

Commissioner's Decision #1500

Décision du commissaire n°1500

TOPICS: G00 Utility
 B22 Not Supported by Disclosure
 B00 Ambiguity or Indefiniteness

SUJETS : G00 Utilité
 B22 Non appuyée par la divulgation
 B00 Caractère ambigu ou indéfini

Application No.: 2,568,846

Demande n° 2 568 846

PATENT OFFICE

DECISION OF THE COMMISSIONER OF PATENTS

Having been rejected under subsection 30(3) of the *Patent Rules* [SOR/96-423], patent application number 2568846 subsequently was reviewed in accordance with paragraph 30(6)(c) of the *Patent Rules*. In accordance with the recommendation of the Patent Appeal Board, the Commissioner rejects the application.

Applicant:

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INTRODUCTION

- [1] This recommendation concerns the review of the rejected Canadian patent application No. 2,568,846, which is entitled “Method and Device for Remotely Communicating by Using Photoluminescence or Thermoluminescence”, filed in the name of Robert Desbrandes (“the Applicant”). The Patent Appeal Board (“the Board”) proceeded with a review of the rejected application in accordance with paragraph 30(6)(c) of the *Patent Rules*.
- [2] As explained in more detail below, we recommend that the Commissioner of Patents reject the application.

BACKGROUND

The application

- [3] The patent application was filed in Canada on May 23, 2005 under the provisions of the *Patent Cooperation Treaty* and became accessible to the public on December 8, 2005.
- [4] The application generally concerns a method and device for remotely communicating by using photoluminescence and thermoluminescence of particles entangled by quantum bonding (“entangled particles”).

History of the proceedings

- [5] On May 10, 2016, a Final Action (FA) was issued in accordance with subsection 30(4) of the *Patent Rules*. The FA rejected the application and noted the following defects:
- claims 1 to 70 encompass an object that lacks utility and thus do not comply with section 2 of the *Patent Act*;
 - the description does not exactly and completely describe the invention, its operation and its use and thus does not comply with paragraph 27(3)(d) of the *Patent Act*; and

- claims 16, 32, 63 and 64 are indefinite and thus do not comply with subsection 27(4) of the *Patent Act*.

- [6] In a response to the FA (RFA) dated November 7, 2016, the Applicant presented arguments in favour of acceptance of the application and proposed a set of 68 amended claims (the proposed claims).
- [7] The Applicant's arguments did not convince the Examiner to cancel the rejection of the application, and the Examiner considered that the proposed claims do not correct all of the defects. The application was transmitted to the Board for review, accompanied by an explanation presented in a summary of reasons (SOR), in accordance with paragraph 30(6)(c) of the *Patent Rules*. In a letter dated January 25, 2017, the Board sent a copy of the SOR to the Applicant.
- [8] In a letter dated April 16, 2017, the Applicant indicated that he still wanted the Board to proceed with a review of the application.
- [9] This committee (the Committee) was constituted to proceed with the review of this application under paragraph 30(6)(c) of the *Patent Rules*. On May 10, 2019, the Committee sent a preliminary review (PR) letter to the Applicant.
- [10] In a letter dated June 3, 2019, the Applicant indicated that he did not wish a hearing to be held. On June 12, 2019, the Applicant presented a written response to the PR letter ("RPR"). The Applicant did not submit other proposed amendments to the application.

QUESTIONS

- [11] The questions to be settled under this review are whether:
- claims 1 to 70 encompass an object that lacks utility and thus do not comply with section 2 of the *Patent Act*;
 - the description does not exactly and completely describe the invention, its operation and its use and thus does not comply with paragraph 27(3)(d) of the *Patent Act*; and

claims 16, 32, 63 and 64 are indefinite and thus do not comply with subsection 27(4) of the Patent Act.

- [12] If the claims on file are ruled to be defective, we can examine the proposed claims to determine if they constitute necessary changes to bring the application into compliance with the *Patent Act* and the *Patent Rules*.

LEGAL AND PRACTICAL PRINCIPLES OF THE BOARD

The person skilled in the art (PSA)

- [13] The examination of the utility, sufficiency and lack of clarity of the claims is based on an understanding of the PSA. In *AstraZeneca Inc v Apotex Inc* 2014 FC 638 at para. 51, it is noted:

The skilled person is a notional person used by the courts to ensure that patents are read in an “informed” way. For the application of patent law, and to reflect the reality, patents are theoretically addressed to a person skilled in the art rather than to a member of the public. The skilled person is “deemed to be unimaginative and uninventive, but at the same time is understood to have an ordinary level of competence and knowledge incidental to the field to which the patent relates and to be reasonably diligent in keeping up with advances”. Additionally, the skilled person can come from a single discipline, or reflect a combination of multiple disciplines, depending on the nature of the patent: *Merck & Co. v. Pharmascience Inc.*, 2010 FC 510, at paragraphs 34 to 40 [*Merck finastérider*].

Common general knowledge

- [14] The assessment of common general knowledge (CGK) is governed by the principles stated in *Eli Lilly & Co v Apotex Inc*, 2009 FC 991 at para. 97 [*Eli Lilly*], upheld by 2010 FCA 240, citing *General Tire & Rubber Co. v. Firestone Tyre & Rubber Co. Ltd*, [1972] RPC 457, [1971] FSR 417 (UKCA) (*General Tire*) at pages 482 and 483 (of RPC):

The common general knowledge imputed to such an addressee must, of course, be carefully distinguished from what in the patent law is regarded as public knowledge. This distinction is well explained in Halsbury’s Law of England, Vol. 29, para. As regards patent specifications, it is the somewhat artificial (see per Lord Reid in the *Technograph* case, [1971] F.S.R. 188 at 193) concept of patent law

that each and every specification, of the last 50 years, however unlikely to be looked at and in whatever language written, is part of the relevant public knowledge if it is resting anywhere in the shelves of the Patent Office. On the other hand, common general knowledge is a different concept derived from a commonsense approach to the practical question of what would in fact be known to an appropriately skilled addressee—the sort of man, good at his job, that could be found in real life.

The two classes of documents which call for consideration in relation to common general knowledge in the instant case were individual patent specifications and “widely read publications”.

As to the former, it is clear that individual patent specifications and their contents do not normally form part of the relevant common general knowledge, though there may be specifications which are so well known amongst those versed in the art that upon evidence of that state of affairs they form part of such knowledge, and also there may occasionally be particular industries (such as that of colour photography) in which the evidence may show that all specifications form part of the relevant knowledge.

As regards scientific papers generally, it was said by Luxmoore, J. in *British Acoustic Films* (53 R.P.C. 221, at 250):

“In my judgment it is not sufficient to prove common general knowledge that a particular disclosure is made in an article, or series of articles, in a scientific journal, no matter how wide the circulation of that journal may be, in the absence of any evidence that the disclosure is accepted generally by those who are engaged in the art to which the disclosure relates. A piece of particular knowledge as disclosed in a scientific paper does not become common general knowledge merely because it is widely read, and still less because it is widely circulated. Such a piece of knowledge only becomes general knowledge when it is generally known and accepted without question by the bulk of those who are engaged in the particular art; in other words, when it becomes part of their common stock of knowledge relating to the art.” And a little later, distinguishing between what has been written and what has been used, he said:

“It is certainly difficult to appreciate how the use of something which has in fact never been used in a particular art can ever be held to be common general knowledge in the art.”

These passages have been cited often and no decision was presented to us in which they were criticized. We accept them as correctly stating the general law on this point, although we reserve for deeper examination the question of whether the words “accepted without question” set the bar somewhat high: for the purposes of this matter, we are willing, without seeking to present a complete definition, to substitute the words “generally considered as a good basis to continue”

Utility

[15] Section 2 of the *Patent Act* requires that there be utility:

invention “means any new and useful art, process, machine, manufacture or composition of matter, or any new and *useful* improvement in any art, process, machine, manufacture or composition of matter. [italics added]

[16] In *AstraZeneca Canada Inc v Apotex Inc*, 2017 SCC 36, at para. 53 [*AstraZeneca*], the Supreme Court of Canada (SCC) required “the scope of potentially acceptable uses” of “the proposed invention to be related to the nature of the subject matter” and set out the approach it is suitable to adopt to determine if a patent application discloses an invention that is useful enough within the meaning of section 2 of the *Patent Act*:

[54] To determine whether a patent discloses an invention with sufficient utility under s. 2, courts should undertake the following analysis. First, courts must identify the subject matter of the invention as claimed in the patent. Second, courts must ask whether that subject matter is useful—is it capable of a practical purpose (i.e. an actual result)?

[55] The Act does not prescribe the degree or quantum of usefulness required, or that every potential use be realized—a scintilla of utility will do. A single use related to the nature of the subject matter is sufficient, and the utility must be established by either demonstration or sound prediction as of the filing date *AZT*, at para. 56.

[17] The utility as of the filing date in Canada can be established by means of a demonstration or a sound prediction. Utility cannot be corroborated by evidence or knowledge that becomes accessible only after the filing date (also see *Apotex Inc v Wellcome Foundation Ltd*, 2002 SCC 77, at para. 56 [*AZT*], cited in the foregoing passage).

[18] In the event that the utility of an invention must be established by a demonstration, the demonstration must have taken place as of the filing date, but does not necessarily have to be included in the description (see *Eli Lilly Canada Inc v Apotex Inc*, 2015 FC 1016 at paras. 138 to 142). The data establishing the demonstration of utility as at the filing date may be provided after the filing date, by the Applicant, by way of an affidavit.

[19] The sound prediction rule allows the alleged utility to be established even when this utility was not completely verified as of the filing date. However, a patent application must provide a “solid teaching” regarding the operation of the claimed invention, as opposed to “mere speculation” (AZT, at para. 69).

[20] The question of the soundness of the prediction is a question of fact (AZT, at para. 71). The analysis of the sound prediction should be based on three components (AZT, at para. 70):

- there must be a factual basis for the prediction;
- the inventor must have at the date of the patent application an articulable and “sound” line of reasoning from which the desired result can be inferred from the factual basis;
- there must be proper disclosure, including the underlying facts and the line of reasoning.

[21] These components are assessed from the point of view of the person skilled in the art to whom the patent application is addressed, accounting for that person’s CGK. Moreover, with the exception of CGK, the factual basis and the reasoning must be included in the patent application (see *Bell Helicopter Textron Canada Limitée v Eurocopter, SAS*, 2013 FCA 219, at paras. 152 and 153).

[22] Although a prediction does not have to be equivalent to a certainty to be sound, the appropriate standard in matters of utility is a “*prima facie* reasonable inference” (*Gilead Sciences Inc v Idenix Pharmaceuticals Inc*, 2015 FC 1156 at para. 251; *Mylan Pharmaceuticals ULC v Eli Lilly Canada Inc*, 2016 FCA 119, at para. 55).

[23] The obligation to demonstrate utility or ensure that it has been the subject matter of a sound prediction is set out more specifically in section 12.04 of the *Manual of Patent Office Practice* [MOPOP], revised in November 2017 (CIPO).

[24] In the RPR, the Applicant considered that, in the present case, the sound prediction required by the SCC is not the working principle of the invention, but rather the processes described in the application as of the filing date. The Applicant also noted that

the jurisprudence cited concerning the issue of utility was limited to the pharmaceutical and medical fields, a category of invention where utility requires evidence of the alleged therapeutic effect by means of studies conducted prior to the filing date.

- [25] We note that to be patentable, inventions in all fields required that utility be demonstrated or established by sound prediction. In some cases, such as for mechanical devices, the factual basis is found in the statutes or the scientific principles, or in the CGK of the PSA. In these cases, it may be apparent to the PSA that the invention should work as claimed (i.e. there is a sound line of reasoning that makes it possible to infer the desired utility of the invention from the factual basis).

Sufficiency

- [26] The material passages of subsection 27(3) of the *Patent Act* are worded as follows:

The specification of an invention must:

(a) correctly and fully describe the invention and its operation or use as contemplated by the inventor;

(b) 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 likely connected, to make, construct, compound or use it;

...

- [27] The courts have indicated that the sufficiency of disclosure is mainly related to two questions, which are relevant for the application of paragraphs 27(3)(a) and 27(3)(b) of the *Patent Act*: What is the invention? How does it work? (*Consolboard Inc v MacMillan Bloedel (Sask) Ltd*, [1981] 1 SCR 504 at para. 526). The description must provide an exact and complete answer to each of these questions so that, once the monopoly period has ended, the public, while only having the specification, can use the invention with the same success as the inventor at the time of the application, without having to prove inventive ingenuity or engage in excessive experimentation.

[28] Subsection 9.03 of the *MOPOP* is also relevant:

Although external documents may be referred to in the description, the invention must be described and enabled by the description alone as interpreted by the person skilled in the art in view of their common general knowledge. Specific prior art knowledge (e.g. information only available in one or a few documents, and which has not been shown to be commonly known and accepted) may be considered not to be “common general knowledge”, and in such cases those specific teachings from the prior art necessary to describe or enable the invention must be included in the description in order to provide a full and complete disclosure.

Indefiniteness

[29] Subsection 27(4) of the *Patent Act* requires claims to define distinctly and in explicit terms the subject matter of the invention.

“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.”

[30] In *Minerals Separation North American Corp v Noranda Mines Ltd*, [1947] Ex. CR 306, at p. 352, the Court insisted on the Applicant’s obligation to set out clearly in its claims the extent of the monopoly it is seeking to obtain and to use clear and precise terms in its claims:

By his claims the inventor puts fences around the fields of his monopoly and warns the public against trespassing on his property. His fences must be clearly placed in order to give the necessary warning and he must not fence in any property that is not his own. The terms of a claim must be free from avoidable ambiguity or obscurity and must not be flexible; they must be clear and precise so that the public will be able to know not only where it must not trespass but also where it may safely go.

[31] The requirements are set out more precisely in subsection 11.03 of the *MOPOP* revised in March 1998.

ANALYSIS

- [32] In our analysis, we first examined the question of utility, followed by sufficiency and the lack of clarity.

The PSA and the relevant CGK

- [33] The examination of the utility, sufficiency and lack of clarity of the claims is based on an understanding of the PSA and his CGK. The material date for the examination of CGK in terms of utility and sufficiency is the filing date (*AZT and Teva Canada Ltd v Pfizer Canada Inc* 2012 SCC 60 at para. 90).

- [34] The Examiner cited the following reference to substantiate the CGK:

D9: Louis Armand et al., *Alpha encyclopedie*, tome 29, “modulation” definition, Franson, Montréal, (1970) pages 4033 to 4044.

- [35] In the PR, we also presented the following references, applicable to CGK:

D10: “No Communication Theorem”, Wikipedia, archived on May 4, 2005, at the address: https://web.archive.org/web/20050504064143/https://en.wikipedia.org/wiki/No-communication_theorem

D11: Pirandola et al., “Advances in Quantum Teleportation”, *Nature Photonics*, 9 (September 29, 2015) pages 641 and 642.

- [36] In the FA (page 4), the Examiner defined the PSA as a person skilled in the art of quantum communications. This definition was not contested by the Applicant, and we therefore adopt it here.

- [37] In the FA (page 4), the Examiner enumerated the CGK of the PSA as follows:

The Examiner conceives the person skilled in the art of quantum communications as having the following knowledge:

- a) He or she is familiar with the concepts of quantum mechanics, and the formalisms used in it, such as Dirac’s formalism (bra-ket notation, etc.) or Schrödinger’s formulism (wave equation), and the representation and treatment of quantum numbers (spin, angular-

moment, polarization, energy, etc.) of quantum entities (electrons, photons, atoms, etc.).

b) He or she is familiar with the measuring devices that allow detection of quantum entities (for example, photomultiplier tubes) or identification of some of their quantum numbers (for example, polarizers), and the way of preparing a quantum entity in a given state (for example, with a defined spin). In particular, he or she is familiar with the production of X-rays, particularly by the Bremsstrahlung effect.

c) He or she is familiar with the concepts of thermoluminescence and photoluminescence, the processes of preparation (for example, the selection of materials), irradiation and measuring (for example, heating) using these properties, and the main applications (for example, dosimetry) where they have been used.

d) Finally, he or she is familiar with the concepts and methods of communication (electric, optical, radioelectric or acoustic), and particularly with the modulation techniques used by them, which are part of a wave context (D9).

[38] In the Applicant's letter, received on December 1, 2015, the Applicant affirms (pages 10 and 11) that the PSA would know how to prepare and stimulate conventional thermoluminescent or photoluminescent samples, for dosimetry, for example. We do not contest this, and this aspect was pointed out in the definition of CGK given by the Examiner in point c) above. However, according to our assessment, the CGK would not extend to how to prepare such samples containing material quantities of entangled trapped electrons, because it seems that these substances were not common prior art knowledge at the time this application was filed. In the Applicant's same letter, on pages 14 and 15, he claims that it is the teaching set out in the specification, rather than the CGK, which would allow the PSA to prepare samples containing entangled trapped electrons by means of a linear accelerator.

[39] In the same letter, the Applicant (page 13) considered that the PSA would know how to produce entangled photon beams, and cited Kurtsiefer et al., "Generation of correlated photon pairs in type II parametric down conversion—revisited", presented in *J. Mod. Opt.*, February 7, 2001, in support of this opinion. The Applicant also cited Smith, "How to select non linear crystals and model their performance using SNLO software", but this document does not refer to quantum entanglement. We note that the reference to only one

article does not constitute sufficient evidence that a teaching pertains to CGK. We add that even it were our opinion a priori that Kurtsiefer's teachings pertained to CGK as of the material date, our conclusions regarding the sufficient at issue hereinafter would not change, as is explained below.

[40] Consequently, as in the PR, we adopt the CGK enumerated above, taken from the FA. This definition was not contested by the Applicant in the RPR.

Utility

[41] We examine the utility according to the guidance set out in *AstraZeneca*, at para. 54.

What is the subject matter of the invention as it is claimed?

[42] Claims 1 to 16 concern a system of entangled photoluminescent or thermoluminescent samples and claim 69 concerns the media that contain these systems. Claim 1 is representative, in our opinion:

System of entangled samples characterized in that it contains at least one type of photoluminescent or thermoluminescent materials that have at least one excited state including groups of two or more electrons contained in traps of said excited photoluminescent or thermoluminescent materials, said electrons of said groups being entangled with each other and being distributed in whole or in part in said samples, called the entangled samples, said entangled samples being separable in space while retaining distant quantum bonds between some of said electrons trapped in said photoluminescent or thermoluminescent materials of said separated entangled samples.

[43] Claims 17 to 31 concern a method of production of a system of entangled samples and claims 67 and 68 concern means of implementing this method. Claim 17 is representative, in our opinion:

Production process of a system of entangled samples characterized in that two or more samples are prepared together, containing at least one type of photoluminescent or thermoluminescent materials, by bombardment, irradiation or illumination by means of at least one

source directly or indirectly emitting groups of entangled elementary particles capable of exciting said source of photoluminescent or thermoluminescent materials, said samples, once bombarded, irradiated or illuminated, being separated to form the system of entangled samples.

[44] Claims 32 to 66 concern a method of communication using samples entangled by quantum bonding, and claim 70 concern means of implementing this method. Claim 32 is representative, in our opinion:

Communication process characterized in that a system of entangled samples is used, containing at least one type of photoluminescent or thermoluminescent materials that have at least one excited state, involving groups of two or more electrons contained in traps of said excited photoluminescent or thermoluminescent materials, said electrons being entangled with each other and being distributed in whole or in part in said entangled samples in which:

- at least one stimulation is provoked, modulated in amplitude and/or in frequency over at least one of said entangled samples, the master entangled sample,
- at least one item of information or at least one remote control signal measuring at least one variation of luminescence correlated over at least another one of said entangled samples, the slave entangled sample, is determined, during stimulation of said master entangled sample, practically instantaneously, regardless of the distances separating the entangled samples and the media separating these samples or in which they are placed.

[45] According to our assessment, as we wrote in the PR, the claimed subject matter that must be useful to comply with section 2 of the *Patent Act* and common to all of the claims, is the system of entangled photoluminescent or thermoluminescent samples.

[46] This definition was not contested by the Applicant in the RPR.

[47] First of all, it is also our opinion that the use of the system of entangled samples for communication, which is the only utility disclosed in the application, is adequately linked to the nature of the subject matter of all of the claims and would render the alleged

invention useful within the meaning of section 2 of the *Patent Act*, if this utility is established either by demonstration or by sound prediction.

Had the required utility been established by means of a demonstration as of the filing date?

[48] We consider that the specification does not contain any demonstration of the use of a system of entangled photoluminescent or thermoluminescent samples in a method of communication. We studied the Applicant's letter, dated February 13, 2012, which is accompanied by documented experiments in Appendices A and B. However, these experiments seem to have been conducted after the filing date, namely May 23, 2005. According to the guidance set out in *AZT*, the evidence and knowledge available after the filing date cannot serve to establish utility. Consequently, according to our assessment, the utility of the invention claimed was not established on the basis of a demonstration as of the filing date.

Had the required utility been established by means of a sound prediction as of the filing date?

[49] As was pointed out in the "Legal Principles" section, the factual basis, the reasoning and their disclosure are components to consider when determining if a prediction is sound. These components are assessed from the point of view of the PSA, accounting for the material CGK, and based on what the PSA would consider a sound line of reasoning that allows the required utility of the invention to be inferred from the factual basis.

i. Factual basis

[50] The description on pages 1 to 6 discloses the conventional physical bases of excitation and stimulated emission of thermoluminescent and photoluminescent crystals, without quantum entanglement. The description also discloses the principles of quantum entanglement, on page 8, according to which quantum entanglement can be transferred from particle to particle by interaction, and discloses that the quantum bond is retained even when the particles are separated by any distance.

[51] In the RFA, on pages 3 to 6, the Applicant explains the principles that underlie the way the electrons that have spins entangled by quantum bonding behave regarding the energy bands in the doped crystals.

ii. Reasoning

[52] A sound prediction of utility necessitates a sound line of reasoning that makes it possible to infer the desired result from the factual basis. On page 8, it is affirmed in the description that when the photon beams entangled by quantum bonding interact with the crystal samples, the quantum bond of the photons is transferred to the electrons of the valence band, which then are captured in the crystal traps. The description also affirms that when the stimulation of an electron in the sample causes it to emit visible photons by de-excitation, the corresponding entangled electron in the unstimulated slave sample undergoes a correlated de-excitation, causing the emission of photons in the slave sample.

[53] In the RFA, on page 6, the Applicant affirms that the reason why the slave sample emits a photon is that, once the electron entangled in the master sample is stimulated to emit a photon, it acquires a defined spin. This would cause the electron entangled in the slave sample to acquire an opposite spin, which renders it incompatible with its orbit in the crystal trap.

iii. Disclosure of the factual basis, reasoning

[54] To establish a sound prediction of utility, the underlying factual basis and reasoning of the prediction, except if they are part of CGK as of the filing date, must be disclosed in the specification as filed. The description must be clear enough to allow the PSA to understand the basis of the prediction and be able to predict soundly that the invention would operate in its full scope once it would be presented in practical form.

[55] The only factual basis in the above description of the reasoning is the assertion, on pages 8 and 9, that according to a principle of quantum mechanics, the bond is retained when the two entangled samples are separated.

[56] The other explanations of the factual basis and the reasoning by the Applicant in the RFA, and mentioned above, cannot be considered a disclosure for the purposes of the sound prediction, because these explanations do not appear in the specification filed initially and do not seem to be part of CGK.

Analysis of projected utility

[57] As mentioned previously, our assessment is that the factual basis disclosed on this application is limited to the conventional physical bases of excitation and stimulated emission of thermoluminescent or photoluminescent crystals and to the generally known principles of quantum entanglement. Concerning the reasoning, we find that, according to the CGK as of the filing date, the PSA would consider that the stimulation of photoluminescence or thermoluminescence in the master sample leads to the destruction of the entanglement of its electrons with any counterpart entangled in the slave sample, so that the photoluminescence or thermoluminescence of the master sample does not cause any observable change in the slave sample. In the absence of any factual basis and reasoning disclosed in support of the contrary, the PSA would maintain his or her point of view in this regard. Moreover, according to our assessment, the PSA would consider that this information transfer regarding the state of the master sample (stimulated or not) to the slave sample constitutes a violation of the no-communication theorem from quantum information theory (see D10), which was known generally and accepted from the outset by the majority of those practising the prior art in question as of the filing date (see *Eli Lilly*). In other words, the PSA would not consider that the reasoning is sound.

[58] In the RPR, the Applicant submits that the non-communication theorem from quantum physics does not apply to the invention. In our opinion the PSA, equipped with his or her CGK as of the filing date, would consider the no-communication theorem applicable and

material to the question of determining if the specification discloses a sound line of reasoning that underlies a sound prediction.

[59] We find that the above-mentioned considerations are the core of our assessment, namely that the theory disclosed and the corresponding reasoning are not compatible with the generally accepted laws of physics and quantum mechanics, and that the PSA, based on the CGK as of the filing date, as well as the factual basis and the reasoning defined, would not have considered it a sound prediction that the system of entangled photoluminescent or thermoluminescent samples described can be used for communications.

[60] Consequently, according to our assessment, the utility of the subject matter claimed was not established by sound prediction as of the filing date.

Conclusion regarding utility

[61] According to our assessment, the Applicant did not establish the utility of the subject matter of claims 1 to 70 as of the filing date of the application, either by demonstration or by sound prediction. Consequently, we conclude that the subject matter of the claims on file is devoid of utility and does not comply with section 2 of the *Patent Act*.

Sufficiency

[62] Accounting for the legal principles stated previously, we now examine the question of whether the specification is defective because it does not provide the PSA with clear, concise and complete information allowing the PSA to produce the invention as claimed, only using the instructions contained in the disclosure, without having to prove inventive ingenuity or engage in excessive experimentation.

[63] In the FA (middle of page 7), it is affirmed that the description is insufficient as to the instructions provided to the PSA, indicating how to reproduce entangled trapped electrons in samples of photoluminescent or thermoluminescent materials. The Examiner

did not contest the assertion that the PSA could generate entangled photon beams (FA, page 7). As was noted previously, although we do not find that the generation of entangled photon beams pertains to CGK, we also do not consider that this aspect is related to the following argument. The question relating to sufficiency is whether the description provides sufficient guidance to the PSA as to how to use these entangled photon beams for reliable production of photoluminescent or thermoluminescent crystal samples, which all contain entangled trapped electrons in sufficient concentrations to be used for communication purposes.

- [64] On page 8, the description explains the production of entangled trapped electrons by bombardment of samples with rays emitted by BBO nonlinear crystals. The description also mentioned, on page 24, the bombardment of samples with rays emitted by a CLINAC linear accelerator. No information relating to the geometry, the sample size or the ambient conditions, among others, is provided. According to our assessment, the PSA who has CGK as of the filing date would not consider that these descriptions are sufficient instructions for flexible generation of photoluminescent or thermoluminescent crystal samples, which all contain entangled trapped electrons in sufficient concentrations to be used for communication purposes.
- [65] We note that D11 describes the state of the technique in 2015, well after the failing date of May 23, 2005. D11 describes the recent progress to achieve entanglement in solid state systems. All the references to this progress are articles published after the filing date. The state of the technique tends to indicate that the fact of achieving the entanglement of electrons trapped in solid state samples was not part of CGK as of the filing date.
- [66] In the RPR, the Applicant maintained that the specification provides a sound teaching regarding the preparation of the entangled samples and that a person skilled in the art of quantum communications who would have overcome his prejudices against the efficacy of the technique could put invention into practices.

[67] In our opinion, sufficiency is not a question of prejudice. We note that the PSA is considered to possess the CGK in the prior art at the time of filing and a mind ready to understand the specification, but lacks inventive ingenuity. In our opinion and for the above-mentioned reasons, the teaching of the specification that concerns the preparation of the entangled samples would not lead such a person to produce functional entangled samples without having to show inventive ingenuity or needing to engage in excessive experimentation.

[68] The FA (page 5) also considers that the description is insufficient, insofar as it refers to claims 32 and 64 and the concept of modulation. The FA claims that “modulation” only has meaning in reference to wave communications (referring to D9). We find that this description discloses the communication of binary as “1 = “heated master sample” and 0 = “unheated master sample””. The PSA would understand, according to the description of Figure 5, how a binary information sequence of intensity or an information sequence of analogous intensity could be encoded by sequential stimulation or non-stimulation of a series of samples on two synchronized films. Although these are forms of “basic band communication” in the art of communications, this would not involve wave “modulation” according to the PSA’s general understanding. According to our assessment, the description is insufficient regarding the concept of modulation set out in claims 32 and 64.

[69] Consequently, according to our assessment, the specification does not comply with subsection 27(3) of the *Patent Act*, because it does not allow the person skilled in the art to implement the invention as it is claimed, without having to show inventive ingenuity or engage in excessive experimentation.

Indefiniteness

[70] The FA indicates that claim 16 lacks clarity because it does not end in a period. According to our assessment, this is a minor typographical error.

- [71] The FA mentioned the lack of antecedent in the terms “distances” and “media” in claim 32. According to our assessment, the antecedents are implicit, because a certain distance and a certain intermediary medium are part of the environment in which the system operates. Consequently, we find that the claim is not defective in this regard.
- [72] The FA also indicates that claims 32, 63 and 64 lack clarity due to the use of the term “and/or”. According to our assessment, the term does not introduce any ambiguity in the present context. Consequently, we find that these claims are not defective in this regard.
- [73] Finally, the FA indicates that claim 63 lacks clarity due to the inclusion of the term “different”, which is subjective. According to our assessment, the PSA would interpret “different” in the context of the current specification as signifying a different chemical component, a doping or a different form. We find that the claim is not defective in this regard.
- [74] Consequently, according to our assessment, claims 16, 32, 63 and 64 are clear and comply with subsection 27(4) of the *Patent Act*.

SET OF PROPOSED CLAIMS

- [75] In the RFA, the Applicant proposed to amend claim 32, withdraw claims 63 and 64 and renumber the other claims accordingly.
- [76] According to the SOR, these amendments would introduce other defects related to indefiniteness.
- [77] According to our assessment, these amendments would correct the above-mentioned defect regarding the insufficiency of claims 32 and 64 as to the way to produce a modulation of amplitude of frequency, and would not introduce other defects related to indefiniteness.

[78] However, according to our assessment, the proposed amendments would not correct the defects related to utility and insufficiency, which remains, for the same reasons as those mentioned above regarding the claims on file.

CONCLUSIONS

[79] According to our assessment, the subject matter of the claims on file is devoid of utility and does not comply with section 2 of the *Patent Act*. Moreover, according to our assessment, the specification does not comply with subsection 27(3) of the *Patent Act*, because it does not allow the PSA to implement the invention as it is claimed, without having to show inventive ingenuity or engage in excessive experimentation. According to our assessment, claims 16, 32, 63 and 64 are clear and comply with subsection 27(4) of the *Patent Act*.

[80] Moreover, we have determined that the set of proposed claims do not remedy the defects and that, consequently, the set of proposed claims do not constitute a specific amendment which is “necessary” under the terms of subsection 30(6.3) of the *Patent Rules*.

RECOMMENDATION THE BOARD

[81] We recommend that the Commissioner of Patents reject the application, because the subject matter of the claims on file is devoid of utility and does not comply with section 2 of the *Patent Act*, and the specification does not comply with subsection 27(3) of the *Patent Act*.

[82] Moreover, the set of proposed claims do not remedy the defects and that, consequently, the Committee declines to recommend the introduction of these claims, because they do not constitute a specific amendment which is “necessary” under the terms of subsection 30(6.3) of the *Patent Rules*.

Howard Sandler
Member

Marcel Brisebois
Member

Paul Fitzner
Member

DECISION OF THE COMMISSIONER

[83] I subscribe to the conclusions of the Board and its recommendations to reject the application, because the subject matter of the claims on file is devoid of utility and does not comply with section 2 of the *Patent Act*, and the specification does not comply with subsection 27(3) of the *Patent Act*.

[84] Consequently, in accordance with section 40 of the *Patent Act*, I reject this application. In accordance with the provisions of section 41 of the *Patent Act*, the Applicant has a period of six months to file an appeal of my decision with the Federal Court of Canada.

Johanne Bélisle
Commissioner of Patents

Made in Gatineau, Quebec,

On this 16th day of October, 2019