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Datasheet for the decision of 17 December 2024

Case Number: T 0529/22 - 3.2.07

Application Number: 12861139.9

Publication Number: 2797714

IPC: C09K3/14, C09C1/68, C09G1/02, B24D11/00, B24D9/08, B24B55/10

Language of the proceedings: EN

Title of invention:
ABRASIVE ARTICLE HAVING A NON-UNIFORM DISTRIBUTION OF OPENINGS

Patent Proprietors:
Saint-Gobain Abrasives, Inc.
Saint-Gobain Abrasifs

Opponent:
Robert Bosch GmbH

Headword:

Relevant legal provisions:
EPC Art. 100(b), 83, 100(a), 54, 56
RPBA 2020 Art. 12(3), 12(5), 13(2)

Keyword:
Grounds for opposition - insufficiency of disclosure (no) - lack of patentability (no)
Novelty - (yes)
Inventive step - (yes)

Decisions cited:
T 0204/83, G 0002/21

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 0529/22 - 3.2.07

D E C I S I O N
of Technical Board of Appeal 3.2.07
of 17 December 2024

Appellant: (Opponent)	Robert Bosch GmbH Postfach 30 02 20 70442 Stuttgart (DE)
Representative:	Robert Bosch GmbH Postfach 30 02 20 70442 Stuttgart (DE)
Respondent 1: (Patent Proprietor 1)	Saint-Gobain Abrasives, Inc. One New Bond Street Worcester, MA 01615 (US)
Respondent 2: (Patent Proprietor 2)	Saint-Gobain Abrasifs Rue de l'Ambassadeur 78700 Conflans-Sainte-Honorine (FR)
Representative:	Zimmermann & Partner Patentanwälte mbB Postfach 330 920 80069 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 12 November 2021 rejecting the opposition filed against European patent No. 2797714 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	G. Patton
Members:	A. Cano Palmero
	S. Ruhwinkel

Summary of Facts and Submissions

I. The opponent (appellant) lodged an appeal within the prescribed period and in the prescribed form against the decision of the opposition division to reject the opposition filed against European patent No. 2 797 714.

II. The opposition was filed against the patent in its entirety and based on the grounds for opposition pursuant to Articles 100(a) and (b) EPC (lack of novelty, lack of inventive step and insufficient disclosure).

III. In preparation for oral proceedings, scheduled upon the parties' requests, the board communicated its preliminary assessment of the case to the parties by means of a communication pursuant to Article 15(1) RPBA dated 2 September 2024. The board indicated that the appeal was likely to be dismissed. The appellant replied to this communication in the substance with letter dated 12 November 2024, received on 26 November 2024.

IV. Oral proceedings before the board took place on 17 December 2024. At the conclusion of the oral proceedings the decision was announced. Further details of the oral proceedings can be found in the minutes thereof.

V. The appellant requested

that the decision under appeal be set aside
and
that the patent be revoked.

VI. The patent proprietors 1 and 2(respondents) requested

that the appeal be dismissed, *i.e.* that the patent be maintained as granted (main request),
or, in the alternative,
if the decision under appeal is set aside,
that the patent be maintained in amended form according to one of the sets of claims filed as auxiliary requests 1 to 13 during opposition proceedings.

VII. The following documents are referred to in this decision:

D1: WO 2008/109211 Al;
D2: US D586,370 S;
D3: Community Design EU 001647918-0001;
D4: Community Design EU 001161293-0001;
D5: US D541,317 S;
D6: "Linc. - Schnittstelle zwischen Hochschule und Wirtschaft";
D11: Yushan Lv et. al., "Analysis of the polishing slurry flow of chemical mechanical polishing by polishing pad with phyllotatctis pattern", Proceedings of SPIE, Vol. 7997 79972V-1 to 6, 2010,;
D14: US 2008/0153407 Al;
EB1: Jacob Trevino et al., "Geometrical structure, multifractal spectra and localized optical modes of aperiodic Vogel spirals", OPTICS EXPRESS, Vol. 20, No 3, 30 January 2012, 3015-3033;
EB4: Helmut Vogel, "A better way to construct the sunflower head", MATHEMATICAL BIOSCIENCES 44, 1979, pages 179-189.

VIII. The lines of argument of the parties relevant for the present decision are dealt with in detail in the reasons for the decision.

IX. **Independent claim 1** of the **main request** (*i.e.* according to the patent as granted) with the feature labelling used by the parties reads as follows:

"M1. An abrasive article (100) comprising:
M2. a coated abrasive having a plurality of apertures (101) arranged in an aperture pattern,
M3. wherein the aperture pattern has a controlled non-uniform distribution,
M4. wherein the aperture pattern is rotationally asymmetric about the center of the aperture pattern, and
M5. wherein the aperture pattern is a spiral phyllotactic pattern having a controlled asymmetry,

characterized in that

M6. the aperture pattern is described in polar co-ordinates by the following equation:

$\varphi = n * \alpha$, $r = c\sqrt{n}$ (Eq. 1),

where:

n is the ordering number of an aperture, counting outward from the center of the aperture pattern;

φ is the angle between a reference direction and a position vector of the nth aperture in a polar coordinate system originating at the center of the aperture pattern, such that the divergence angle

between the position vectors of any two successive apertures is a constant angle α;

r is the distance from the center of the aperture pattern to the center of the nth aperture;

and

c is a constant scaling factor, and

M7. wherein the aperture pattern divergence angle in polar co-ordinates ranges from 100° to 170°."

X. **Independent claim 6** of the **main request** (*i.e.* according to the patent as granted) reads as follows:

"A method of making an abrasive article (100) comprising:

disposing an abrasive layer (707) on a backing (701); perforating the abrasive layer (707) and the backing (701) to create a plurality of apertures (101), wherein the aperture pattern has a controlled asymmetry, wherein the aperture pattern is rotationally asymmetric about the center of the aperture pattern, and wherein the apertures are arranged in an aperture pattern having a controlled non-uniform distribution that is a spiral phyllotactic pattern, and

characterized in that

the aperture pattern is described in polar co-ordinates by the following equation:

$\varphi = n * \alpha$, $r = c\sqrt{n}$ (Eq. 1),

where:

n is the ordering number of an aperture, counting outward from the center of the aperture pattern;

φ is the angle between a reference direction and a position vector of the nth aperture in a polar coordinate system originating at the center of the aperture pattern, such that the divergence angle between the position vectors of any two successive apertures is a constant angle α;

r is the distance from the center of the aperture pattern to the center of the nth aperture; and

c is a constant scaling factor; and

wherein the aperture pattern divergence angle in polar co-ordinates ranges from 100° to 170°."

XI. **Claim 7** of the **main request** (*i.e.* according to the patent as granted) reads as follows:

"An abrasive system comprising:
a coated abrasive (700) according to claim 1; and

a back-up pad,

wherein the back-up pad comprises a plurality of air flow paths disposed in a pattern adapted to correspond with the apertures (101) of the coated abrasive (700)."

Reasons for the Decision

1. *Patent as granted (main request) - Sufficiency of disclosure, Articles 100(b) and 83 EPC*

1.1 The appellant argued that in the case that the scaling factor was selected to be zero, which is also encompassed by the subject-matter of claim 1 of the patent in suit, all n apertures of the abrasive article defined by the "Vogel formula" of feature M6 would be located exactly in the centre of the grinding wheel, thereby entering into contradiction with features M3 to M5. Therefore, the skilled person cannot carry out the invention according to claim 1 as granted at least on one range of values covered by the claim, so that the requirements of Article 83 EPC were not met.

1.1.1 The board disagrees. As correctly argued by the respondents, the skilled person, attempting to carry out the invention would immediately rule out values of the constant scaling factor c that could enter into contradiction with the rest of the features of the claim.

1.2 With its letter dated 12 November 2024, the appellant further argued that claim 1 according to the patent as granted contained features M5 and M7, which stated that the hole pattern was, on the one hand, a "spiral phyllotactic pattern" and on the other hand described all hole patterns which could be produced by the Vogel equation with angles ranging between 100° to 170°. However, there were a large number of solutions to the Vogel equation according to feature M.6 that did not occur as phyllotaxis patterns in the plant world (see in particular figures on pages 3 to 5 of the appellant's letter dated 12 November 2024). It could

not possibly be determined by an expert in the field of grinding discs, which and how many of these are actual phyllotaxis patterns. Therefore, granted claim 1 could not be carried out over the whole scope claimed without undue burden and the requirements of Article 100(b) in conjunction with Article 83 EPC were not fulfilled.

1.2.1 The board considers that this last point under paragraph 1.2 is a new objection constituting an amendment to the appellant's appeal case which has been raised by the appellant for the first time after the notification of the board's communication under Article 15(1) RPBA dated 2 September 2024. According to Article 13(2) RPBA, any amendment to a party's appeal case made after notification of a board's communication shall, in principle, not be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned.

1.2.2 The appellant argued that the new arguments were based on the same formal objection that the invention could not be carried out by the skilled person; consequently they could not amount to a fresh objection. Furthermore, these arguments were occasioned by the surprising conclusion of the board expressed in the communication according to Article 15(1) RPBA. In addition, the arguments presented were not complex and could be immediately examined by the board without delaying the proceedings. All this amounted to exceptional circumstances in the sense of Article 13(2) RPBA.

1.2.3 The board disagrees for the following reasons.

As acknowledged by the appellant, what is mentioned under point 1.2 above was not raised in its statement

setting out the grounds of appeal, nor in any of its written submissions before the notification of the board's communication. This part of the appellant's case is thus to be regarded as amendment under Article 13(2) RPBA.

The fact that the ground for opposition based on Article 100(b) EPC had been raised in the notice of opposition does not provide a legal basis for an opponent to raise any new objections later on in the proceedings, especially at the appeal stage. The board sees the late-filed fact mentioned under point 1.2 above as a completely new objection which constitutes an amendment to the appellant's case in appeal proceedings.

The board cannot follow the appellant either in that the new objection was triggered by the board's allegedly surprising preliminary opinion. Indeed, the board merely followed the reasoned findings of the decision under appeal, so that this preliminary opinion could not take the appellant by surprise. The board also notes in this respect that the appellant did not point to any passage of the board's communication which went beyond any of the parties's arguments which had already been provided. In particular, the preliminary opinion under point 7.2 expressly referred to the argumentation of the respondents under point II.2 of the reply to the statement setting out the grounds of appeal.

Finally, the alleged fact that the new objection was not complex and not detrimental to procedural economy is in the board's view pure speculation and, hence, cannot provide exceptional circumstances.

The situation in the present case is even more severe since the new objection filed for the first time with letter dated 12 November 2024 was directed against the patent as granted. The board is convinced that the appellant not only could but most importantly should have formed its complete case on sufficiency of disclosure already with its statement setting out the grounds of appeal, if not during opposition proceedings.

Since the appellant has not convincingly justified with cogent reasons that there were exceptional circumstances for the amendment of its case, the new objection under Article 83 EPC is not considered in the appeal proceedings under Article 13(2) RPBA.

1.3 In sum, the board concludes that the appellant has not convincingly and admissibly demonstrated that the ground for opposition pursuant to Article 100(b) EPC could prejudice the maintenance of the patent as granted.

2. *Patent as granted (main request) - Novelty, Articles 100(a) and 54 EPC*

2.1 The appellant argued that, contrary to the findings of the opposition division in point 16 of the reasons for the decision under appeal, **document D6** anticipated the subject-matter of claim 1 as granted. In particular, the appellant argued that the embodiment of the top figure on page 22 of **D6** disclosed an aperture pattern "influenced" (in German: *"beeinflusst"*) by the Fibonacci sequence of the sunflower, which did not mean a reproduction of any irregularities of real sunflowers, but rather the direct application of the Fibonacci sequence. A deliberate deviation from the

Fibonacci sequence is neither disclosed nor hinted at by D6. Indeed, a slight deviation from the Fibonacci φ and r values would have extreme consequences in the pattern as shown by figure 1 of document EB1. In particular, the figure of D6 was similar to figure 1(e) of EB1.

2.1.1 According to the appellant, the skilled person could even relatively accurately read the angle to be used in the Vogel formula from the shape of the pattern. In this sense, the appellant made reference to decision T 204/83, which confirmed that a technical teaching could be derived from a drawing.

2.1.2 In addition, the appellant indicated that the subject-matter of the claim merely required that the aperture pattern had a plurality of apertures arranged according to the Vogel formula, but it did not exclude that additional apertures could be present which did not follow that distribution. Therefore it would be sufficient for a low number of the total apertures to be distributed according to the formula.

2.1.3 In sum, the appellant held that the top picture on page 22 of D6 already directly and unambiguously showed a grinding wheel whose aperture pattern exactly followed the Vogel equation contained in feature M6, at least for a plurality of apertures. Even if this was only a schematic representation of a grinding wheel, certain pattern properties (*i.e.* the formula used to create the pattern) with exact mathematical precision could be derived from the figure, as it was developed by the appellant during opposition proceedings.

2.1.4 The board disagrees. Firstly, the board concurs with the opposition division that the fact that the pattern

of D6 is "influenced" by the Fibonacci sequence of the sunflower does not directly and unambiguously mean that such a sequence is followed, even for a certain number of apertures.

2.1.5 Secondly, as correctly put forward by the respondents, the aperture pattern at the top of page 22 of D6 does not necessarily correspond to a pattern according to the Vogel equation of feature M.6. Indeed, the alleged "similarity" between the pattern shown in figure 1(e) of EB1 and the pattern of D6 does not necessarily imply that the patterns are corresponding.

2.1.6 Lastly, the board concurs with the opposition division (see point 15 of the reasons for the decision under appeal) that the image analyses and the appellant's resulting allegations are based on the analysis of a figure, which, in the absence of any accompanying description passage, is to be regarded as a mere schematic representation. The evaluations and correlations computed by the appellant during the opposition proceedings are based on coordinate estimations on the schematic figures of the prior art, and as such cannot provide an explicit or implicit disclosure of the Vogel equation of feature M6. In particular, it is established Case Law of the Boards of Appeal that in the absence of any specification, no dimensions and/or measurements can be directly and unambiguously derived from a schematic drawing (see Case Law of the Board of Appeal [CLB], 2022, I.C.4.6).

2.2 With respect to **document D1**, the appellant argued that the alleged invention according to claim 1 as granted was not a mathematical formula (the Vogel formula) or its application, but rather a specific aperture pattern in abrasive articles which could be described by a

mathematical formula. In consequence, it was irrelevant whether the Vogel formula is mentioned in the prior art, as long as the aperture pattern could be derived from the prior art. Indeed, the aperture pattern according to claim 1 could be described through other formula, *e.g.* through a polynomial formula. In sum, any aperture pattern that could also be reproduced by the Vogel formula, regardless of whether it was produced using this formula or not, anticipates feature M6. This applied also to figures 4a and 4b of document D1, which were not indicated as being schematic drawings and therefore anticipated the aperture pattern of feature M6.

2.2.1 The board is not persuaded by the appellant's arguments for the following reasons. As correctly indicated by the respondents, the accompanying description passage of figures 4a and 4b of D1 (page 12, lines 15 to 26) do not provide an explicit or implicit disclosure of an aperture pattern following the Vogel formula. The fact that figures 4a and 4b are not indicated as being schematic is not considered to be a sufficient indication that exact dimensions can be directly and unambiguously derived from these figures.

2.3 Consequently, the board concludes that there is no direct and unambiguous disclosure in either D6 or D1 of an abrasive article with an aperture pattern as required by at least features M6 and M7. The subject-matter of claim 1 as granted is therefore new in view of D6 and D1. The parties confirmed that the same conclusion applied *mutatis mutandis* to the subject-matter of claims 6 and 7 according to the patent as granted, which is therefore also considered new.

2.4 The appellant also relied, in with its written submissions exclusively, on documents D2 to D5 and D14 as being novelty destroying for the subject-matter of claim 1 as granted (see page 17 and page 18 of the statement setting out the grounds of appeal and point I of the letter dated 17 January 2023). As these written submissions are mere statements and references to the notice of opposition the board holds the view that the requirements of Article 12(3) RPBA are not fulfilled since no argumentation is provided as to why the decision under appeal should be reversed for these particular objections. As a matter of fact, according to Article 12(3) RPBA, the statement of grounds of appeal and the reply shall contain a party's complete case. They shall set out clearly and concisely the reasons why it is requested that the decision under appeal be reversed, amended or upheld, and should specify expressly all the facts, arguments and evidence relied on. Thus, the novelty objections based on documents D2 to D5 and D14 are not admitted into the appeal proceedings under Article 12(5) RPBA.

3. *Patent as granted (main request) - Inventive step, Articles 100(a) and 56 EPC*

3.1 The appellant argued that the subject-matter of claim 1 as granted lacked an inventive step starting from document **D6 as closest prior art in combination with the common general knowledge**, as depicted by documents EB1 or EB4. According to the appellant, if the characterising portion of claim 1 was to be considered as the distinguishing features with respect to D6, the technical effect could be regarded as improving the swarf material removal. The objective technical problem could be seen as optimising the grinding pad design.

3.1.1 In a different approach, the appellant relied on the problem of providing an alternative opening pattern that could be easier to manufacture and to reproduce, as a result of the mathematical formula which could be given to a machine for producing the pattern, with in addition the possibility of easily changing the pattern if so wished. In particular, the appellant argued in view of the similarity of the pattern of D6 with the pattern of the patent in suit, and taking into account the absence of a clear description in the original application of the alleged effects linked to the distinguishing features, that the improvement was not significantly above the margins of error (see CLB, *supra*, I.D.9.18). Therefore, no particular technical effect was apparent. Consequently, the skilled person, starting from the pad of the top figure on page 22 of D6, would apply the generally known Vogel formula (as depicted by, for example, EB1 or EB4) which produced an almost identical and exactly regular aperture pattern and would facilitate its manufacturing, thereby arriving at the subject-matter of claim 1 as granted without exercising any inventive skill.

3.1.2 The board disagrees. The board is in the first place satisfied, contrary to the appellant's allegation, with the technical effect delivered by the distinguishing features M6 and M7 identified in paragraphs [0020] and [0027] of the patent in suit, namely to provide an improved swarf removal. The board concurs with the opposition division that the objective problem solved by the distinguishing features is to be seen as optimising the swarf removal, which leads to a higher quality finishing surface of the product. In particular the board notes that, having the common general knowledge in mind, and based on the application as originally filed, the respondents may rely on this

technical effect (see G 2/21, Headnote II). The board also agrees with the opposition division that, starting from D6 and willing to optimise the swarf removal, the skilled person would have no incentive from the common general knowledge (also not from EB1 or EB4, which do not deal with grinding at all) to employ an aperture pattern following the Vogel formula in order to provide such effects.

3.1.3 In the second place, the same holds true even in the case that the second problem posed of providing an alternative pattern that facilitates the manufacturing and reproducibility of the pattern could be considered. The skilled person would have no hint from the common general knowledge (also not from EB1 or EB4, the first document being focused on the enhancement of light-matter coupling and the second document being restricted to the mathematical aspects of the Vogel formula) that the aperture pattern according to the Vogel formula could be suitable for an abrasive article according to claim 1.

3.1.4 The board thus concludes that the subject-matter of claim 1 as granted is inventive in view of D6 in combination with the common general knowledge, depicted by EB1 and EB4.

In view of this outcome a decision on admittance of EB1 or EB4 into the proceedings, as raised initially by the respondents against these documents, is not necessary.

3.2 The appellant further argued that the subject-matter of claim 1 lacked inventive step starting from **D1 as closest prior art in combination with the teaching of either of documents D6 or D11.** The distinguishing features M6 and M7 provided the technical effect of

improving the swarf removal efficiency. When facing the objective technical problem which could be seen as improving swarf removal capability of the abrasive article of D1 or alternatively facing the problem of improving the manufacturing and reproducibility of the aperture pattern, the skilled person would turn to the pattern taught by either D6 or D11 thereby arriving at the subject-matter of claim 1 in an obvious manner.

3.2.1 The board is not persuaded by the appellant's arguments. With regard to D6, the board is already of the view that this document neither discloses nor hints at an aperture pattern according to the Vogel equation as required by features M6 and M7. With respect to D11, the board concurs with the opposition division that the skilled person would not turn to this document to find solutions regarding aperture patterns, since this document rather teaches solutions of abrasive particle patterns on abrasive pads. The use of such a pattern for the aperture distribution of D1 could only be considered as the result of an *ex post facto* analysis.

3.3 Finally, the appellant argued that the subject-matter of claim 1 also lacked inventive step starting from any of **documents D2 to D5 and D14**. In its argumentation the appellant held that feature M6 and/or M7 were either anticipated by these documents or that these features were to be disregarded in the assessment of inventive step, since they did not provide any proven technical advantage.

3.3.1 The board disagrees. Similarly to the disclosures of D6 and D1, the board does not see in documents D2 to D5 or D14 a direct and unambiguous disclosure of an aperture pattern following the Vogel formula as required by features M6 and M7. Further, as already

concluded in the discussion on inventive step starting from documents D6 or D1 as closest prior art, the board is convinced that distinguishing features M6 and M7 provide the technical effect of improving the swarf removal efficiency, as identified in paragraphs [0020] and [0027] of the patent in suit. The board concurs with the opposition division (see point 22 of the reasons for the decision under appeal) that, starting from any of documents D2 to D5 or D14 and wishing to optimise the swarf removal, the skilled person would have no incentive from their common general knowledge to employ an aperture pattern following the Vogel formula in order to provide such effects. In addition, the skilled person would also not arrive at the subject-matter of claim 1 according to the patent as granted in an obvious manner, even if the technical problem is considered as providing an alternative pattern facilitating manufacturing and reproducibility of the pattern, for the same considerations as for documents D6 or D1 above.

3.4 In sum, the board is of the view that the subject-matter of claim 1 as granted is inventive. The parties confirmed that the same conclusion applied *mutatis mutandis* to the subject-matter of claims 6 and 7 according to the patent as granted, which is therefore also considered inventive.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar: The Chairman:

G. Nachtigall G. Patton

Decision electronically authenticated