filed does not provide sufficient information to justify the narrow interpretation of the said functional expression, which, in view of the contents of the application as filed, can also be construed to simply refer to a compression "at the surface" of the end cap aperture, hence at a location between the outlet member and the inner liner.

- 2.4 Consequently, the board holds that present claim 1, when properly construed in the light of the application as filed and the knowledge of the skilled person, encompasses all those air filters wherein the filter element is radially sealed against an inserted outlet tube by means of an annular end cap made of a soft compressible PU foam material, which end cap has an inwardly directed surface having a diameter smaller than the diameter of the outlet tube, and wherein the seal is achieved by compressing the end-cap material at least in a surface region located between the inserted outlet tube and an inner supporting liner of the filter element. Present claim 1 does not exclude inner liners which are not rigid enough to suppress any yielding thereof and does not require that the seal forming compressed region be confined to or contained within the annular region between the outlet tube and the

liner, in the sense that the compressive forces are supported by the inner liner and that outer diameter of the end cap may not expand when the seal is formed. Neither is claim 1 restricted to air filters suitable for being used as air intake filters in trucks or tractors.

3. *Amendments*

3.1 In the board's view, the compliance of claim 1 as amended during the appeal proceedings with the requirement of Article 123(2) and (3) EPC cannot or can no longer be challenged on the basis of the objections raised during the prosecution of the case. The board is satisfied that amended claim 1 in its present wording, construed as set out above, finds sufficient basis in the application as filed and is restricted in comparison to claim 1 as granted, by virtue of the inclusion of the additional feature "foamed urethane" and "inner supporting liner".

3.2 The feature "soft" as contained in present claim 1, which was objected to for lack of clarity by the appellant during the oral proceedings before the board, was already present in claim 1 as granted. Since lack of clarity is not a ground for opposition, and since the objection does not arise from the amendments to the claims, it need not be further considered, see eg T 301/87 (OJ EPO 1990, 335).

4. *Inventive step*

The main further issue in dispute at the oral proceedings was the presence or absence of an inventive step.

4.1 Closest prior art

4.1.1 The introductory sentence of the patent specifies that the claimed invention relates to air cleaners with pleated filter elements "used **primarily** with over-the-road trucks and agricultural tractors". In view of this wording, other uses of the claimed air filters are not excluded. Considering its construction of claim 1 (see point 2. above), the board thus takes the view that claim 1 cannot be considered to be limited to air filters suitable for being used in trucks or tractors, and that the subject-matter of claim 1 cannot be considered to be specifically adapted for these uses. Consequently, the prior art to be taken into account as starting point in the assessment of inventive step need not necessarily be chosen from the specific field of air filters for heavy duty vehicles.

4.1.2 On the other hand, and in contrast to the impression given by the introductory part of the contested patent relating to the prior art (see column 1, line 15 to column 2, line 4 and column 2, lines 40 to 57), the person skilled in the art already knew, before the filing date of the contested patent, air filter arrangements wherein an open end cap is **radially** sealed against an air outlet tube extending into the interior of a cylindrical filter element, as well as their use in filtering the intake air of internal combustion

engines, see eg D2, left-hand column, second paragraph, and figure 1, and D9, page 1, lines 9 to 14, claims 1, 2 and 7, and figures 3, 5 and 7 and the corresponding description.

- 4.1.3 Another air filter with a filter element radially sealed against an air outlet tube is known from D13. This document discloses a cylindrical air filter element to be used for instance in larger or industrial vacuum cleaners, able to withstand high load operating conditions and nevertheless being easy and fast to exchange. The filter element comprises an inner liner (2) supporting a pleated filter medium (1), said liner being fabricated from wire mesh, perforated sheet metal or plastic grid. The filter element is closed by an end-cap (3) at one of its ends. At the opposite end of the filter element, the cylindrical inner liner is embedded in an annular mass (7) of soft foamed polyurethane which is to be considered as a second end cap having a central aperture. For use, the filter element is said to be pushed onto ("aufgesteckt") an air suction tube operating as air outlet member, the open annular poly-urethane end cap thereby forming an annular seal ("Ring-Dichtung", "umlaufende Dichtung"). In operation, the air to be filtered flows through the pleated medium towards said inner line and leaves the filter via the air outlet member. See in particular figure 1, claims 1, 5 and 7, page 3, second paragraph, the first two sentences, page 4, first paragraph, page 6, last paragraph, page 7, third full paragraph, and page 9, the first two lines.

As emphasised by the respondent, D13 does not contain a drawing actually showing the details of a filter element positioned on an outlet tube. Also, D13 does not explicitly state whether the annular seal is supposed to act radially, ie against the outlet tube, axially, ie against some housing part not shown, or both axially and radially. However, considering that D13 is silent about any surface against which the annular sealing ring is to be axially pressed upon use, and considering further that radial seals were known to the skilled person in the field of air filters at the date of filing the patent in suit (see above point 4.1.2), there is no reason why the skilled person would find the disclosure of D13 inconsistent with the available prior art. The board is thus convinced that a skilled person would understand the language used in D13, ie the reference to the pushing of the filter element onto the outlet tube and its pulling off, in combination with the reference to the forces required to do so, to implicitly disclose in a clear and unambiguous manner a radial seal between the soft foamed annular polyurethane end cap material and the outlet tube, see in particular D13, page 4, last paragraph and page 8, last paragraph.

The respondent further argued during the oral proceedings that even assuming in view of the forces mentioned in D13 that some kind of radial seal was formed by pushing the filter in its operational position, the said radial seal could also be located at the **outer** circumferential surface of the annular end cap. The board does not accept this argument, since claim 1 of D13 clearly refers to the pushing of the filter element **onto the outlet tube** ("auf Ansaugstutzen

aufgesteckt"), which wording leaves no room for the interpretation of the respondent.

The board is also convinced that the skilled person would clearly and unambiguously consider the language used in D13, ie the expression "pushed onto" ("aufgesteckt"), in combination with the mention of the forces required to actually push the filter element onto the outlet tube, and the information provided by Figure 1, to implicitly disclose the further seal-related features of present claim 1 as construed by the board as well (see point 2. above). In particular, it directly follows from the type of seal material used, ie a soft, foamed and hence compressible PU, and from the forces required to generate the radial seal, that the seal material is expanded and thus compressed, at least to a certain degree, at its inwardly oriented surface, upon being pushed onto the outlet tube. To achieve this effect, the outer diameter of the outlet tube must necessarily be larger than the narrowest diameter of the central end cap aperture. Looking at Figure 1 of D13, this unambiguously implies that the outlet tube penetrates the end cap and extends into the filter element interior at least down to the lower edge of the end cap aperture. From the fact that in its narrowest part the inner circumferential surface of the end cap shown in Figure 1 of D13 is surrounded by the concentric inner liner 2 at least up to a certain depth, it clearly follows that the compression of the polyurethane occurring at the said circumferential surface is at least in part located between the outlet tube and the inner liner 2, which may be more (plastic mesh) or less (perforated metal) rigid or yielding.

Consequently, the only features of present claim 1 as construed by the board which can be regarded as not being disclosed in D13 are the ones relating to the specific construction of the filter housing and its relative arrangement with respect to the filter element and the outlet tube, ie the features "a housing (10) having first and second opposite ends and a sidewall with an air inlet opening (14) therein; an air outlet member (20) including an inner portion sized for receipt within said housing second end; an air filter element (15) adapted to be operably received within said housing (10) and to be mounted in air flow communication with said air outlet member (20)".

4.1.4 Considering that the prior art to be taken into consideration as the closest prior art for the assessment of inventive step is not restricted to air filters for heavy duty vehicles, and that D13 discloses an air filter with a radial type seal as defined in present claim 1, the board shares the opinion of the appellant that it is document D13 which represents the said closest prior art.

4.2 *Technical problem*

In view of the disclosure of D13, the technical problem to be solved by an air filter according to present claim 1 as construed by the board can be seen in providing, based on the indications given in D13 concerning the filter element and its interaction with the outlet tube, a complete and fully functional device for air filtration, such as eg an industrial vacuum cleaner.

4.3 *Obviousness of the solution*

4.3.1 Air cleaners of the suction type and more particularly large or industrial vacuum cleaners of the type referred to in D13 generally comprise a housing within which a filtering element is arranged. Dirt laden air is sucked into the housing and against and through the filtering element from the outside to the inside thereof, whereby the dirt is separated and retained within the housing. The cleaned air leaves the filter interior and the housing and flows further towards the air suction device. Such a housing will generally have parts that could be considered as first and second ends in the broadest sense.

4.3.2 The respondent has not provided arguments supportive of an inventive step based on the features of claim 1 which relate to the construction of the housing and the inlet to the housing or the combination of such features with the air filter disclosed in D13. It has essentially based its argumentation on the alleged differences in terms of the seal construction, the sealing mechanism, and the intended uses of the filters according to the present patent and D13, respectively. In view of the proper construction of claim 1 as adopted by the board (see point 2. above), these arguments cannot, however, contribute to establish an inventive step.

4.3.3 The board takes the view that in reducing to practice and completing the information given in D13, the skilled person would provide a housing with an air inlet around the radially sealed system of outlet tube and filter element disclosed therein. Arranging the air

intake in a side wall, and arranging the air outlet/suction tube at one of the said two ends are mere design options which are near at hand to the skilled person. The board thus comes to the conclusion that the skilled person confronted with the stated technical problem would consider the incorporation of the system disclosed in D13 into a housing, and particularly into a conventional industrial vacuum cleaner housing, as well as the arrangement of the air inlet and outlet in the way recited in present claim, as an obvious solution of the stated technical problem.

- 4.4 Since the subject-matter of claim 1 is not based on an inventive step as required by Article 56 EPC, the main request cannot be allowed.

First auxiliary request

5. *Amendments*

The insertion of the term "relatively" in connection with the term "soft" finds a basis on page 6, line 13 of the application as filed. This amendment can only be considered to restrict, if at all, the scope of claim 1 according to the main request. Hence, the amendment fulfils the requirements of Article 123(2) and (3) EPC.

6. *Construction of claim 1*

Even when considering the entire contents of the application as filed, the board takes the view that no clear additional information can be attributed to the expression "relatively soft" as compared to the term "soft". In particular, the application as filed does

not support the respondent's allegation according to which the expression "relatively soft" should be construed as restricting the seal forming materials to those which are softer than any of the other sealing materials used in air filter elements before the filing date of the contested patent, including the soft PU foams as disclosed in D13. The entire passage of the application as filed which relates to the consistency of the end cap material does not indicate or imply any clear basis for the comparison implicit to the term "relatively", see page 6, lines 11 to 15. Said term could also, for example, be understood to qualify the PU material used in comparison to relatively hard plastisol seal materials, or in comparison to known PU materials ranging from hard to soft.

7. *Inventive step*

Since in the board's view the insertion of the term "relatively" does not imply any clear additional substantive difference of the claimed subject-matter over the disclosure of D13, this amendment cannot affect the assessment of inventive step. For the same reasons as given above concerning claim 1 of the main request, the subject-matter of claim 1 of the first auxiliary request is thus found not to be based on an inventive step as required by Article 56 EPC. Consequently, the first auxiliary request cannot be allowed either.

Order

For these reasons it is decided that:

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

The Registrar:

The Chairman:

U. Bultmann

R. Spangenberg