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Datasheet for the decision of 19 February 2019

Case Number: T 2158/13 - 3.3.06

Application Number: 07719377.9

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Language of the proceedings: EN

Title of invention:
METHOD FOR DETECTING PATHOGENS USING MICROBEADS CONJUGATED TO BIORECOGNITION MOLECULES

Applicant:
Fio Corporation

Headword:
Method for detecting pathogens/Fio Corporation

Relevant legal provisions:
EPC Art. 52(1), 56, 84, 123(2)

Keyword:

Amendments - added subject-matter (yes) - clarity and support by the description (no) - all claim requests
Inventive step - (no) - all claim requests

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 2158/13 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 19 February 2019

Appellant: (Applicant)	Fio Corporation 75 White Pine Trail Richmond Hill, ON L4E 3L8 (CA)
Representative:	Walker, Ross Thomson Forresters IP LLP Skygarden Erika-Mann-Strasse 11 80636 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 14 May 2013 refusing European patent application No. 07719377.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	J.-M. Schwaller
Members:	G. Santavicca
	J. Hoppe

Summary of Facts and Submissions

I. The appeal lies from the decision of the Examining Division refusing European patent application No. 07719377.9, *inter alia*, because none of the requests then on file complied with the requirements of Articles 84 and 123(2) EPC.

Furthermore, the claimed subject-matter was obvious over D1 (WO 03/003015 A1) in combination with D5 (US 2003/153021 A1).

II. With its statement of grounds of appeal, the applicant (now "the appellant") filed new main and first to fourth auxiliary requests. Further, it argued that the new claimed subject-matter was not obvious over D1, which did not relate to the detection of pathogens, and so could not represent the closest prior art, let alone in combination with D5, which did not concern microbead-type analysis.

III. Claim 1 according to the new Main Request reads as follows (amendments to Claim 1 as originally filed made apparent by the Board):

"1. A method of: ~~performing one or more of~~ detecting pathogens, identifying pathogens, characterizing pathogens and characterizing pathogen hosts, comprising the steps of:

preparing a pathogen-detection medium for detection of pathogen and host markers, ***wherein said pathogen-detection medium comprises microbeads conjugated to pathogen-specific biorecognition molecules (BRMs) and said microbeads contain quantum dots;***

~~*collecting a sample from a host;*~~

combining ~~*said*~~ ***a*** *sample* ***collected from a host*** *with said pathogen-detection medium containing pathogen-specific detectors; and*

analyzing said combined sample to produce a list of pathogens contained within the host, and a list of pathogen and host characteristics, ***said analyzing step comprising illuminating said bead-pathogen-detection signal complex with a laser, measuring a resulting spectrum and identifying the pathogen from a database; and,***
further including collecting location information for one or more of said pathogen and said host, wherein said location information is collected via a GPS-enabled device, wherein:
each of said microbeads contains a unique combination of quantum dots, based on colour and intensity of said quantum dots, to provide a unique optical barcode associated with said each microbead-pathogen detection combination, each barcoded microbead conjugated to its appropriate pathogen is further conjugated to a detection molecule and the resulting combination complex is detected by a second signal from said detection molecule to generate a pathogen-detection optical signature, wherein said second signal in said detection molecule is produced by a fluorophore; and, said identification of the pathogen is achieved via matching of the resulting sample spectrum to a collection of pathogen-specific spectra from a database, said database is located on-board the GPS-enabled device or said database is remote and accessed wirelessly."

Claim 1 of the First and Second Auxiliary Request is identical to above claim 1.

Claim 1 according to Third Auxiliary Request further includes the features "*detecting single complexes in said combined sample, the single complexes consisting of: (a) a spectrally-coded microbead conjugated to pathogen- or host-specific biorecognition molecule, (b) a pathogen-derived analyte, and, (c) an additional detection molecule labeled with a label different to that of the microbead that is detected*".

Claim 1 of the Fourth Auxiliary Request is broader than Claim 1 of the Main Request, as it does not include the feature that the analyzing step "comprises illuminating said bead-pathogen-detection signal complex with a laser, measuring a resulting spectrum and identifying the pathogen from a database".

IV. In a communication the Board expressed its provisional opinion that the above requests did not meet the requirements of Articles 56, 84 and 123(2) EPC.

V. The appellant informed the Board by phone that it will not be attending the scheduled oral proceedings, that it withdrew its request for oral proceedings and that it requested a decision based on the current state of the file.

VI. In writing the Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the Main Request or, alternatively, of one of the First to Fourth Auxiliary Request, all requests havng been submitted with its statement of grounds of appeal.

Reasons for the Decision

1. Allowability of the amendments under Article 123(2) EPC

1.1 The appellant argued that claim 1 according to the main request was based on the combination of original claims 1-3, 5-8, 10, 15-16.

1.2 As already mentioned in its communication, the Board was of the opinion that claim 1 at issue was not only based on claims 1-3, 5-8, 10 and 15-16 as originally filed, but also on claim 17 (which requires that "the database is remote and accessed wirelessly", as in claim 1 at issue).

1.3 For the board, even with claim 17, this combination of claims infringes Article 123(2) EPC because of the **omission of the features of in particular original claim 9**, because original claims 15 to 17 are strictly dependent on claim 9.

1.4 In this context, the omission of the features of claim 9 (which requires that the detection molecule "*comprises a fluorophore conjugated to one of: an anti-human IgG molecule, an anti-human IgM molecule, an anti-pathogen/host marker detection antibody, or an oligonucleotide sequence*") amounts to a non-disclosed intermediate generalisation, which adds subject-matter (in the present case a method according to original claim 1 carried out with a detection molecule which can be different from those mandatorily defined in original Claim 9), and thus does not fulfil the requirements of Article 123(2) EPC.

1.5 It follows that already for this reason, the Main Request is not allowable.

1.6 Claim 1 of each of the First and Second Auxiliary Requests being identical to Claim 1 according to the Main Request, the above objection applies *mutatis mutandis* to each of said auxiliary requests, which consequently are not allowable either.

1.7 Claim 1 of the Third Auxiliary Request includes the features "*detecting single complexes in said combined sample, the single complexes consisting of: (a) a spectrally-coded microbead conjugated to pathogen- or host-specific biorecognition molecule, (b) a pathogen-derived analyte, and, (c) an additional detection molecule labeled with a label different to that of the microbead that is detected*", for which no basis has been given by the Appellant, and which do not appear to have any basis as such in the application as originally filed either.

1.7.1 For the board, the amendment involving these features calls two objections:

- Firstly, the feature "*a spectrally-coded microbead conjugated to pathogen*" does not necessarily imply any of the "*microbeads conjugated to pathogen-specific biorecognition molecules*" defined earlier in Claim 1, with the consequence that the claimed single complex is made up of further non-disclosed microbeads conjugates;

- Secondly, the amendment amounts to a non-disclosed, intermediate generalisation of the set of specific features illustrated in the examples in paragraphs [0034] to [0038] of the original application. As a case in point, the detection molecule can now have a label

which is not a fluorophore, contrary to what has been illustrated in said examples.

1.7.2 Thus, Claim 1 of the Third Auxiliary Request does not comply with Article 123(2) EPC either.

1.8 Claim 1 of the Fourth Auxiliary Request is broader than Claim 1 of the Main Request, as it does not include the additional features of original Claim 10 but still includes those features of original Claims 15 to 17 without including the additional features of original Claim 9. Consequently, it does not comply with Article 123(2) EPC either.

2. Clarity and support by the description - Article 84 EPC

2.1 The Appellant particularly stressed that the essential features (identified as "sandwich complex" and "multiplexing by bar-codes" and objected to by the Examining Division) were now present in the claims.

2.2 As already objected to in the board's communication, the feature "... *each barcoded microbead conjugated to its appropriate pathogen is further conjugated to a detection molecule ...*" does not clearly express that this is indeed a distinct step (from the combination of bead-BRMs and sample, i.e. subsequent thereto), hence an incubation step, as apparent from all of the examples of the original application (paragraphs [0034] to [0038] (e.g. in the latter paragraph that "The detection antibodies conjugated to the fluorophores **are then added** to produce a bead-sample-detector complex").

In other words, Claim 1 at issue encompasses a method wherein beads-BRMs, sample and detection molecules are mixed up at the same time altogether, which however is

not the one illustrated as essential in paragraphs [0034] to [0038] of the application as filed.

2.3 Therefore, Claim 1 of all the claim requests (which all include this amendment) is not clear and/or not supported by the description, contrary to the requirements of Article 84 EPC.

3. Inventive step

3.1 According to the appellant, D1 does not relate to the detection of pathogens, and so could not be taken as the closest prior art. Morevoer the teaching in D5 relating to location information was specifically linked to the ELISA techniques used throughout D5, so that the skilled person would have no incentive to combine D5 with D1.

3.2 As indicated in its communication, the Board is of a different opinion for the following reasons:

According to paragraph [0001] of the application, the invention relates to a method for detecting, identifying, characterising and surveiling pathogen and host markers. For the Board, the skilled person understands a "pathogen" to mean "any infectious agent or germ that can produce a disease".

3.3 Closest prior art

3.3.1 For the board, the closest state of the art is represented by D1, which *inter alia* relates (paragraph [0002]) to a method of using a conjugate of multicolor quantum dot tagged beads for multiplexed detection of, in particular, biomolecular targets.

3.3.2 Still according to D1 (paragraph [0089]), this method "*has application in various diagnostic assays, including, ... , the detection of viral infection, cancer, cardiac disease, liver disease, genetic diseases, and immunological diseases*", and "*can be used in a diagnostic assay to detect certain disease targets, by, for example, (a) removing a sample to be tested from a patient; (b) contacting the sample with a multicolor quantum dot-tagged bead conjugate prepared as described above, (c) detecting the luminescence, wherein the detection of luminescence indicates that the disease target is present in the sample. The probe is typically an antibody or antigenically reactive fragment thereof that binds to the virus (e.g., HIV, hepatitis) or protein associated with a given disease state (e.g., cancer, cardiac disease, liver disease).*".

Thus D1 manifestly relates to the detection of pathogens, alike the present application.

3.3.3 D1 further discloses a method for detecting pathogens after preparation of a medium comprising microbeads containing quantum dots, each of which being in a unique combination depending on the pathogen to which the bead should form a complex.

This is apparent at least from claims 43, 42, 35, 22, 2 of D1, which disclose a method of detecting one or more targets in a sample, which method comprises:
(a) contacting the sample (e.g. collected from a patient) with a conjugate comprising a multicolor quantum dot-tagged bead prepared by the method of Claim 2, which comprises at least one multicolor quantum dot, a bead, and a probe, wherein the probe is attached to

the bead, wherein the probe of the conjugate specifically binds to a target; and
(b) detecting luminescence, wherein the detection of luminescence indicates that the conjugate bound to the target in the sample, wherein
- the probe of the conjugate is an antigen or epitope thereof, and the protein in the sample is an antibody or an antigenically reactive fragment thereof that binds the antigen or epitope thereof, and wherein
- the antigenically reactive fragment thereof is specific for a virus, a bacterium, a part of a virus, or a part of a bacterium."

Consequently, D1 addresses the same objectives as the application in suit, and is the most suitable closest prior art for assessing inventive step according to the problem-solution approach.

3.4 Technical problem

3.4.1 According to paragraph [0016] of the application, the technical problem underlying the alleged invention was to provide "a system which enables pathogen detection, identification and characterization, as well as host characterization in a much more timely manner than existing methods. [...¨] Further, the system would also enable simultaneous detection, identification and characterization of multiple pathogens in a single sample whereby the pathogens are differentiated by optical pathogen-specific profiles stored in a pre-existing database."

3.4.2 The board notes that this technical problem has been formulated against a background art which does not include D1. Hence, any improvement in terms of e.g. "much more timely manner" or "simultaneous detection,

identification and characterization of multiple pathogens in a single sample" over D1 has not been established.

3.4.3 As the only apparent improvement over D1 is due to the presence of a GPS receiver in the device, the technical problem can be seen in the provision of a method for detecting pathogens, which is improved over D1 in the determination of the geographical localisation of the detection point.

3.5 Solution

3.5.1 As a solution to the above technical problem, the invention as defined in Claim 1 at issue is in particular characterised by the steps of (the differences to D1 are emphasised by the board):
- preparing .... quantum dots;
- combining ...; and
- analyzing said combined sample to produce a list of pathogens contained within the host, and a list of pathogen and host characteristics, said analyzing step comprising illuminating said bead-pathogen-detection signal complex with **a laser**, measuring a resulting spectrum and identifying the pathogen from a database; and,
- further including collecting location information for one or more of said pathogen and said host, wherein said location information is collected via a GPS-enabled device, wherein:
each of .... , said database is located on-board the **GPS-enabled device** or said database is remote and accessed wirelessly".

3.5.2 The Board has no reason to bbelieve that the reformulated technical problem is not effectively solved by the claimed solution.

3.6 Obviousness of the solution

It remains to be decided whether the claimed solution was obvious for the skilled person starting from D1 and facing the mentioned technical problem.

3.6.1 For the board, the use of a **laser**, as one of "electromagnetic radiation source (of either broad or narrow bandwith)" (see paragraph [0051], first sentence, of D1), or instead of wave-length resolved spectroscopy (see Claim 50 of D1), or instead of a mercury lamp (see Example 13 of D1), for exciting quantum dots with e.g. UV light, is obvious for a skilled person, as a laser is nothing else than an alternative way of exciting quantum dots for producing fluorescence spectra, within the breadth of the possibilities for carrying out the method of D1.

3.6.2 As regards the use of a **GPS receiver**, the board notes that this device does not interact in any way with the steps for detection of pathogens, and so it is only there for collecting geographical location or positional information.

The use of a GPS receiver in a portable device used for detecting pathogens is however known from D5 (paragraphs [0014], fourth sentence; [0069], first sentence; [0082], last sentence), and so its transposition in a device for carrying out a different method of detection is obvious for the skilled person, as it fulfils the same function as in D5, namely to

give the desired positional information, which is independent from the specific kind of device used.

3.6.3 Thus, the skilled person aiming at improving the prior art method would obviously have tried to use a **laser** in the method of D1, e.g. as a specific alternative falling within the broad teaching of D1, in the expectation that this measure would provide an alternatively controlled excitation of the quantum dots. Further, he would obviously also have used a **GPS device** to achieve the desirable, additional collection of positional information, which might be of valuable interest for correctly taking the necessary measures against the pathogens and their effects, as taught by D5.

3.6.4 It follows from the above considerations that the method according to claim 1 of the main request is obvious over D1 taken in combination with D5, with the consequence that the Main Request is not allowable.

3.7 The same conclusion applies to the subject-matter of all the auxiliary requests, which does not overcome this objection, and for which the above reasoning applies similarly.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar: The Chairman:

D. Magliano J.-M. Schwaller

Decision electronically authenticated