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Case Number: T 0206/12 - 3.3.05

Application Number: 01203469.0

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Language of the proceedings: EN

Title of invention:
Air filter element with integral radial seal gasket

Patent Proprietor:
Baldwin Filters, Inc.

Opponent:
DONALDSON COMPANY, INC.

Headword:

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Novelty - (yes)
Inventive step - (yes)

Decisions cited:

Catchword:

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Case Number: T 0206/12 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 24 July 2015

Appellant: (Opponent)	DONALDSON COMPANY, INC. 1400 West 94th Street Minneapolis, MN 55440 (US)
Representative:	Eisenführ Speiser Patentanwälte Rechtsanwälte PartGmbB Johannes-Brahms-Platz 1 20355 Hamburg (DE)
Respondent: (Patent Proprietor)	Baldwin Filters, Inc. 4400 East Highway 30 Kearney, Nebraska 68848-6010 (US)
Representative:	Hoeger, Stellrecht & Partner Patentanwälte mbB Uhlandstrasse 14c 70182 Stuttgart (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 28 November 2011 maintaining European patent No. 1258278 in amended form.**

Composition of the Board:

Chairman	G. Raths
Members:	G. Glod
	P. Guntz

Summary of Facts and Submissions

I. The present appeal lies from the decision of the opposition division that European patent EP 1 258 278 as amended (auxiliary request 1) met the requirements of the EPC.

II. The documents cited during the opposition proceedings included the following:

B2: WO-A-9942719
B3: US 5 071 456
B4: US 4 720 292
B5: US 5 484 466
B6: US 5 547 480
B7: US 6 099 606
B8: US 5 954 849

III. The **opponent (appellant)** filed an appeal against said decision and submitted grounds for the appeal.

IV. With the letter of 12 October 2012, the **patent proprietor (respondent)** submitted auxiliary requests I to III and main request (a) to auxiliary request III(a).

V. In its communication under Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA), the board expressed its preliminary non-binding opinion that the main request and auxiliary requests 1 to 3 did not meet the requirements of Article 123(2) EPC. Document B2 was found highly relevant for the question of novelty of claim 1 of the main request and main request (a). Auxiliary requests I to III and I(a) to III(a) were considered to involve an inventive step.

VI. Oral proceedings took place on 24 July 2015. During them the respondent withdrew all requests except for "Auxiliary Request Ia" that was found allowable. Claim 1 of that request reads as follows:

"*1. An air filtering (30) element comprising in combination:*
a tubular filter media (35) having first and second ends; tubular inner (33) and outer (34) liners supporting the filter media (35) and also having first and second ends; characterized by the filter element (30) having a closed end cap (36) formed of molded foam material encapsulating the first ends of the liners (33, 34) and the filter media (35); an insert ring (42) of substantially stiff plastic material having:
a cylindrical flange (43) having an inner surface (45) positioned to support a gasket (44); a sealing portion (54) supporting the cylindrical flange (43) and sized to snugly fit within the inner liner (33), the sealing portion (54) forming a fluid restriction, and the fluid restriction restraining the foam material from filling the area between the cylindrical flange (43) and the inner liner (33); a tapered portion (53) intermediate the cylindrical flange (43) and the sealing portion (54), the tapered portion (53) being sized to engage the inner liner (33) for guiding the inner liner (33) to the sealing portion (54), a base portion (41) supporting the sealing portion (54);
the insert ring (42) being fit within the second end of the inner liner (33) with the sealing portion (54) snugly engaging the inner liner (33); and an open end cap (38) formed of molded compressible foam material of sufficient resilience to serve as a gasket, the foam material encompassing the base portion (41) of the insert ring (42), the second ends of the liners (33, 34) and filter media (35) and the inner surface (45) of

the cylindrical flange (43), the shape and dimension of said foam material on the inner surface (45) being configured to form a sealing gasket as a part of the open end cap (38)."

Claim 2 is directed to the combination of claim 1 wherein the sealing portion (54) comprises a substantially straight-sided cylindrical portion positioned between the tapered portion (53) and the base portion (41).

Claims 3 to 10 represent particular embodiments of the subject-matter of claim 1 on which they depend.

VII. The **appellant**'s arguments relevant to the present decision can be summarised as follows:

Based on the teaching of the description in combination with the figures, the skilled person recognised that the sealing portion 54 was part of vertical legs distributed about the periphery of the ring and extending from base portion 41 with feet 51 towards tapered portion 53 of cylindrical flange 43, thereby providing for a minimal connection between the stiff ring and the filter pack elements. The fluid restriction formed by the sealing portion 54 limited but did not completely block the foam material from entering into the gap 50 between the cylindrical flange 43 and the inner liner 33.

Novelty

The subject-matter of claim 1 lacked novelty over B2, since the only difference acknowledged by the opposition division, namely "the sealing portion 54 forming a fluid restriction and the fluid restriction

restraining the foam material from filling the area between the cylindrical flange 43 and the inner liner 33" was unambiguously derivable from B2. In particular, legs 36a of B2 fulfilled the definition of a sealing portion according to claim 1. A sealing portion was not to be understood as a continuous ring, but only as a section that had sealing properties. In sections between legs 36a the outer perimeter of wall 35 restrained the foam material from filling the area between wall 25 and inner liner 3. It was clear, as illustrated for example by figure 1, that this area was not intended to be filled by foamed material. "Restraining" was not to be understood as "preventing" in this context. The insert ring in the opposed patent had openings 57 that were intended to be penetrated by foam material in exactly the same way as the notches and openings in the insert ring of B2. Foam material was viscous and did not easily penetrate small openings such as the gap between 35 and inner liner 3 that was present when no legs 36 were present. In addition, the wall section 35 was tapered and the legs 36 were connected to the outer periphery of wall section 35 via a curved or tapered portion.

Inventive step

The subject-matter of claim 1 lacked an inventive step over B2 alone or in combination with B5 or B8.

If the continuous circular surface around the whole insert ring was assumed to be the difference with B2, the objective problem would be to provide an improved, more complete connection between the insert ring and the inner liner. The solution was obvious, since making legs 36a continuous around the periphery of support 23 was an an obvious measure. In addition, B5 disclosed

continuous ring 40 that acted as a barrier to the moulding material. The same applied to continuous ring 40 shown in B8.

The advantage of stiffness linked to the tapered portion could not be taken into consideration, since there was no indication about the amount of tapering. It was not credible that only a small degree of tapering increased stiffness. The guiding of the inner liner to the sealing portion during assembly was already achieved in B2 through the inclined portion 35. Therefore, the tapering did not provide any benefit with respect to B2 and was to be considered as an obvious alternative. The continuous ring 40 disclosed in B5 was tapered. So was continuous ring 40 shown in B8.

The subject-matter of claim 1 also lacked inventive step over B3 in combination with any one of documents B4 to B7.

VIII. The **respondent**'s arguments can be summarised as follows:

The detailed specification clearly defined the sealing portion 54 to be a cylindrical portion of flange section 43. There could be no doubt from figure 5 that sealing portion 54 was an uninterrupted cylindrical portion of flange section 43 and could not be defined as only an assembly of pin points.

If base 41 was encapsulated by the end cap material 38 and the flange section projected from the end cap, sealing portion 54 would necessarily not be embedded in the end cap.

There could be no doubt that figure 5 showed a continuous circular surface extending around flange section 43 adjacent to tapered portion 53. The word "seal" itself allowed no other interpretation than a tight and perfect closure or a device to prevent a passage or return of gas or air.

Novelty

B2 did not give the slightest indication that there should be no foam material in the gap between filter support 23 and inner liner 3. It was obvious that legs 36a extended radially from perimeter area 35a and that if legs compressed against the portion of inner liner 3 during assembly there would be a reasonable gap between inner liner 2 and perimeter area 35a. Foam material would pass through said space and fill the area between filter support 23 and inner liner 3. B2 (last paragraph, page 28) even disclosed an embodiment having large apertures 42 to allow the flow of polymer into said area. Therefore, B2 did not disclose a sealing portion forming a fluid restriction and the fluid restriction restraining the foam material from filling the area between the cylindrical flange and the inner liner.

B2 also did not disclose a tapered portion intermediate to the cylindrical flange.

Inventive step

The problem to be solved was to provide an air filter with a formed-in-place radial seal gasket in which the formed-in-place gasket was isolated from forces normally imposed on the inner liner so that the filter had excellent seal integrity in high and low

temperature extremes and under vibration conditions normally encountered.

This problem was solved by an insert ring 42 with a sealing portion that formed a fluid restriction, and with a tapered portion that provided stiffness.

The functional definition of the tapered portion defined the size of the taper. If the taper was able to engage the inner liner for guiding the inner liner to the sealing portion, then the tapered portion would also provide stiffness to the ring.

B2 did not relate to the avoidance of foam material in the gap between filter support 23 and the inner liner 3. It was also completely silent about a tapered portion to guide the liner to the sealing portion during assembly. In B2, stiffness was increased by struts 40.

Neither B5 nor B8 taught an insert ring having a sealing portion snugly fitting within the inner liner and restraining the foam from entering the area between the inner liner and the insert ring.

IX. Requests

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

The respondent (patent proprietor) requested that the patent be maintained in amended form on the basis of its sole request, submitted on 12 October 2012 as "Auxiliary request Ia". All other requests were withdrawn.

Reasons for the Decision

Auxiliary request Ia (sole request)

1. Article 54 EPC

Claim 1 contains several features that are defined with reference to their function. This includes the features "sealing portion (54)" that has to be "sized to snugly fit within the inner liner (33)" and has to be able to "form[ing] a fluid restriction, and the fluid restriction restraining the foam material from filling the area between the cylindrical flange and the inner liner", and "the tapered portion (53) being sized to engage the inner liner (33) for guiding the inner liner (33) to the sealing portion (54)".

The expression "restraining ...from filling" is rather vague and does not provide any indication as to the extent to which the area between the cylindrical flange and the inner liner should not be filled. Still, it would be understood by the skilled person that the sealing portion has to be such that the filling of the **whole** area between the cylindrical flange and the inner liner during moulding needs to be somehow obstructed.

B2 discloses in figure 1 an air filtering element 1 comprising in combination a tubular filter media 4 having first and second ends; tubular inner liner 3 and outer liner 2 supporting the filter media 4 and also having first and second ends, the filter element having a closed end cap 7 formed of moulded foam material (B2: page 25, lines 25 to 27) encapsulating the first ends of the liners and the filter media, an insert ring 23 of substantially stiff plastic material (B2: page 28,

lines 22 to 24) having a cylindrical flange 25 having an inner surface 32 positioned to support a gasket 15.

The legs 36a which support feet 36 on the insert ring 23 (figure 2) can be considered as a sealing section (portion) supporting the cylindrical flange and sized to snugly fit within the inner liner 3. It can also be accepted that the legs 36a form a fluid restriction at that part of the insert ring where they are located.

In addition, a base portion 36 supports the sealing portion 36a. The insert ring 23 is fit within the second end of the inner liner 3 with the legs 36a (sealing portion) snugly engaging the inner liner 3. The open end cap 6 is formed of moulded compressible foam material (B2: page 25, lines 25 to 27) so that it has sufficient resilience to serve as a gasket. The foam material encompasses the feet 36 that can be considered as a base portion of the insert ring 23. In addition, it encompasses the second ends of the liners 2 and 3, the filter media and the inner surface 32 of the cylindrical flange 25. The shape and dimension of said foam material on the inner surface 32 are configured to form a sealing gasket as a part of the open end cap 6.

However, it is not directly and unambiguously derivable from B2 that the legs 36a, which are only present in a limited number on the ring 23 (B2: figures 2, 2A and 2B) -(preferably 5 to 12 (B2: page 29, line 19))- have any significant influence on the filling of the whole area between the cylindrical flange 25 and the inner liner 3 during moulding. The foam will simply bypass the rather narrow legs 36a and enter said area through the space present between inner liner 3 and the outer perimeter of wall section 35. The area may not be

filled that quickly in view of the narrowness of said space, which could also be considered to reflect the feature "restraining from filling". However, in that case the "restraining from filling" is due rather to the wall section 35 than to the legs 36a. The wall section 35 cannot be considered as a sealing portion that is sized to snugly fit within the inner liner, since the contact with the inner liner is due to the legs 36a (B2: page 29, line 11 "friction fit caused by legs 36a").

The board concludes that "the sealing portion forming a fluid restriction, and the fluid restriction restraining the foam material from filling the area between the cylindrical flange and the inner liner" is not directly and unambiguously derivable from B2.

In addition, B2 does not disclose "a tapered portion (53) intermediate the cylindrical flange (43) and the sealing portion (54), the tapered portion (53) being sized to engage the inner liner (33) for guiding the inner liner (33) to the sealing portion (54)". The insert ring 23 shown in figure 1 of B2 is bent to provide wall section 35, but the ring does not have a tapered portion in the sense that the thickness of the ring would change, as is evident from figures 1, 2, 2A and 2B.

The board concludes that the subject-matter of claim 1 fulfils the requirements of Article 54 EPC.

2. Article 56 EPC

2.1 Invention

The invention concerns an air filter element with integral radial seal gasket (see claim 1 and title).

2.2 Closest prior art

It is settled case law that the closest prior art is normally represented by a document disclosing subject-matter conceived for the same or similar use, purpose and effect as the invention at issue, and requiring the minimum of structural and functional modifications.

B2 is considered to be the closest prior art since, as indicated above, it discloses an air filtering element similar to that claimed.

2.3 Problem

According to the patent in suit, the problem was to provide an air filter with a formed-in-place radial seal gasket that was isolated from forces normally imposed on the inner liner, so that the filter had excellent seal integrity in high and low temperature extremes and under vibration conditions normally encountered (paragraphs 6 and 9 of the patent).

2.4 Solution

As a solution to this problem the patent in suit proposes an air filtering element according to claim 1 of auxiliary request Ia characterised in that the sealing portion (54) of the insert ring forms a fluid restriction such that the foam material is restrained

from filling the area between the cylindrical flange (43) and the inner liner (33), and in that the insert ring has a tapered portion (53) intermediate to the cylindrical flange (43) and the sealing portion (54), the tapered portion (53) being sized to engage the inner liner (33) for guiding the inner liner (33) to the sealing portion (54).

2.5 Success of the solution

It is plausible that the problem has been solved, since the tapered portion helps to improve the stiffness of the ring (column 5, lines 22 to 24) while the extension of the sealing portion will improve the sealing integrity. This will ensure that no foam enters the area between the cylindrical flange 25 and the inner liner 3 and the gap between the inner liner 3 and the outer perimeter of wall section 35. The tapered portion is also helpful for the creation of the gap 50 (see figures 4 to 6 of the patent) and the isolation of the gasket from the inner liner.

The tapered portion has to be sized such that it engages the inner liner for guiding the inner liner to the sealing portion. This means that a minimal tapering would not suffice, as the guiding would then not be possible. The board considers that the tapering needed to achieve the required guiding function is such that the advantages mentioned in the above paragraph can be achieved.

It is also accepted that the extension of the sealing portion and the inclusion of the tapered portion lead to an improvement over the air filter shown in B2, since the structure and the limited number of legs 36a cannot provide a good sealing between the ring 23 and

the inner liner 3.

So there is no need to reformulate the problem.

2.6 Obviousness

It has to be decided whether or not the proposed solution can be derived from the prior art in an obvious manner.

2.6.1 B2 relates to a retrofitted Donaldson-type radially sealing structure formed from soft compressible foamed polyurethane as shown in figure 5. In order to be able to achieve such a retrofitting, the ring 23 that can be considered as an adapter is included in the air filter (page 27, lines 14 to 19; figure 1). The legs 36a help to fix the ring 23 to the media pack 5 so that it does not separate during moulding (page 29, lines 8 to 15).

B2 does not teach that the improved sealing and stiffness of the ring 23 help to reduce forces on the inner liner. The skilled person finds no pointer in B2 towards any change of the ring for the purpose of isolating forces on the inner liner.

Even assuming that wall section 35 of ring 23 provided the same guiding function as the tapered portion claimed, there would still be no teaching towards a tapering and the benefits linked thereto in B2. B2 rather teaches that to strengthen wall 25, struts 40 could be included (page 29, lines 23 and 24). Although it may still be argued that the skilled person knew that the legs 36a had to be extended to improve the sealing, there is no teaching in B2 that the tapered portion in combination with the sealing portion solves the posed problem (point 2.3). Tapering is not

mentioned at all in B2. It can only be derived therefrom with hindsight. The board concludes that the proposed solution cannot be derived from B2.

2.6.2 B3 relates to a construction different from B2. The object of B2 is to provide an air filter in which the clean air filter is reliably sealed off from the raw air chamber with a low-cost gasket (column 1, lines 58 to 61). The end plate 19 carries a radial gasket 23 (column 3, lines 31 and 32). End plate 19 is not embedded in any foam material and there is no insert ring within the meaning of claim 1 of this request. Consequently, B3 is also completely silent about forces on the inner ring. B3 does not provide a solution to the posed problem.

In addition, in view of the different overall construction and the different purpose, B3 does not qualify as suitable closest prior art.

2.6.3 B4 does not disclose an insert ring of stiff material having a cylindrical flange and the sealing portion supporting the cylindrical flange. Therefore, it is not relevant when looking for a solution to the posed problem.

2.6.4 B5 discloses a sealing gasket 40 for the outer filter element. It is preferably injection moulded using a rubber-like material known as Nitrile rubber. The gasket is in the form of a ring having an upper radially extending mounting portion or flange 42 (figure 5) and having a sealing portion 43 integral with and depending on the lower, inner margin of the mounting flange. The sealing portion 43 of the gasket 40 is inclined so as to slope inwardly upon progressing downwardly from the mounting flange 42 (column 3, line

61 to column 4, line 2). The sealing gasket 40 is joined to the media pack 32 of the filter element 30 by an end cap 50 (figures 2 to 4) of mouldable potting compound which causes the separately formed gasket to become an intimate part of the media pack (column 4, lines 16 to 20).

The sealing gasket has a tapered portion but, as is evident from figure 4, the sealing portion does not snugly fit within the inner liner 33, but is fixed to a rib 52 that is part of the end cap. In view of this construction, the sealing portion does not form a fluid restriction in the sense of claim 1 of this request. B5 is also completely silent about the problem posed and it does not relate to the isolation of forces from the inner liner. The skilled person does not learn from B5 that the inclusion of a tapered portion is beneficial, since the sealing gasket is not made of substantially stiff plastic material and the tapering is in no relation to the stiffness.

It cannot be argued that the missing features from B2 were known from B5 and would therefore be incorporated in B2, since the structure of the insert ring 23 in B2 is completely different from the structure of the insert ring 40 of B5. The insert ring 23 is a kind of adapter ring (B2: page 27, lines 17 and 18) while the sealing ring 40 has a purely sealing function (B5: column 3, lines 50 to 60). Therefore, they are also made from different materials.

The board concludes that the skilled person trying to solve the posed problem does not find any teaching in B5 towards the proposed solution.

2.6.5 B6 also discloses an air filter element with a radially directed seal. Even assuming that the second ring member 28 was an insert ring, then the foam material 46 would not encompass the base portion of the ring, and there would be no snug fit within the inner liner and no fluid restriction (see figure 3). In addition, this element would not have a tapered portion. B6 is not relevant for the solution of the posed problem.

2.6.6 B7 does not disclose an inner ring, so that it is not relevant for the solution of the posed problem.

2.6.7 B8 discloses a sliding construction 40 that is an insert ring and has a tapered portion 202 (see figures 14 to 16 and column 12, line 10). Figure 4 shows the slide construction 40 including central mounting rim 41. The central mounting rim 41 is positioned within aperture 38, and is oriented to provide a surface of engagement between filter element 4 and yoke assembly 9, when filter element 4 is slid upon yoke assembly 9. In particular, central mounting rim 41 includes slide surface 42, which is oriented for sliding engagement with yoke assembly 9 during mounting (column 8, lines 51 to 64).

The sliding construction 40 can also function to provide support to sealing ring 36 and to provide a better seal around the top of pleated filter media 35 (column 9, lines 5 to 7). It includes end 43 which is potted within end cap 19 during construction to secure slide construction 40 in place (column 9, lines 19 to 22). It provides some lateral support for the sealing base 47 (column 9, lines 49 to 51) that is part of the end cap 19.

When end cap 19 is moulded from a polymeric material,

slide construction 40 and inner and outer liners 30 and 31 respectively will have been positioned in the mould, along with filter media 21, and the polymeric material of the end cap. Standoffs 54 will support liner 30 and prevent it from projecting through the polymer of the end cap as it cures (column 10, lines 50 to 54). Surface features of the slide construction 40 facilitate moulding of the filter element (column 10, lines 63 to 65). If the shoulder (feet) of the slide construction is expanded, it can prevent leaking during use (column 15, lines 18 to 28).

The sliding construction of B8 does not have a sealing portion that snugly fits within the inner liner 30; it does not have a sealing function. Therefore, as is evident from figure 4, foam is present between the inner liner and the sliding construction. B8 is completely silent about forces that are imposed on the inner liner. The skilled person does not find any teaching in B8 that would guide him to the solution of the posed problem. The tapering of sliding construction 40 is not taught to provide increased stiffness to the sliding construction with the goal of preventing forces on the inner liner.

The inner ring of B2 cannot be simply replaced by the inner ring of B8 without completely changing the structure of the filter. As mentioned above (2.6.4), inner ring 23 of B2 is an adapter ring construction (B2: page 27, lines 17 and 18) that would not be possible with ring 40 of B8.

2.6.8 Therefore the solution to the problem does not appear obvious in view of the prior art.

The board concludes that the subject-matter of claim 1

fulfils the requirements of Article 56 EPC.

Consequently, the request is allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Opposition Division with the order to maintain the patent on the basis of claims 1 to 10 according to the sole request (submitted as "Auxiliary Request Ia" under cover of the letter of 12 October 2012) and a description to be adapted.

The Registrar: The Chairman:

C. Vodz G. Raths

Decision electronically authenticated