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Datasheet for the decision of 3 March 2015

Case Number: T 2442/10 - 3.4.02

Application Number: 02711443.8

Publication Number: 1296125

IPC: G01M3/20, G01N15/08, F01N3/00, G01M3/26, B01D65/10

Language of the proceedings: EN

Title of invention:
INSPECTION METHOD AND DEVICE FOR DETECTING DEFECT

Applicant:
NGK Insulators, Ltd.

Headword:

Relevant legal provisions:
EPC 1973 Art. 56

Keyword:
Inventive step - (yes) - after amendment

Decisions cited:

Catchword:

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Case Number: T 2442/10 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 3 March 2015

Appellant: (Applicant)	NGK Insulators, Ltd. 2-56 Suda-cho, Mizuho-ku Nagoya-City, Aichi Pref. 467-8530 (JP)
Representative:	Paget, Hugh Charles Edward Mewburn Ellis LLP 33 Gutter Lane London EC2V 8AS (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 12 July 2010 refusing European patent application No. 02711443.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	B. Müller
Members:	A. Hornung
	F. J. Narganes-Quijano

Summary of Facts and Submissions

I. The applicant appealed against the decision of the examining division refusing European patent application No. 02711443.8 on the basis of Article 56 EPC.

II. The applicant requested that the decision of the examining division be set aside and a patent be granted on the basis of *inter alia* the set of claims 1 to 4 amended according to the main request filed with the letter dated 18 February 2015.

III. The present decision refers to the following documents:
D1: US 5,411,682
D5: US 5,102,434

IV. Independent claim 1 according to the main request reads as follows:

"An inspection method for detecting a defect in a porous honeycomb structure, the porous honeycomb structure being a diesel particulate filter having a plurality of through passages defined by partition walls, wherein the ends of the passages are alternately sealed, and where the diameter of the defect is in the range 0.1 to 0.8 mm, in which method;

a particulate is generated, where the particulate has a diameter in the range 1 to 10 µm, and

the generated particulate is introduced into the porous honeycomb structure, wherein the particulate is introduced by a pressurizing force of 1 to 30 Pa at the particulate inlet of the porous honeycomb structure, then

light having high directivity is emitted such that the light passes in a range up to 5 mm from a discharge surface of the porous honeycomb structure to irradiate the particulate discharged from the porous honeycomb structure, thereby making the particulate visible."

The remaining claims 2 to 4 of the main request are dependent claims referring back to claim 1.

Reasons for the Decision

1. Amendments

The board is satisfied that the present amended set of claims 1-4 fulfills the requirement of Article 123(2) EPC.

Present independent claim 1 is generally based on original claim 1. The amendments of claim 1 are based on original claims 5 to 7 (diesel particulate filter), on page 21, lines 15 to 20 (defects in the range 0.1 to 0.8 mm; particulate diameter in the range 1 to 10 microns), on page 17, lines 14 to 16 (pressurizing force of 1 to 30 Pa) and on page 19, lines 2 to 8 (light passes in a range up to 5 mm from a discharge surface).

2. Clarity

Present claim 1 is supported by the description since it specifies all the relevant technical features necessary for defining a method for detecting defects in a porous honeycomb structure, i.e. claim 1 defines:

- the porous honeycomb structure to be inspected: a diesel particulate filter having a plurality of through passages defined by partition walls, wherein the ends of the passages are alternately sealed,
- the size of the defects: in the range of 0.1 to 0.8 mm,
- the size of the particulates used for inspecting the defects: in the range of 1 to 10 microns,

- the pressurizing force under which the particulates are introduced at the inlet of the porous honeycomb structure: in the range of 1 to 30 Pa, and
- the location at which the light having high directivity irradiates the particulates discharged from the porous honeycomb structure: in a range up to 5 mm from the discharge surface of the porous honeycomb structure.

Therefore, the board is satisfied that present claim 1 is supported by the description within the meaning of Article 84 EPC 1973.

3. Inventive step

The subject-matter encompassed by claim 1 is restricted to a particular technical field, namely the inspection of diesel particulate filters. D5 discloses an inspection method for detecting defects in such diesel particulate filters and represents the closest prior art.

During the appeal proceedings the applicant amended claim 1. The claimed subject-matter now on file differs from the disclosure of the inspection method of document D5 in that

- the diameter of the detected defect is in the range of 0.1 to 0.8 mm,
- the pressurizing force under which the particulates are introduced at the inlet of the diesel filter is in the range of 1 to 30 Pa, and
- light having high directivity is emitted such that it passes in a range up to 5 mm from the discharge surface of the diesel filter to irradiate the particulates discharged from the porous honeycomb structure, thereby making them visible.

It is to be noted that D5, column 3, lines 23 to 25, discloses the use of particulates in the range of 0.1 to 1 micron, thereby anticipating the claimed range of 1 to 10 microns.

Even though each of the individual distinguishing features of claim 1 identified above might be seen as being obvious on its own, since each feature appears to result from the conventional approach of the skilled person to try out and optimize the operation conditions of the inspection method, the applicant convincingly demonstrated that the invention consists in a precise combination of a plurality of technical circumstances under which specific defects in a specific test object are ascertained with high efficiency.

In particular, it is demonstrated in figure 4 of the application and the accompanying description on page 20, line 10 to page 21, line 20, that, for a diesel particulate filter, an optimal relationship exists between the size of the detected defects and the particles used for detecting the defects. On the basis of that optimal relationship, figures 6(a), (b) and (c) and the accompanying description from page 21, line 21 to page 23, line 4, go on demonstrating that optimal inspection results are obtained when introducing the particulates into the diesel filter at a pressurizing force of 10 Pa belonging to the claimed range and irradiating the discharged particulates at a distance of 3 mm above the filter, also belonging to the claimed range.

Document D5, with reference to figure 1, merely discloses a schematic drawing of a diesel particulate filter with particulates passing through it. There is no hint in D5 establishing a precise link between the size of the defects to be detected, the size of the particulates, the pressurizing force for circulating the particulates through the diesel filter and the distance at which the discharged

particulates are to be made visible. In addition, D5 does not use laser irradiation for rendering visible the discharged particulates but marking of a screen.

The disclosure of D1 is even less relevant for deriving the optimal relationship between the various technical features as claimed. Indeed, D1 does not even concern diesel filters with their typical geometry of pores and it explicitly teaches the use of particles having a size of 0.2 to 0.3 microns falling outside the claimed range.

In view of the above considerations, the board comes to the conclusion that the inspection method of claim 1 involves an inventive step over the available prior art.

4. It follows that the main request meets the requirement of the EPC and that a patent can be granted on the basis thereof.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent based on the following documents:

- Claims 1 to 4 of the main request as filed with the letter dated 18 February 2015,

- Description pages 1 to 3, 6 to 14 and 17 to 24 as filed with the letter dated 18 February 2015 and description

pages 4, 4A, 5, 15 and 16 as filed with the letter dated 23 February 2015,

- Drawing sheets 1/8 to 8/8 as originally filed.

The Registrar: The Chairman:

M. Kiehl B. Müller

Decision electronically authenticated