Federal Court of Appeal  Cour d'appel fédérale

Date: 20110817

Docket: A-121-11

Citation: 2011 FCA 237

CORAM: **NOËL J.A.**
PELLETIER J.A.
MAINVILLE J.A.

BETWEEN:

PHOSTECH LITHIUM INC.

Appellant

and

VALENCE TECHNOLOGY INC.

Respondent

Heard at Montreal, Québec, on June 6, 2011.

Judgment delivered at Ottawa, Ontario, on August 17, 2011.

REASONS FOR JUDGMENT BY: PELLETIER J.A.

CONCURRED IN BY: NOËL J.A.
MAINVILLE J.A.

Federal Court of Appeal  Cour d'appel fédérale

Date: 20110817

Docket: A-121-11

Citation: 2011 FCA 237

CORAM: **NOËL J.A.**
PELLETIER J.A.
MAINVILLE J.A.

BETWEEN:

PHOSTECH LITHIUM INC.

Appellant

and

VALENCE TECHNOLOGY INC.

Respondent

REASONS FOR JUDGMENT

PELLETIER J.A.

INTRODUCTION

[1] This is an appeal from the decision of Gauthier J. of the Federal Court (the trial judge), reported as *Valence Technology, Inc. v. Phostech Lithium Inc*., 2011 FC 174 (Reasons), which held that the appellant Phostech Lithium Inc's. (Phostech) P1 Process for the manufacture of lithiated iron phosphate ($LiFePO_4$) infringed the respondent Valence Technology, Inc.'s (Valence) Canadian Patent no. 2, 395, 115 (the '115 Patent). The appeal raises no novel question of law; it turns on the construction of a single claim of the '115 Patent and, in particular, on the meaning of the word

"carbon" in the claim. Phostech also raises the issue of the validity of a second Valence patent, Canadian Patent no. 2, 466, 366 (the '366 Patent).

[2] For the reasons which follow, I am of the view that the trial judge made no error in concluding that the term "carbon" in claim 3 of the '115 Patent is not restricted to particulate carbon, and encompasses carbon in other forms. I am also of the view that Phostech's request for a declaration of invalidity of the '366 Patent should be dismissed. As a result, I would dismiss the appeal with costs.

THE INVENTION

[3] The '115 Patent deals with novel lithium mixed metal materials, which have useful properties in the manufacture of lithium ion batteries, and with a novel method of producing such materials. In this case, only the method is in issue.

[4] The trial judge summarized the invention taught in the '115 Patent as follows (Reasons at para. 107):

> [I]t appears that the invention set out in the '115 Patent can be summarized as: an improved method whereby selective CTR [or carbothermal reduction] is used to make lithium mixed metal compounds (such as $LiFePO_4$) that could contain conductive carbons intimately mixed with the final product of the reaction. Thus a feature of the invention is that carbon can have a dual role – enabling the use of cheaper metal containing compounds with a valency that will be reduced by CTR and increasing the conductivity of the end product.

[5] The term “selective CTR” refers to the use of carbon as a selective reducing agent to reduce the oxidation state of the metal without reducing it to its elemental oxidation state of zero. Not all metals are capable of existing in multiple oxidation states. For example aluminum is binary and exists in either the 3^+ state when oxidized or in its elemental oxidation state of 0 (Examination in Chief of Dr. Dahn, Appeal Book at 8343). Other metals, such as iron, can exist in a range of oxidations states. In the patented process, the selective reduction of iron results in its reduction from the 3+ to the 2+ oxidation state (depicted as Fe^{3+} and Fe^{2+} respectively) rather than full reduction to its elemental state of Fe^0. The advantage obtained by this selective reduction is the ability to use less expensive precursors in which iron is in the Fe^{3+} state.

[6] Another advantage of the invention noted by the trial judge is that, after the CTR reaction, carbon remains in the final product and increases its electrical conductivity.

[7] While the principles of carbothermal reduction were previously known, they had not been applied in this context. The novel aspect of the ‘115 Patent, whose validity was admitted, was set out at page 60 of the specification:

> Principles of carbothermal reduction have been applied to produce pure metal from metal oxides by removal of oxygen. [references omitted]. Principles of carbothermal and thermal reduction have also been used to form carbides. [references omitted]. Such methods are not known to have been applied to form lithiated products or to form products without oxygen abstraction from the precursor. The methods described with respect to the present invention provide high quality products which are prepared from precursors which are lithiated during the reaction without oxygen abstraction. This is a surprising result.

[8] The patent deals at length with the selection of precursor materials and with variations on the method taught in the patent. For our purposes, it is sufficient to focus on the role of carbon in the process as the definition of carbon is the main issue raised in the appeal.

[9] The ‘366 Patent is a divisional patent flowing from the ‘115 Patent.

PHOSTECH’S P1 PROCESS

[10] Phostech manufactures lithium iron phosphate using a process whose details are the subject of a confidentiality order. However, the trial judge’s public Reasons for Judgment disclose sufficient details of the process for the purposes of this appeal. (The parties to the trial received Confidential Reasons for Decision in which the particulars of the P1 Process are disclosed).

[11] Phostech begins by mixing two precursor compounds in particle form and adding to that mixture an organic compound which acts as a binder and assists in the formation of pellets. This ensures that the compounds are in intimate contact during the reaction.

[12] The pellets are placed in a kiln and exposed to high temperatures in an inert atmosphere. At a point prior to the carbothermal reaction, the binder decomposes leaving behind a carbonaceous residue. The temperature is further increased to the point where carbothermal reduction occurs. The mixture is then cooled to room temperature. The final product is $LiFePO_4$.

THE FEDERAL COURT'S DECISION

a) Infringement of the '115 Patent

[13] The only claim whose infringement is in issue in this appeal is claim 3 of the '115 Patent which states as follows:

> In a method of making a lithium mixed metal polyanion compound by reacting a mixture of a lithium compound and at least one metal containing compound, said compounds in particle form, the improvement comprising: incorporating carbon into the said mixture in an amount sufficient to reduce the oxidation state of at least one metal ion of the metal containing compound without full reduction to an elemental state and carrying out the reaction in the presence of said carbon.

[14] The parties agreed that all the elements of the claim, whatever they meant, were essential.

[15] Valence alleged that Phostech's P1 Process infringed claim 3 of the '115 Patent in that the process contained all the essential elements of the claim. In particular, Valence claimed that the carbonaceous residue formed by the pyrolysis of the polymer supplied the carbon for the carbothermal reduction of the oxidation state of at least one metal ion of the metal containing compound.

[16] At trial, Phostech raised a number of defences to Valence's claim that its P1 Process infringed claim 3. Over the course of the litigation, Phostech abandoned many of its defences and at the conclusion of the trial only three issues remained: the definition of "carbon", the meaning of "incorporating carbon into said mixture" and whether carbon was required to be the reducing agent or simply a reducing agent.

[17] The trial judge heard conflicting evidence from the parties' experts on the meaning of "carbon". Phostech's expert, Dr. Whittingham, testified that, to a person skilled in the art, carbon meant carbon in solid form, "that is as particles, not a gas or a liquid" (Appeal Book at 6192-6193). In cross-examination, Dr. Whittingham conceded that the carbon referred to in claim 3 must exist in a form in which it is capable of functioning as a reductant in carbothermal reduction. One of Valence's experts, Dr. Dahn, testified that the person skilled in the art would understand that the claim did not require carbon to be present in particulate form (Appeal Book at 1223, 8346). The other, Dr. Cairns, testified that the person skilled in the art would understand that the carbon formed by the decomposition of a carbonaceous material would constitute "carbon" as that term is used in claim 3 (Appeal Book at 10,218).

[18] The trial judge carefully reviewed the qualifications and the evidence of the expert witnesses and concluded that she preferred the evidence of Valence's experts.

[19] In particular, the trial judge accepted the evidence of Valence's experts to the effect that claim 3 only required that carbon be present prior to the carbothermal reaction and that it need not be incorporated into the mixture of precursors prior to the start of the process, that is prior to the introduction of the material into the kiln (Reasons at paras. 114, 119).

[20] Finally, the trial judge concluded that "it is not an essential element of claim 3 that each and every ion of the metal-containing compound be reduced by the carbon described in the claim" (Reasons at para. 128).

b) Validity of the ‘366 Patent

[21] At trial, Phostech raised, then dropped, a number of issues with respect to the validity of the ‘366 Patent and, in particular, claim 26 thereof. In the end, the only issues the judge had to deal with were the insufficiency of the disclosure as to the expression “source of carbon” and “linked by or being nucleated or bound to carbon”, and an argument based on the misappropriation of the claims of Phostech’s own patent application and misrepresentation. Since the only issue which is under appeal is that of the sufficiency of the disclosure, I will review only those parts of the judge’s Reasons dealing with that issue.

[22] It will be recalled that the ‘366 Patent is a divisional of the ‘115 Patent and that they share a common disclosure, except for four pages which were added to specification of the ‘366 Patent. Nothing in this appeal turns on those four additional pages.

[23] Phostech’s argument as to invalidity turns on the fact that while claim 26 includes as a precursor “a source of carbon”, the specification deals only with “carbon”. To that extent, says Phostech, the disclosure is insufficient as it would not permit a person skilled in the art to work the invention. The trial judge noted that Phostech’s expert, Dr. Whittingham, was alone in his view as to the effect of the disclosure. The trial judge noted that there was no evidence that a person skilled in the art would need more information in order to work the invention. While it was known that certain polymers would evaporate rather form a carbonaceous residue, it was a matter of standard tests to determine which polymers would be suitable for use in the reaction. In the result, the trial judge rejected this attack on the validity of the ‘366 Patent.

PHOSTECH'S GROUNDS OF APPEAL

[24] Phostech, who is now represented by new counsel, appealed from the trial judge's decision on only two narrow grounds. Regarding the finding that claim 3 of the '115 Patent was infringed, Phostech argued that the trial judge erred in her construction of claim 3, specifically, in her interpretation of the term "carbon". As for the '366 Patent, Phostech argued that the patent is invalid on the basis that while claim 26 refers to a "source of carbon", the specification of the patent teaches only the use of carbon itself so that the claim is invalid for insufficiency of disclosure.

[25] Counsel's admirable concision in framing the grounds of appeal is a significant departure from the approach taken at the trial where numerous grounds were advanced and abandoned by the time the case reached final arguments. The case put before us was significantly different than that before the trial judge.

ANALYSIS

[26] This is an appeal from the decision of a judge rendered after a trial. The appropriate standard of review was set out in *Housen v. Nikolaisen*, 2002 SCC 33, [2002] 2 S.C.R. 235: correctness for questions of law, and palpable and overriding error for questions of fact and question of mixed fact and law. Since the issues raised by Phostech are questions of law, the standard of review is correctness.

a) Infringement of the '115 Patent

[27] Phostech's argument with respect to claim 3 of the '115 Patent is a classic lawyer's argument, namely that where a draftsman (or patent agent) uses different words, different meanings are intended. Counsel for Phostech put before us a table showing the various expressions used in the patent such as " source of [element]", "[element]-containing compound", "[element] compound", the point of which was to underline that the drafters of the patent referred only to "carbon" and did not include the qualifying words used in relation to other substances. From this, Phostech argued that where the patent refers to carbon, it means carbon in a pure form as opposed to some other compound which may be a source of carbon.

[28] This argument was fully developed in oral argument without any reference to the evidence of the expert witnesses who testified as to what a person skilled in the art would understand from the words used in the patent.

[29] It is trite law that it is the court's function to construe the patent, not the expert's. While the interpretation of the expression "carbon" in claim 3 is a question of law, it must be construed in the light of the evidence as to its meaning to the person skilled in the art (see *Unilever PLC v. Procter & Gamble Inc*. (1995), 61 C.P.R. (3d) 499 (F.C.A.) at 506-507, 184 N.R. 378; *Halford v. Seed Hawk Inc*., 2006 FCA 275 at para. 11, 54 C.P.R. (4^{th}) 130).

[30] In this case, the trial judge heard conflicting evidence on this question. In the end, she preferred the evidence of the experts called by Valence to that of the experts called by Phostech, for

the reasons which she set out in paragraphs 61, 77, 118, 131 (footnote 75), 166, 167, and 169 of her Reasons.

[31] The trial judge summarized the evidence underpinning her conclusion in paragraphs 114 and 115 of her Reasons [footnote omitted]:

> Dr. Dahn testified that "incorporating carbon into said mixture" only means to a posita [person of ordinary skill in the art] that you have to add carbon to the reaction mixture to perform the necessary reduction and it really doesn't matter how the reducing carbon gets in there. It could be done directly in the form in which it will react or via a precursor material such as a binder (including a polymer) which would yield carbon in a form that can be used in the CTR.
>
> …
>
> It is not disputed that the posita would understand that in carrying out the selective CTR the "carbon" must be intimately mixed with the starting material before the reduction starts and he or she would know that the carbon, whether included in particle form before the mixture was heated or in particle form before the reduction starts as a result of the decomposition of a polymer, would be equally capable of carrying out the CTR.

[32] She then set out her conclusion at paragraph 119 of her Reasons:

> "Carbon" is a wide term. The fact that carbon black in powder form is what first comes to mind because it is used in making cathode cells or because it is used in example 9 and appears to be one of the preferred forms is not sufficient to justify limiting the claim in the manner proposed by Dr. Whittingham especially when it is clear and known that it makes no difference to the carbon's ability to reduce in CTR. Having considered the expression in its entire context, the Court prefers the construction proposed by Drs. Cairn, Dahn and Morgan.

[33] In my view, the trial judge's interpretation of the expression "carbon" in claim 3 of the '115 Patent, resting as it does on the evidence which she accepted as to the person skilled in the art's understanding of the term, is unassailable.

[34] The fact that a lawyer, using the usual rules of interpretation, might come to a different conclusion, is of no consequence. The patent is not directed to lawyers but to persons skilled in the art. This principle is anchored in the language of the *Patent Act* itself (R.S.C. 1985, c. P-4, s. 27(3)(*b*) [emphasis added]):

(3) The specification of an invention must … (*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 closely connected, to make, construct, compound or use it;	(3) Le mémoire descriptif doit : […] *b*) exposer clairement les diverses phases d'un procédé, ou le mode de construction, de confection, de composition ou d'utilisation d'une machine, d'un objet manufacturé ou d'un composé de matières, dans des termes complets, clairs, concis et exacts qui permettent à toute personne versée dans l'art ou la science dont relève l'invention, ou dans l'art ou la science qui s'en rapproche le plus, de confectionner, construire, composer ou utiliser l'invention;

[35] That which is true for the specification is equally true for the claims. It could not be otherwise.

[36] As a result, I find that the trial judge committed no error of law in construing the expression "carbon" to include carbon in forms other than particles or powders.

b) Validity of the ‘366 Patent

[37] I turn now to Phostech’s attack on the validity of the ‘366 Patent. Phostech seeks a declaration “that the ‘366 Patent, and in particular claim 26 thereof and the claims that depend therefrom, are, and always have been, invalid, void and of no effect”. As a preliminary matter, the issue of validity was approached on the basis of a single claim, claim 26. This appears to reflect an agreement between counsel which the trial judge accepted but not without noting that it might be based on an incorrect legal premise (Reasons at para. 6, footnote 4). The parties did not change their position on this issue before us, with the result that for the purposes of this appeal, the validity of the ‘366 patent is to be decided on the basis of the validity of claim 26.

[38] The trial judge described the evidence on the issue of invalidity as follows (Reasons at para. 185):

> Dr. Whittingham essentially states that i) there is no support in the specification for any reductant other than carbon itself, ii) the term “source of carbon” is not itself used and iii) there is no example where a source of carbon other than carbon itself is used.

[39] On appeal, Phostech limited its argument to the fact that claim 26 includes as a precursor material “a source of carbon” whereas the specification itself contains only references to “ carbon”. In Phostech’s view, this means that the invention claimed in claim 26 was not disclosed in the specification.

[40] The trial judge preferred the evidence of Valence’s witnesses on the scope of the disclosure. In construing the claims and the disclosure, she referred to their evidence as follows, at paragraph 134 of her Reasons:

> This is disputed by Valence whose experts stated that the posita would understand that this is referring to carbon itself or any carbon-containing material such as those that can yield carbon in a form that can achieve the CTR. In reaching this conclusion, they considered among other things the other portion of the claim which refers to "one thermal step to heat said source of carbon and to decompose or transform the same". Although the term "source of" is not used per se in the disclosure, this step would be understood as including what is described on page 13 of the specification (*i.e.* a binder that decomposes to form a carbon residue). Here again, Valence experts do not construe this expression as being limited to carbon in a particle form.

[41] Phostech argued that the trial judge effectively construed "carbon", as used in the specification, and "source of carbon" as used in claim 26 of the '366 Patent, as meaning the same thing. I can see no reason in principle why the trial judge could not come to that conclusion, if the evidence as to the person skilled in the art's understanding of those expressions, in the context in which they were used, supported her conclusion. When I consider the evidence which the trial judge accepted on these questions, and her reasoning process, I do not see any inconsistency in her construction of those two expressions. Another patent agent might have drafted the patent differently, but that is not the issue. Rather, the issue is what would the person skilled in the art understand the inventor to have disclosed and claimed? Reading paragraphs 185-187, and paragraph 194 of the trial judge's Reasons, it is clear that she accepted that the disclosure supported claim 26. I find no error in her having done so.

[42] In the result, I would dismiss Phostech's request for a declaration that the '366 Patent is invalid.

CONCLUSION

[43] Phostech has not persuaded me that the trial judge erred in finding that its P1 Process infringed claim 3 of the '115 Patent. Her construction of the expression "carbon" was based on the evidence before her as to what a person skilled in the art, reading the patent as a whole, would understand that expression to mean. I find that she committed no error in law in concluding as she did. I also find that there is no basis for saying that the trial judge abdicated her role to those of the experts whose evidence she preferred. I would therefore dismiss Phostech's appeal as to the finding of infringement of claim 3 of the '115 Patent.

[44] I would also dismiss Phostech's request for a declaration that the '366 Patent is invalid for the reasons set out above.

[45] I would dismiss the appeal with costs.

"J.D. Denis Pelletier"
J.A.

"I agree
Marc Noël J.A."

"I agree
Robert M. Mainville J.A."

FEDERAL COURT OF APPEAL
NAMES OF COUNSEL AND SOLICITORS OF RECORD

DOCKET:	A-121-11
APPEAL FROM THE JUDGMENT OF THE HONOURABLE MADAM JUSTICE GAUTHIER DATED FEBRUARY 11, 2011 (PUBLIC REASONS ISSUED FEBRUARY 17, 2011) ("THE JUDGMENT"), DOCKET NUMBER T-219-07	
STYLE OF CAUSE:	PHOSTECH LITHIUM INC. and VALENCE TECHNOLOGY INC.
PLACE OF HEARING:	Montréal (Quebec)
DATE OF HEARING:	June 6, 2011
REASONS FOR JUDGMENT BY:	PELLETIER J.A.
CONCURRED IN BY:	NOËL J.A. MAINVILLE J.A.
DATED:	August 17, 2011

APPEARANCES:

François Guay Jeremy W. Want Daniel Anthony Sheldon Hamilton	FOR THE APPELLANT
Ronald Dimock Angela Furlanetto Ryan Evans	FOR THE RESPONDENT

SOLICITORS OF RECORD:

Smart & Biggar Montréal, Quebec	FOR THE APPELLANT
Dimock Stratton LLP Toronto, Ontario	FOR THE RESPONDENT