Citation: Trustees of Tufts College (Re), 2020 CACP 18

Commissioner's Decision #1538

Décision du Commissaire no 1538

Date: 2020-05-14

TOPIC:	O00	Obviousness
	B22	Not Supported by Disclosure
	B00	Ambiguity or Indefiniteness
SUJET:	O00	Évidence
	B22	Non appuyée par la divulgation
	B00	Caractère ambigu ou indéfini

Application No. : 2,366,018

IN THE CANADIAN PATENT OFFICE

DECISION OF THE COMMISSIONER OF PATENTS

Patent application number 2,366,018 having been rejected under subsection 30(3) of the *Patent Rules* (SOR/96-423) as they read immediately before October 30, 2019 ("the *former Patent Rules*"), has consequently been reviewed in accordance with paragraph 199(3)(c) of the *Patent Rules* (SOR/2019-251). The recommendation of the Patent Appeal Board and the decision of the Commissioner are to refuse the application unless necessary amendments are made.

Agent for the Applicant:

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INTRODUCTION

[1] This recommendation concerns the review of rejected Canadian patent application number 2,366,018 ("the instant application"), which is entitled "SELF-ENCODING SENSOR WITH MICROSPHERES" and is owned by TRUSTEES OF TUFTS COLLEGE ("the Applicant"). A review of the rejected application has been conducted by the Patent Appeal Board ("the Board") pursuant to paragraph 199(3)(c) of the *Patent Rules*. As explained in more detail below, our recommendation is that the Commissioner of Patents refuse the application unless necessary amendments are made.

BACKGROUND

The Application

[2] The instant application was filed under the provisions of the Patent Cooperation Treaty and has an effective filing date in Canada of April 6, 2000. It was laid open to public inspection on October 12, 2000.

[3] The instant application relates to analyzing signals from microsphere bead arrays used in analytical chemistry. The application has 34 claims on file, which were received at the Patent Office on September 5, 2014.

Prosecution History

[4] On October 20, 2016, a Final Action ("FA") was written pursuant to subsection 30(4) of the *former Patent Rules*. The FA stated that the instant application was defective on the grounds that

- claims 1 to 34 (all claims on file) are directed to obvious subject-matter and thus do not comply with section 28.3 of the *Patent Act;*
- claim 1 is not fully supported by the description and does not comply with section 84 of the *former Patent Rules*;
- the description does not correctly and fully describe the invention, and its operation or use, and does not comply with paragraph 27(3)(d) of the *Patent Act*; and
- claim 1 is indefinite and does not comply with subsection 27(4) of the *Patent Act.*

[5] In an April 20, 2017 response to the FA ("R-FA"), the Applicant submitted arguments in

favour of the patentability of the claims on file and also provided proposed claims 1 to 35 ("the proposed claims") and corresponding proposed amendments to the description.

[6] As the Examiner still considered the application not to comply with the *Patent Act*, pursuant to paragraph 30(6)(c) of the *former Patent Rules*, the application was forwarded to the Board for review on December 14, 2017 along with an explanation outlined in a Summary of Reasons ("SOR"). The SOR set out the position that the specification on file was still considered to be defective. The SOR also indicated that the proposed claims were considered to overcome the enablement and indefiniteness defects, but were not considered to overcome the obviousness and lack of support defects.

[7] In a letter dated December 19, 2017, the Board forwarded to the Applicant a copy of the SOR and requested that the Applicant confirm its continued interest in having the application reviewed.

[8] In a letter dated March 19, 2018, the Applicant confirmed its interest in having the review proceed.

[9] The present panel ("the Panel") was formed to review the instant application under paragraph 199(3)(c) of the *Patent Rules*.

[10] In a preliminary review letter ("PR letter") dated January 28, 2020, the Panel set out its preliminary analysis of the issues with respect to the claims on file and the proposed claims. The Panel also provided the Applicant with an opportunity to make oral and/or written submissions.

[11] In a letter dated March 6, 2020 the Applicant declined the opportunity for a hearing and indicated that they did not wish to provide further written submissions.

ISSUES

[12] A review of the prosecution indicates to us that the defects identified in the FA under paragraph 27(3)(d) of the *Patent Act* and section 84 of the *former Patent Rules*—now section 60 of the *Patent Rules*—are directed to the question of whether the specification of the instant application enables the person skilled in the art ("PSA") to make and use the claimed invention according to paragraph 27(3)(b) of the *Patent Act*. Any concern over non-compliance with section 60 of the *Patent Rules* we take as being subsumed within that inquiry.

[13] Therefore, the issues to be addressed by the present review are whether or not:

- claims 1 to 34 are directed to non-obvious subject-matter and thus comply with section 28.3 of the *Patent Act;*
- the description enables the person skilled in the art to make and use the claimed invention and complies with paragraph 27(3)(b) of the *Patent Act*; and
- claim 1 is unambiguous and complies with subsection 27(4) of the *Patent Act*.

[14] If the specification on file is considered to be defective, we will turn to the proposed amendments and consider whether they constitute amendments necessary for compliance with the *Patent Act* and *Patent Rules*, pursuant to subsection 86(11) of the *Patent Rules*.

ANALYSIS

Obviousness – Legal Principles

[15] Section 28.3 of the *Patent Act* requires claimed subject-matter not to be obvious:

> The subject-matter defined by a claim in an application for a patent in Canada must be subject-matter that would not have been obvious on the claim date to a person skilled in the art or science to which it pertains, having regard to
>
> (*a*) information disclosed more than one year before the filing date by the applicant, or by a person who obtained knowledge, directly or indirectly, from the applicant in such a manner that the information became available to the public in Canada or elsewhere; and
>
> (*b*) information disclosed before the claim date by a person not mentioned in paragraph (*a*) in such a manner that the information became available to the public in Canada or elsewhere

[16] In *Apotex Inc v Sanofi-Synthelabo Canada Inc*, 2008 SCC 61 at para 67, the Supreme Court of Canada stated that it is useful in an obviousness inquiry to follow a four-step approach. Below we consider independent claim 1 according to that approach and then consider the dependent claims.

Obviousness – Analysis

(1)(a) Identify the notional "person skilled in the art"

[17] Based on our reading of the specification, we define the PSA as a person or team working

in the field of analytical chemistry and instrumental methods of analysis including fluorescence spectroscopy.

(1)(b) Identify the relevant common general knowledge (CGK) of that person

[18] The FA cited the following prior art:

D1: WO 97/14028 Chandler et al April 17, 1997

D2: D.R. Walt, "Fiber Optic-imaging sensors" (1998) 31:5, Accounts of Chemical Research, pages 267-268.

D9: K.J. Lockhart et al, "Expression monitoring by hybridization to high-density oligonucleotide arrays" (1996) 16:12, Nature Biotechnology, pages 1675-1680.

[19] From the background of the invention, as well as D1 and D9, in our view the PSA would be familiar with assays of proteins and nucleic acids by fluorescence spectroscopy with various dyes.

[20] The PSA would also be familiar with statistical analyses to assess the validity of data, such as those involving averaging and confidence intervals. For examples, see:

- D1 [page 32 shows an averaging computation and refers to ratio of means to a standard or to each other]; and
- D9 [page 1679, left column refers to probe redundancy; page 1679 right column refers to the average of difference values].

(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it

[21] We consider the combination of all the elements of claim 1 to define the inventive concept, and the meaning of terms to be clear. In this case, a detailed purposive construction analysis is not required. Claim 1 reads:

> A method of determining the statistical validity of response signals from a bead array, said method comprising:
>
> a) providing a bead array comprising a planar substrate having a patterned surface wherein said substrate is not a fiber optic bundle, said surface having a population of beads distributed thereon at a density of least 20,000 beads per 1 mm^2, said population of beads comprising a plurality of subpopulations of beads, the plurality of subpopulations of

beads comprising a first subpopulation comprising beads having redundant first bioactive agents and a second subpopulation comprising beads having redundant second bioactive agents;

b) contacting said array with a target analyte comprising a protein, thereby producing a response signal at said beads of at least one of said first and second subpopulations;

c) obtaining individual response signals from 5 to 100 separate beads from at least one of said first and second subpopulations; and

d) performing a statistical analysis on said response signals from at least one of said first and second subpopulations, whereby statistical validity of said response signals is determined.

(3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed

[22] In our view, D2 is the closest prior art of record. With respect to claim 1, D2 discloses the following elements:

- a bead array comprising a fiber optic bundle, the end of which comprises a planar substrate having a patterned surface and having a population of beads distributed thereon at a density of at least 20,000 beads per 1 mm^2 [page 275, last paragraph – page 276 left column and Figure 16];

- first and second subpopulations of beads each comprising redundant bioactive agents [page 276 right column – page 277, end of section and Figure 17];

- contacting said array with a target analyte comprising a protein, thereby producing a response signal at said beads of at least one of said first and second subpopulations [page 276, right column mentions enzyme-based analyses]; and

- performing a statistical analysis on response signals from at least one of said first and second subpopulations, whereby statistical validity of said response signals is determined [page 277, right column states "There are multiple copies of each microsphere enabling redundant measurements from multiple sensors, thereby reducing the possibility of false positive and false negative results].

[23] In the R-FA, the Applicant asserted that D2 does not disclose a subpopulation of beads having redundant bioactive agents. The Applicant also asserted that none of the cited references teach sensor redundancy or statistical analysis based on results from a plurality of beads comprising identical probes. In our view, subpopulations of redundant bead types are disclosed by D2 as detailed above. In our view, statistical analysis based on results from a plurality of beads comprising identical probes is disclosed in D2, page 277 as noted

above, and is also CGK, as exemplified above in references D1, and D9.

[24] In our view, the differences between claim 1 and D2 are:

- D2 does not disclose a sensor that is not a fiber optic bundle; and
- D2 does not disclose obtaining individual response signals from 5 to 100 separate beads of at least one of the subpopulations.

(4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

[25] While D2 does not disclose a sensor that is not a fiber optic bundle, D9, in the same art of chemical analysis, discloses a planar array synthesized on a glass wafer and sampled with a scanning confocal microscope [page 1679, left column, second paragraph and right column second paragraph]. The PSA seeking to implement a method such as in D2 but without using a fiber optic bundle as a substrate would look to D9 as providing an alternative.

[26] While D2 does not specifically disclose sampling 5 to 100 separate beads of one subpopulation, it discloses thousands of beads in an array. The PSA familiar with the improvement in confidence from averaging multiple samples would know that the confidence improves dramatically with a few redundant samples, but further improvements require a very large number of redundant samples. Therefore, the advantage of using 5 to 100 samples would be apparent.

[27] Therefore, in our view, claim 1 is obvious and does not comply with section 28.3 of the *Patent Act* having regard to D2 in view of D9 and CGK.

[28] Regarding claim 2, D2 further discloses decoding arrays (identifying the location of beads) [page 277, right column, second paragraph].

[29] Regarding claim 3, excluding outlying data samples in statistical analysis is considered CGK.

[30] Regarding claims 4 and 24, substrate materials glass and plastic are considered to be CGK.

[31] Regarding claims 5 to 8, a bioactive agent as a nucleic acid or protein is considered to be CGK. Specific base lengths and sequences are also considered to be CGK.

[32] Regarding claims 9 to 19 and 33 to 34, all the recited statistical methods and sample population numbers are considered to be CGK.

[33] Regarding claims 20 to 23 and 30 to 32, D2 further discloses these details of beads in wells [page 275, right column – page 277, right column first paragraph and Figure 16].

[34] Regarding claim 25, the substrate dimensions are considered to be CGK.

[35] Regarding claims 26 to 29, a target analyte in solution and the various means of contacting the sensor with the solution are considered to be CGK.

[36] Therefore, in our view, all of claims 1 to 34 are obvious and do not comply with subsection 28.3 of the *Patent Act* having regard to D2 in view of D9 and the CGK.

Lack of Enablement – Legal Principles

[37] Although the FA cited paragraph 27(3)(d) of the *Patent Act*, in our view, paragraph 27(3)(b) is more relevant to this enablement inquiry and recites that the specification of an invention must:

> set out clearly the various steps in a process, or the method of constructing, making, compounding or using a machine, manufacture or composition of matter, in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it pertains, or with which it is most closely connected, to make, construct, compound or use it;

[38] A determination of whether the specification complies with paragraph 27(3)(b) of the *Patent Act* requires that, having only the specification, the PSA should be able to produce the invention using only the instructions contained in the disclosure (*Teva Canada Ltd v Novartis AG*, 2013 FC 141, citing *Teva Canada Ltd v Pfizer Canada Inc*, 2012 SCC 60 and *Consolboard v MacMillan Bloedel* (1981), 56 CPR 2d 145 (SCC)). Although the CGK can be relied upon, the PSA should not be called upon to display inventive ingenuity or undertake undue experimentation.

Lack of Enablement – Analysis

[39] The FA found claim 1 to be not enabled in that the claimed element of a substrate that is *not* a fiber optic bundle appeared to be inconsistent with the claimed element of the substrate having a patterned planar surface. We note that a substrate which *is* a fiber optic bundle having a patterned planar surface appears to be supported and enabled by at least

Figure 5A and associated description on page 32, lines 6-11. We also note that a substrate which is *not* a fiber optic bundle appears to be supported and enabled by the description of using a microscope cover slide as a substrate on page 45, lines 8-10. The instant description at page 16, lines 7-11 recites various alternative methods, such as photolithography, acknowledged to be CGK, of creating a patterned surface on such a substrate.

[40] Therefore, in our view, the claimed patterned planar surface on a substrate that is not a fiber optic bundle is enabled, and the specification does comply with paragraph 27(3)(b) of the *Patent Act*.

Indefiniteness

[41] Subsection 27(4) of the *Patent Act* requires that the claims define the subject matter of the invention distinctly and in explicit terms:

> The specification must end with a claim or claims defining distinctly and in explicit terms the subject-matter of the invention for which an exclusive privilege or property is claimed.

[42] The FA found claim 1 indefinite due to reciting the negative limitation of the substrate being "not a fiber optic bundle". The FA viewed this as constituting a clarity defect as there did not appear to be a recitation of what the substrate is. In our view, claim 1 does recite what the substrate is—a planar substrate having a patterned surface. Therefore, claim 1 is clear and does comply with subsection 27(4) of the *Patent Act*.

Additional Defects

[43] In the course of reviewing the specification, we noted several additional defects:

- claims 5 to 7 are inconsistent with claim 1. A bioactive agent being a nucleic acid would not be expected to provide detection functionality with an analyte comprising a protein. This leads to a lack of clarity as to whether a nucleic acid was actually intended to be recited in these claims. Consequently, in our view, claims 5 to 7 do not comply with subsection 27(4) of the *Patent Act*;

- several terms appear to be trademarks not identified as such and therefore the description does not comply with section 52 of the *Patent Rules*. First references to these terms noted are Sepharose (page 17), Tween 20 (page 21), Macintosh (page 30), Nafion (page 32), and Excel (page 49); and

- the description incorporates other documents by reference and does not comply with subsection 57(1) of the *Patent Rules*. Occurrences noted are at pages 25, 28, 49 and 61.

PROPOSED CLAIMS

[44] The Applicant removed the restrictions of "not a fiber optic bundle" and "having a patterned surface" in proposed claim 1. Therefore, the scope of the claim has been *broadened* and would encompass both the embodiment of a fiber optic bundle having a patterned surface and the embodiment of a microscope cover slide having a smooth planar surface, both of which are considered enabled in view of the description and the CGK.

[45] Proposed claim 1 also recites the bead array comprising nucleic acid probes rather than bioactive agents for detecting proteins. This change is not consequential to the obviousness defect, as both types of probes are CGK. Further, D2 explicitly discloses nucleic acid probes [page 273, left column, second paragraph]. The proposed change to claim 1 would, however, cure the indefiniteness issue with respect to claims on file 5 to 7 raised above.

[46] In relation to D2, we again note that the Applicant submitted in its R-FA (page 2) that "there is no teaching of statistical analysis" and "Applicant finds, after a careful reading of D2 that no section of D2 discloses a bead array comprising a subpopulation of beads, said subpopulation of beads having redundant bioactive agents."

[47] However, as explained above in relation to the claims on file, in our view, the PSA would understand D2 to disclose:

- first and second subpopulations of beads each comprising redundant bioactive agents [page 276 right column – page 277, end of section and Figure 17]; and
- performing a statistical analysis on response signals from at least one of said first and second subpopulations, whereby statistical validity of said response signals is determined [page 277, right column states "There are multiple copies of each microsphere enabling redundant measurements from multiple sensors, thereby reducing the possibility of false positive and false negative results].

[48] Accordingly, as with claim 1 on file, the PSA would not regard the step of performing statistical analysis as a feature sufficient to render the claim non-obvious.

[49] Proposed claims 2 to 31 are similar to claims on file 2 to 34, with minor changes consistent with reference to nucleic acid probes rather than protein. These amendments do not

introduce any inventive element with respect to the prior art of record.

[50] Proposed claims 32 to 35 recite the additional element of the two types of probes being directed to different target areas of the same nucleic acid analyte (target redundancy). This is in addition to the element of redundant probes of each type (sensor redundancy) recited in claim 1 upon which these claims depend. The description provides support for these claims at least at page 51, lines 21 to 27. In our view, the combination of target and sensor redundancy adds a level of confidence as non-specific binding interactions can be statistically minimized. In our view, this combination is not obvious in view of the prior art of record and the CGK

[51] Therefore, an amended claim set based on the proposed claim set comprising an independent claim incorporating all the elements of proposed claim 32 would cure the obviousness and indefiniteness defects.

CONCLUSIONS

[52] For the reasons set out above, for the specification on file:

- all of claims 1 to 34 are obvious and do not comply with subsection 28.3 of the *Patent Act* having regard to D2 in view of D9 and the CGK;
- the specification complies with paragraph 27(3)(b) of the *Patent Act*;
- claim 1 is clear and complies with subsection 27(4) of the *Patent Act*;
- claims 5-7 are indefinite and do not comply with subsection 27(4) of the *Patent Act*;
- the description does not comply with section 52 of the *Patent Rules*; and
- the description does not comply with subsection 57(1) of the *Patent Rules*.

[53] For the reasons set out above, an amended claim set based on the proposed claim set and comprising an independent claim incorporating all the elements of proposed claim 32 would cure the above claim defects. An amended description would also be required to address the trademark and incorporation by reference defects identified above. A further amendment to the description consistent with proposed amended description page 7 would make the amended description correspond more closely to the amended claims.

RECOMMENDATION OF THE BOARD

[54] For the reasons set out above, we recommend that the Applicant be notified, in accordance with subsection 86(11) of the *Patent Rules*, that the following are necessary for compliance of the application with the *Patent Act* and *Patent Rules*:

- the deletion of the claims on file;
- the deletion of the description on file;
- the insertion of claims corresponding to the proposed claims but with the limitations of proposed claim 32 incorporated into the independent claim; and
- the insertion of a description based on the description on file with proposed page 7 as per the R-FA, but additionally having changes throughout to address the trademark and incorporation by reference defects noted above.

Howard Sandler	Ed MacLaurin	Leigh Matheson
Member	Member	Member

DECISION OF THE COMMISSIONER

[55] I concur with the conclusion and recommendation of the Board. In accordance with subsection 86(11) of the *Patent Rules*, I hereby notify the Applicant that the following amendments and only the following amendments must be made in accordance with paragraph 200(b) of the *Patent Rules* within three (3) months of the date of this decision, failing which I intend to refuse the application:

- the deletion of the claims on file;
- the deletion of the description on file;
- the insertion of claims corresponding to the proposed claims but with the limitations of proposed claim 32 incorporated into the independent claim; and
- the insertion of a description based on the description on file with proposed page 7 as per the R-FA, but additionally having changes throughout to address the trademark and incorporation by reference defects noted in the recommendation.

Johanne Bélisle
Commissioner of Patents

Dated at Gatineau, Quebec

this 14th day of May, 2020.