Federal Court Cour fédérale

Date: 20130911

Docket: T-735-11

Citation: 2013 FC 947

Ottawa, Ontario, September 11, 2013

PRESENT: The Honourable Mr. Justice Barnes

BETWEEN:

ABB TECHNOLOGY AG,
ABB INC. AND
ABB AG

Plaintiffs

and

HYUNDAI HEAVY INDUSTRIES CO., LTD.

Defendant

REASONS FOR JUDGMENT AND JUDGMENT

[1] In this patent infringement action the Plaintiffs, ABB Technology AG, ABB Inc. and ABB AG (collectively ABB), allege that the Defendant, Hyundai Heavy Industries Co., Ltd. (Hyundai), has infringed Canadian Letters Patent No. 2,570,772 (772 Patent) and Canadian Letters Patent No. 2,567,781 (781 Patent). The specific acts ABB complains about involve the sale by Hyundai of several medium voltage gas-insulated switchgear (GIS) assemblies to British Columbia Transmission Corporation and/or to British Columbia Hydro Authority (collectively BC Hydro). Those GIS assemblies are alleged to infringe a number of essential features claimed in the 772 and

781 Patents. The Defendant has counterclaimed against the Plaintiffs seeking declarations of invalidity with respect to both patents. This action has been bifurcated and only the liability issues are now before the Court.

[2] The parties are agreed about the following facts:

a. The Plaintiff ABB Technology AG ("ABB Technology") is a Swiss corporation having a principal place of business at Affolternstrasse 44, CH-8050 Zürich, Switzerland.

b. The Plaintiff ABB Inc. ("ABB Canada") is a Canadian corporation having a principal place of business at 8585 route Transcanadienne, Saint-Laurent, Montreal.

c. The Plaintiff ABB AG ("ABB Germany") is a German corporation having a principal place of business at Kallstadter Str. 1, Mannheim, 68309, Germany.

d. The Defendant is a corporation incorporated under the laws of Korea and having a principal place of business at 1 Junha-dong, Dong-gu, Ulsan-si, Republic of Korea.

e. The application for the '772 Patent was filed on June 27, 2005, and laid open for public inspection on January 5, 2006. As well, the '772 Patent claims priority to: German Patent Application No. 10 2004 031 090.0, filed June 28, 2004; and, German Patent Application No. 10 2005 029 600.9, filed June 23, 2005.

f. The '772 Patent issued on August 10, 2010, naming Harald Fink and Maik Hyrenbach as inventors and bearing the title "Gas-Insulated Medium-Voltage Switchgear". ABB Technology AG is recorded in the Canadian Intellectual Property Office's records as the owner of this patent.

g. The application for the '781 Patent was filed on June 7, 2005, and laid open for public inspection on December 22, 2005. As well, the '781 Patent claims priority to German Patent Application No. 10 2004 028 275.7, filed June 9, 2004.

h. The '781 Patent issued on August 10, 2010, naming Kasimir Mai and Maik Hyrenbach as inventors and bearing the title "Gas-Insulated Switchgear Assembly having a Switch-Position Inspection

Window". ABB Technology AG is recorded in the Canadian Intellectual Property Office's records as the owner of this patent.

i. The Defendant has sold HMGS-G82 switchgear assemblies in Canada, continues to market its C-GIS switchgear in Canada, is completing the installation and commissioning of its switchgear assemblies for BC Hydro and plans on bidding on future projects.

j. The HMGS-G82 is a medium-voltage gas-insulated switchgear assembly.

k. SF_6 is the insulating gas used in the HMGS-G82.

l. The HMGS-G82 comprises three phases.

[3] There are numerous issues that remain in contention between the parties including ownership of the patents, construction of the patent claims and validity and infringement of the patents. For the reasons that follow it is unnecessary to deal with every issue in dispute.

The Trial Witnesses

[4] In the course of this trial testimony was received from seven witnesses. ABB called three witnesses and Hyundai called four witnesses.

[5] Dr. Maik Hyrenbach works for ABB AG as a principal engineer in its research and development department. He is one of the inventors named in both patents. Dr. Hyrenbach provided evidence about the technologies relevant to the patent claims and about the steps taken to arrive at the patented technology. He also testified about the processes that were followed at ABB to transfer ownership of the patents.

[6] Christoph Bartoszek also testified on behalf of ABB. He is employed by ABB AG as a sales manager and gave evidence about ABB's business in Canada including its history as a long-standing supplier of switchgear to BC Hydro.

[7] Mr. David Leone provided expert opinion evidence on behalf of ABB on the issues of construction, validity and infringement. To that end he produced two reports upon which he was cross-examined.

[8] Mr. Sung Geil Kim (Mr. Kim) testified in Korean and his evidence was ably interpreted by Mr. Albert Kim. Mr. Kim is employed by Hyundai as an engineer. He testified about his responsibilities for the design and development of Hyundai's medium voltage GIS including the supply of GIS assemblies to BC Hydro.

[9] Mr. Albert Tymchyshyn was called by Hyundai to give evidence about its GIS equipment supplied to BC Hydro. Mr. Tymchyshyn is employed by SNC-Lavalin Engineering (SNC) in Vancouver. SNC has ongoing contract responsibilities with BC Hydro in connection with the Kidd 1 electrical substation where Hyundai's GIS has been installed. Mr. Tymchyshyn testified mainly about matters pertaining to the alleged infringement of the 781 Patent.

[10] Expert evidence on behalf of Hyundai was provided by Mr. Tim Molony and by Mr. Stig Nilsson. Messrs. Molony and Nilsson authored three reports dealing with claims construction, validity and infringement and they were each cross-examined with respect to their opinions.

[11] No objections were taken to the admissibility of any of the expert opinion evidence and I am satisfied that each of those witnesses was qualified to speak to the issues addressed in their respective opinion reports and in their testimony.

Ownership of the Patents

[12] Hyundai asserts that none of the Plaintiffs has an interest in the Patents in suit sufficient to prosecute this action or to support a claim to damages. The Patents, however, were issued in Canada to ABB Technology AG supported by assignments executed by the named inventors. While there may have been irregularities concerning the internal corporate procedures for effecting ownership transfers of these Patents, the evidence before me is insufficient to establish that none of the Plaintiffs has a sufficient interest to afford it standing. One problem with Hyundai's allegation, among others, is that it rests on a point of German law that has not been established to my satisfaction. In the result, there is no basis for me to find that these Patents should not have been issued to ABB Technology AG.

Background to the Technology and to the Patents

[13] Switchgear can refer to a broad range of electro-mechanical devices that control the flow of electricity. A switchgear assembly is an assemblage of components intended to safely control the flow of electrical power from the supply side (incoming) to the electrical load side (outgoing). The constituent components of a switchgear assembly will typically include circuit breakers, buses,

disconnect switches, grounding switches, instrument transformers, cable terminators and control devices.

[14] A major safety concern with higher voltage switchgear assemblies is the potential for arc faults. Electricity can be conducted through air and when a current arcs between two separated switchgear components the resulting flash-over can be explosive and life-threatening. For this reason air-insulated switchgear (AIS) components must be sufficiently separated or, when contact is required, sufficiently tight that arc faults do not arise.

[15] In the 1930s, gas insulated technology began to be applied to high voltage switchgear. This method involved the encapsulation of high voltage switchgear assemblies in gas tight compartments. These systems typically contain sulphur hexafluoride (SF_6) – a gas that has excellent insulating and arc extinguishing properties.

[16] In a GIS system the components can be brought into much closer proximity because the risk of an arc fault is considerably reduced. In terms of space saving the advantage of GIS was considerable, particularly at higher voltages where greater separation of parts is required.

[17] In the 1980s, GIS technology began to be introduced in medium voltage applications (typically 1 kV to 52 kV) and to this day it continues to displace older AIS systems.

[18] The evidence before me indicates that there is no common international standard that applies to GIS and there is apparently no Canadian or United States standard applying specifically to

medium voltage GIS (see Molony report at para 44). Much of what is required in the design of medium voltage GIS is driven by end-user requirements. This has led to some differences between European and North American practices. This point is made by Mr. Leone at paras 49 and 50 of his initial report:

> 49. Specific markets and customers may dictate which combination of these functions are required in any given power switchgear assembly. Many of the specific requirements are driven by service and maintenance protocols dictated by local standards and customer practices. These service and maintenance protocols are important due to the high risk of personal injury at the elevated voltage and power levels.
>
> 50. For example, the North American market, which is commonly referred to as the ANSI market, has a practice requiring that electrical equipment or conductors operating at more than 600V must have a provision for grounding while maintenance is being performed, in addition to a provision for circuit isolation. The European market, which is commonly referred to as the IEC market, has a practice that requires a provision for circuit isolation and does not typically require the additional provision for grounding during maintenance operations. On the other hand for example, a common requirement for both markets is the provision for a "visible-break" in order to verify circuit isolation.
>
> [Footnotes omitted]

Essentially the same point is made by Mr. Nilsson at para 11 of his validity report:

> 11. The general principles of operation are common throughout the World and are continuously being harmonized through standardization activities. However, each region will have different codes and acceptable practices, terminology, and even within a region, there is no complete harmonization of practices. For example, practices in Europe are different in some respects than those in North America and within North America, the practice of one generating authority (e.g. electric utilities in the state of New York) will be different in

> some respects from others (e.g. electric utilities in the state of California). For that reason, among others, each installation is considered a custom design project.

[19] In switchgear assemblies of the sort described by the patents in suit a principal safety component is the circuit breaker. The circuit breaker disconnects the supply of power if an abnormal or fault condition arises. If maintenance of the circuit breaker is required, it must be disconnected from the circuit. In GIS this can be accomplished in different ways all of which involve grounding means.

[20] In Europe it is a common practice to ground the circuit by closing the circuit breaker (grounding through the circuit breaker). In North America this is considered to be unsafe because the circuit breaker may open and disconnect the cables from the ground and because it is not possible to visually verify the contacts within the circuit breaker. In North America this has led to the practice of incorporating a separate and potentially visible grounding switch below the circuit breaker.

[21] The patents in suit address two particular market requirements for GIS assemblies.

[22] The 772 Patent acknowledges the North American desire for redundant grounding between the circuit breaker and the outgoing cables and the corresponding need to introduce "both an additional isolator and an additional ground conductor" to the GIS assembly. This, in turn, created a problem of dimensioning the GIS gas compartment, which the inventors claim to have solved by enlarging the circuit breaker compartment in the direction of the cable connections.

[23] The 781 Patent offers a solution to the problem of visually verifying switch positions in an enclosed GIS capsule. According to the patent, the solution was to fit an inspection window into the housing of the GIS assembly in a line of sight to the switch. Visualization of the switch position was enhanced by the incorporation on the moveable switch element of coloured or topographical markings that act as reference points.

[24] Several of the terms used in these patents require interpretation. These issues of construction were addressed by Mr. Leone on behalf of ABB and by Messrs. Nilsson and Molony on behalf of Hyundai.

Principles of Patent Construction

[25] Patent claims must be interpreted in a purposive way. They are construed through the eyes of the person skilled in the art to which the patent relates. A purely literal construction may thus give way to a contextual or nuanced interpretation in keeping with the common knowledge and experience of the person of skill. Part of the construction exercise is the identification of the essential elements of the invention. Sorting out the essential from the non-essential is necessary because an infringement may arise notwithstanding the omission or substitution by the infringer of non-essential features: see *Free World Trust v Electro Sante Inc.*, 2000 SCC 66, [2000] 2 SCR 1024 and *Western Electric Co. v Baldwin International Radio*, [1934] SCR 570 at pp 586-587, 4 DLR 129 (SCC).

[26] The language of the claims is to be interpreted with the objective of achieving a fair result as between the patentee and the public: see *Whirlpool Corporation v Camco Inc.*, 2000 SCC 67 at para 49, [2000] 2 SCR 1067. The words used in the claims may be considered with reference to the entire specification but not with a view to enlarging or contracting the claims' language. In other words, limiting language in the claims has primacy over a more expansive description of the invention in the specification. While the Court must be sympathetic to the presumed intent of the inventor that principle does not permit an interpretation that effectively ignores the claims language. The balance required is expressed in the following passage from *Free World Trust*, above, at para 51.

> 51 This point is addressed more particularly in *Whirlpool Corp. v. Camco Inc.*, [2000] 2 S.C.R. 1067, 2000 SCC 67 and *Whirlpool Corp. v. Maytag Corp.*, [2000] 2 S.C.R. 1116, 2000 SCC 68, released concurrently. The involvement in claims construction of the skilled addressee holds out to the patentee the comfort that the claims will be read in light of the knowledge provided to the court by expert evidence on the technical meaning of the terms and concepts used in the claims. The words chosen by the inventor will be read in the sense the inventor is presumed to have intended, and in a way that is sympathetic to accomplishment of the inventor's purpose expressed or implicit in the text of the claims. However, if the inventor has misspoken or otherwise created an unnecessary or troublesome limitation in the claims, it is a self-inflicted wound. The public is [page1054] entitled to rely on the words used provided the words used are interpreted fairly and knowledgeably.

[27] ABB contends that the purposive approach requires the Court to choose an available construction that favours the validity of these patents and it cites in support the decision of this Court in *Letourneau v Clearbrook Iron Works Ltd.*, 2005 FC 1229, [2005] FCJ No 1589 and the authorities cited therein. There is a danger, however, in applying a single interpretive principle as though it has primacy over others and, indeed, in *Whirlpool*, above, the Supreme Court of Canada

explicitly warned against a result-oriented approach to claims construction. It is worth remembering that it is the patentee who writes the patent and, with sufficient care, should be able to avoid obvious or glaring ambiguities. Indeed the patentee has an obligation to draft the patent with sufficient clarity that competitors can know its limits: see *Whirlpool*, above, at para 42.

[28] Purposive construction is essentially a contextual exercise with a primary focus on the language of the claims as viewed objectively by the notional person of skill. The approach I adopt is expressed in the following passage from *Whirlpool*, above, at para 49:

…

> A patent must therefore be given such interpretation according to s. 12 of the *Interpretation Act* "as best ensures the attainment of its objects". Intention is manifested in words, whose meaning should be respected, but words themselves occur in a context that generally provides clues to their interpretation and a safeguard against their misinterpretation. P.-A. Côté, in *The Interpretation of Legislation in Canada* [page1095] (3rd ed. 2000), puts the matter succinctly when he writes, at p. 387, "Meaning flows at least partly from context, of which the statute's purpose is an integral element" (emphasis added). To the same effect see *Rizzo & Rizzo Shoes Ltd. (Re)*, [1998] 1 S.C.R. 27, at para. 21. These principles apply to claims construction by virtue of the *Interpretation Act*.
>
> (f) While the appellants express concern that "purposive construction" may open the door to extrinsic evidence of intent, as is the case with certain types of extrinsic evidence in the United States, neither *Catnic, supra*, nor *O'Hara, supra*, goes outside the four corners of the specification, and both properly limit themselves to the words of the claims interpreted in the context of the specification as a whole.
>
> (g) While "purposive construction" is a label introduced into claims construction by *Catnic, supra*, the approach itself is quite consistent, in my view, with what was said by Dickson J. the previous year in *Consolboard, supra*, on the topic of claims construction, at pp. 520-21:

> We must look to the whole of the disclosure and the claims to ascertain the nature of the invention and methods of its performance, (*Noranda Mines Limited v. Minerals Separation North American Corporation*, [1950] S.C.R. 36), being neither benevolent nor harsh, but rather seeking a construction which is reasonable and fair to both patentee and public. There is no occasion for being too astute or technical in the matter of objections to either title or specification for, as Duff C.J.C. said, giving the judgment of the Court in *Western Electric Company, Incorporated, and Northern Electric Company v. Baldwin International Radio of Canada*, [1934] S.C.R. 570, at p. 574, "where the language of the specification, upon a reasonable view of it, can be so read as to afford the inventor protection for that which he has actually in good faith invented, the court, as a rule, will endeavour to give effect to that construction"…

[29] Forming a "reasonable view" of patent language does not, to my thinking, prefer any arguable interpretation that would uphold the patent. In most cases the language of the patent, when viewed contextually and objectively, will be sufficient to establish what was intended thereby ensuring the attainment of its purpose. I would add that the purposive approach is not an invitation to the Court to ignore the ordinary rules of grammar and syntax. If an essential feature of a patent is defined in a specific way and a different more expansive term is also introduced than can include the specific term, one would not generally interpret the two terms as denoting the same thing. The usual purpose of using different words is to distinguish one feature from another and not to express synonymy.

Who is the Person of Skill in this Case

[30] The parties are not in complete agreement about what a person skilled in the art would be expected to know about GIS technology as it applies to these patents. In Mr. Leone's initial report

the person of skill reading the 781 Patent was said to be someone "with practical experience in gas-insulated switchgear assemblies generally". That person would also have a sound understanding of the electrical, mechanical and safety aspects of "such assemblies". This would include knowledge of the requirement for visual verification of switch positions and the means by which that could be accomplished – including cameras or windows (see paras 252-253). At para 258 Mr. Leone stated:

> In my opinion, the skilled addressee of the '781 Patent would have included the same broad range of individuals as I identified above with respect to the '772 Patent, but in the context of switchgear assemblies generally (i.e., not limited to medium-voltage switchgear assemblies, as the visual verification requirement exists with respect to low, medium and high voltage applications).

[31] According to Mr. Leone, the person of skill reading the 772 Patent would have practical experience limited to medium voltage GIS. In Mr. Leone's reply report, he disagreed with Mr. Nilsson's opinion that the person of skill would be the same for both patents and would have a range of knowledge and experience that extended beyond medium voltage GIS. No explanation is provided by Mr. Leone to justify the distinction he makes and, in fact, the evidence establishes that there is no clear demarcation between medium and high voltage GIS. At the margins of their ranges these systems overlap. I, therefore, reject Mr. Leone's contention that the person of skill would be different according to which of the two patents was under consideration. Instead I accept Mr. Nilsson's description of the person of skill at para 7 of his report:

> It is my opinion that the person of ordinary skill in the art to whom each of the 772 and 781 Patents is addressed is a person who has two to four years of experience working with switchgear generally, including experience with design of gas-insulated switchgear in particular. Such persons would have the needed technical background. Their experience may be as a supplier of switchgear to the end user, typically a utility company or an industrial complex, or as a representative of the end user who would have responsibility for oversight of the design and installation of electrical power

> infrastructure. In either event, the persons should be familiar with the configuration, operation, maintenance and use of various types of switchgear, and should be cognizant of the risks present in handling electrical power and the best practices used to mitigate those risks.

The 781 Patent - Construction

[32] The 781 Patent was filed on June 7, 2005 based on PCT Application No. EP 2005/006079. The PCT application claimed priority to a German Patent application filed on June 9, 2004. The 781 Patent was published on December 22, 2005 and issued on August 10, 2010.

[33] The 781 Patent addresses the problem of viewing the position of switches in medium voltage GIS. The visual verification of switch positions in GIS as a supplement to remote sensory verification methods is often a safety requirement for operators, particularly in North America: see para 273 of the Leone Statement dated March 15, 2013. Users of all switchgear systems are naturally concerned that interior components carrying lethal electrical loads be de-energized and grounded before maintenance work is carried out. The use of switches is one means by which this can be accomplished, but in GIS applications the switches are physically inaccessible and cannot be readily observed.

[34] The solution proposed by the 781 Patent to visualize the positions of switches is the fitting of one or more gas tight viewing windows into the GIS housing in a direct or indirect (mirror assisted) line of sight to the switches. Visual verification is enhanced by the incorporation of permanent markings on the moveable contact portion of the switches that act as positioning references.

[35] The 781 Patent advances eight claims. Claim 1 is an independent claim and claims 2 to 8 are all dependant. Claims 1 and 4 are particularly significant to the issue of infringement but all of the claims are in issue with respect to the issue of validity. The claims state:

> The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:
>
> 1. A gas-insulated switchgear assembly having at least one disconnector within a housing for the insulating-gas area of the switchgear assembly, and comprising an inspection window fitted in the housing such that positions of a moveable switch-contact element: can be seen from outside the housing in a direct line of sight via the inspection window by an unassisted eye; or can be seen from outside the housing in an indirect line of sight via the inspection window and at least one mirror by an otherwise unassisted eye.
>
> 2. A gas-insulated switchgear assembly as defined in claim 1, wherein the inspection window is fitted in the housing such that a hermetic seal with the housing is maintained.
>
> 3. A gas-insulated switchgear assembly as defined in claim 2, wherein a pressure-overload triggering device is arranged within the housing and is triggered before a bursting limit of the hermetic seal of the inspection window with the housing.
>
> 4. A gas-insulated switchgear assembly as defined in claim 1, 2 or 3, wherein the movable switch-contact element is provided with a colored or topographical marking which changes position with respect to a fixed marking or reference structure depending on the switch-contact element position.
>
> 5. A gas-insulated switchgear assembly as defined in claim 4, wherein, in order to inspect switch positions in a polyphase arrangement, the positions of the inspection window and of the marking or reference structure are selected in relation to one another in such a way that the latter can be inspected safely.
>
> 6. A gas-insulated switchgear assembly as defined in claim 4 or 5, wherein illumination means are provided outside the housing which can illuminate the marking or reference structure for inspection thereof.
>
> 7. A gas-insulated switchgear assembly as defined in any one of claims 1 to 6, wherein, in order to inspect switch positions in a

> polyphase arrangement, one or more inspection windows are provided.
>
> 8. A gas-insulated switchgear assembly as defined in any one of claims 1 to 7, which is a gas-insulated medium- voltage switchgear assembly.

[36] In a general sense the construction of Claims 1 and 4 is not difficult. ABB claims an invention over the use of viewing windows to ascertain the positions of the described switches in medium voltage GIS. They also claim to have invented the incorporation of coloured or topographical markings into the described switches that serve as positioning references.

[37] One important point of construction controversy that arises from the evidence is whether the reference in the claims to "a moveable switch-contact element" is limited to a sliding contact switch or would be understood to include what is conventionally known as a knife blade switch. ABB argues that the patent claims are directed at the problem of viewing sliding contact switches for which the use of windows was apparently unknown. The Defendant says that the term would be understood by a person of skill to include knife blade switches. This difference is significant because, as ABB acknowledges, the prior art disclosed the use of viewing windows in medium voltage and high voltage GIS to observe the positions of knife blade switches.

[38] The evidence before me establishes that knife blade switches are commonly used in AIS where space limitations are not usually a significant limitation. In GIS systems, where space limitations are often a consideration, sliding contact switches are used more often.

[39] Sliding contact switches and knife blade switches perform the same function by somewhat different means. In the case of a sliding contact switch, the moveable contact travels in line between its positions which, in the case of a three position switch, are "on", "isolated" or "grounded". Although the moveable contact can only be in one position at a time, the operator is, nevertheless, concerned that it be in its proper full contact position ("on" or "ground") or fully isolated from "on" or "ground". In a less than optimal position an arc fault can arise with catastrophic results. With sliding contact switches, the resting positions of the moveable contact can be difficult to observe.

[40] Knife blade switches can also be used as three position switches. These switches incorporate a moveable blade that pivots in an arc between the desired positions making contact in either a grounded saddle or an energized saddle or resting between those two positions (isolated). Given their design, the contact and isolated positions of knife blade switches are generally easier to observe than sliding contact switches.

[41] Mr. Leone asserted that a person of skill mindful of the overall context of the 781 Patent claims, description and drawings would not understand the reference to a moveable switch-contact element to include a knife blade switch (see para 275 of Leone's Statement). This opinion is supported, he said, by the ease by which knife blade switches can be observed (see para 277) and by the exemplary embodiment of a sliding contact switch in Figures 1 and 2 of the Patent.

[42] Mr. Leone's reliance on the ease with which knife blade switches can usually be seen is not a valid basis for excluding them from Claim 1. There is nothing in the patent that discusses this

point and the distinction is entirely relative. The problem described is one of viewing a switch in an inaccessible location potentially presenting any number of variable visibility problems. While the position of a knife blade switch may be easier to see through a viewing window, that is not inevitably true. Indeed in comparing the ease of viewing knife blade switches as between AIS and GIS, Mr. Leone acknowledged that "if you put a knife blade in GIS, then it's more difficult to see" (see p 650).

[43] Although Mr. Leone was in places quite categorical about the "unique" and "specific" problems associated with viewing sliding contact switches, at other points his testimony was less dogmatic. For example, when he was asked why windows had seemingly not been employed to view sliding contact switches when the prior art disclosed this use with knife blade switches, he answered: "I guess because the configuration and the minimum use of sliding contact switches at that time. It was easy to confirm – easier to confirm with knife blade switches, which was basically the state of the art at the time, and they hadn't developed the solution for windows and sliding contact switches yet". To the same effect is his evidence at p 649. The Patent description also acknowledges that the viewing problems associated with GIS assemblies will vary according to their "construction, position and design".

[44] I do not agree with Mr. Leone's interpretation of this essential feature of the 781 Patent. In a purely grammatical sense the words used by the inventors readily apply to knife blade switches which also incorporate "a moveable switch-contact element" ie. the blade. The inventors were clearly mindful of both types of switches because at page one of the description, they state that "[c]onventional three-position disconnectors are known as linear-travel switches or knife switches".

Thereafter the patent refers repeatedly to disconnectors to describe the switch that is being visualized. A skilled reader would not interpret the claims as limited to "linear-travel switches" because that phrase was not reused. Instead the patent employs a generic reference to a moveable contact that does not distinguish between switch types.

[45] Mr. Leone did not address this grammatical point in his report but it did arise in an oblique way during his testimony. When he was asked what had led him to his narrow interpretation of "moveable switch contact element", Mr. Leone gave the following answer:

> A. Yes, and this is the first reference that begins to teach me that they're discussing a linear-travel switch because the movable contact piece is generally not a knife blade. If it would have said the movable blade, or the movable knife, then I would be thinking about a knife blade switch. But because they say "movable contact piece" that leans me towards a sliding switch. [p 537]

This evidence actually undermines Mr. Leone's construction opinion. By suggesting that the drafter of the claims would have used a specific term if the intent was to include a knife blade switch, he necessarily invites the same approach if the intent was to claim only a sliding contact switch. Instead the drafter used language that comfortably describes both switch types.

[46] The description of a sliding contact switch in the patent illustrations does not, as Mr. Leone suggests, support any limitation in the claim language. Indeed, from the description of the diagram as "exemplary" a skilled reader would be just as likely to infer that the claims were not limited but, instead, included both of the two identified conventional switch types that are generically identified as disconnectors.

[47] I reject Mr. Leone's assertion that the problem addressed by the 781 Patent is unique or specific to sliding contact switches or that visibility issues do not exist with knife blade switches. Whatever the switch type, the viewer needs to know where the moveable contact has come to rest and in GIS assemblies both switches can be difficult to observe. On this issue of construction, I accept Mr. Nilsson's opinion that the phrase "moveable switch contact element" in Claim 1 is a generic term that includes knife switches and sliding contact switches.

[48] Another point of interpretive disagreement arises in connection with Claim 4 and, in particular, what constitutes "a colored or topographical marking" on the moveable switch-contact element. ABB and Mr. Leone maintain that Hyundai has incorporated such a feature in its GIS installed in British Columbia.

[49] The 781 Patent discloses one embodiment of a coloured topographical reference in the form of a groove that is machined and painted around the circumference of the moveable contact element of the switch. When the moveable contact element is properly seated the painted ring is visible immediately adjacent to the end of the circular switch housing. This tells the user that the contact is in the desired position. According to Mr. Leone, the inventors did not have any specific requirement as to the colour or shape of the topographical marking (see Leone report at para 330). I have no particular problem with Mr. Leone's characterization of this essential feature but, as discussed below, I do not agree with Mr. Leone that any visible feature, whatever its intended purpose, is included. Based on the evidence from Hyundai's witnesses, I reject Mr. Leone's opinion that the guide pins protruding from Hyundai's moveable switch contact constitute a

topographical positioning reference as described in Claim 4 or that a person of skill would read Claim 4 to include them.

The 781 Patent – Validity – Legal Principles

[50] The general approach to obviousness was outlined by Justice Judith Snider in *Laboratoires Servier v Apotex Inc*, 2008 FC 825 at paras 226-227, [2008] FCJ No 1094:

> 226 Much has been written about the test for obviousness in the case law. However, I think that the Federal Court of Appeal in Janssen-Ortho Inc. v. Novopharm Ltd., 2007 FCA 217, leave to appeal to S.C.C. refused, [2007] S.C.C.A. No. 442 [Janssen-Ortho (C.A.)], has now provided a very useful summary of the test for obviousness and the manner in which a trial judge should approach the question. Justice Sharlow, writing for the Court of Appeal in Janssen-Ortho (C.A.), outlined the test for obviousness at paras. 23-24:
>
> > The accepted legal test for obviousness is stated as follows in the leading case of Beloit Canada Ltd. et al. v. Valmet OY (1986), 8 C.P.R. (3d) 289 (F.C.A.) at page 294, per Hugessen J.A.:
> >
> > > The classical touchstone for obviousness is the technician skilled in the art but having no scintilla of inventiveness or imagination; a paragon of deduction and dexterity, wholly devoid of intuition; a triumph of the left hemisphere over the right. The question to be asked is whether this mythical creature (the man in the Clapham omnibus of patent law) would, in the light of the state of the art and of common general knowledge as at the claimed date of invention, have come directly and without difficulty to the solution taught by the patent. It is a very difficult test to satisfy.
> >
> > The inquiry mandated by the Beloit test is factual and functional, and must be guided by expert evidence about the relevant skills of the hypothetical person of ordinary skill in the art, and the state of the art at the relevant time. The expert evidence must be carefully

assessed as to its credibility and reliability. The classic warning from Beloit about hindsight must always be borne in mind (at page 295, per Hugessen J.A.):

> Every invention is obvious after it has been made, and to no one more so than an expert in the field. Where the expert has been hired for the purpose of testifying, his infallible hindsight is even more suspect. It is so easy, once the teaching of a patent is known, to say, "I could have done that"; before the assertion can be given any weight, one must have a satisfactory answer to the question, "Why didn't you?"

227 Of particular assistance, at paragraph 25, Justice Sharlow described a number of factors that could "guide the required factual inquiry" and that could be used "as a framework for the factual analysis that must be undertaken". Justice Sharlow then listed and explained the following non-exhaustive list of factors that could guide the factual inquiry. Those factors are the following:

Principal factors

1. The invention
2. The hypothetical skilled person referred to in the Beloit quotation
3. The body of knowledge of the person of ordinary skill in the art
4. The climate in the relevant field at the time the alleged invention was made
5. The motivation in existence at the time [of] the alleged invention to solve a recognized problem
6. The time and effort involved in the invention

Secondary factors

7. Commercial success
8. Meritorious awards

[51] In *Apotex Inc v Sanofi-Synthelabo Canada Inc*, [2008] SCC 61 at para 67, [2008] 3 SCR 265, the Supreme Court of Canada set out a four-part framework for assessing whether a patent claim is obvious. The test requires the reviewing Court to apply the following considerations:

a. identify the notional person skilled in the art and the relevant general knowledge of that person;

b. identify the inventive concept of the claim and, if that cannot be readily accomplished, construe the claim;

c. Identify what, if any, differences exist between the matter cited as forming part of the state of the art and the inventive concept as construed; and

d. viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps that would have been obvious to the person of skill or do they require any degree of invention.

The patents in issue are presumed to be valid and the burden of proving otherwise on a balance of probabilities rests upon the Defendant.

Is the 781 Patent Invalid for Obviousness?

[52] Having found that Claim 1 of the 781 Patent asserts a claim to the use of viewing windows to ascertain the position of knife blade switches in medium voltage GIS, the Patent necessarily fails.

It was not open to ABB to claim a monopoly over a technology that was known in the prior art: see *Apotex*, above, at para 51; *Bristol-Myers Squibb Co. v. Canada (Attorney General)*, 2005 SCC 26 at para 1, [2005] 1 SCR 533, and; *Free World Trust*, above, at para 13. Even if I am wrong about the meaning of the phrase "moveable contact switch element", the 781 Patent fails because the use of windows in medium voltage GIS to view the position of sliding contact switches would have been obvious to the person of skill. It is clear from the evidence that Hyundai's use of cameras to ascertain switch positions does not infringe because, as Mr. Leone acknowledges, such use was known in the prior art (see para 253 of Leone's Statement and para 206 of Leone's Reply). ABB similarly does not dispute that the use of windows to visualize switch positions was known in the prior art at least with reference to AIS and to GIS applications where knife blade switches are used and for sliding contact switches in high voltage GIS (see para 198 of the Leone reply report).

[53] Mr. Leone opines that, notwithstanding the use of windows in AIS and GIS applications, safety considerations taught away from their use in the case of the invention identified by the 781 Patent. This contention is untenable because, as Mr. Leone concedes, the use of windows in this way was a proven and reliable method to verify switch positions in GIS. Any inherent safety concerns with their use had presumably been solved.

[54] At paragraphs 210 and 211 of Mr. Leone's Reply, he offers the following additional statement:

> 210. Accordingly, the skilled person would have appreciated that while windows may have been in use in certain contexts, there were certainly other means for confirming switch positions, including non-visual means if agreed by the customer. Indeed, up until June 9, 2004, the only switches known to the skilled person as being able to work with an inspection window were knife blade switches. In this

> regard, the references cited at paragraphs 150-153 of the Nilsson Statement (Exhibit #29 and Exhibit #30) are limited to windows for viewing knife blade switches. Furthermore, as of June 9, 2004 the skilled person would have understood that the only available options for inspecting sliding contact switches would have been cameras and non-visual means (as described above).
>
> 211. In summary, there were numerous paths forward for a skilled person, and significant reasons why such a skilled person would believe that an inspection window would not work and would have been unsatisfactory in the context of gas-insulated switchgear assembly having sliding contact switches. As such, the skilled person would not have gone directly and without difficulty to an inspection window in the context of a gas-insulated switchgear assembly having sliding contact switches. The state of the art, which included windows for knife switches, but consisted of cameras and non-visual means for sliding contact switches, clearly taught and pointed the skilled person away from the use of windows.

This evidence is disingenuous. The problem of viewing switch positions in GIS applications had been solved and the 722 Patent describes nothing that is inventive.

[55] When Mr. Leone was asked if he could categorically state whether windows had been used to visualize sliding contact switches in medium voltage GIS, he could only say that he had seen no evidence "one way or the other" [see p 653]. He did concede that windows had been used to visualize sliding contact switches in high voltage GIS (see pp 628-629). He also stated that, although he did not know for certain whether windows had been used to visualize sliding contact switches in medium voltage GIS, the problem of visualizing switch positions had been solved by using cameras and other devices – presumably to the exclusion of windows (see pp 653 and 631). Despite saying at para 228 of his reply report that the placement of viewing windows would not have been evident to the person of skill, when Mr. Leone was asked about the absence of positioning instructions in the Patent, he described a process of routine measurement (see pp 554 to

556) that he ultimately referred to as "really a matter of geometry" (see p 644). Another example where Mr. Leone adopted an untenable position in his report that he later retreated from under cross-examination concerns the scope of Claim 6. At para 232 of his reply report, Mr. Leone said that a person of skill would not know to use a flashlight to illuminate a switch position; but in his testimony he conceded that this was a known method to view the position of a sliding contact switch – at least from the side (see p 630). Why a flashlight would only be useful from the side of the GIS assembly was never explained.

[56] Mr. Leone's evidence is a less than robust endorsement of the inventiveness of using a window to observe a different switch type in medium voltage GIS applications and I reject it.

[57] The further suggestion by Mr. Leone that the person of skill would be uninformed by the use of windows and sliding contact switches in high voltage GIS is unsustainable. Although ABB's engineers may have segregated their medium voltage and high voltage development teams, it is difficult to believe that any reasonably diligent person working with medium voltage GIS would be oblivious to these developments in high voltage GIS and the potential for their use in lower voltage applications. In fact, the evidence clearly indicates that it was the advantage of gas insulation in high voltage applications that established a market for the same technology in lower voltage applications. The problem of visually verifying switch positions is the same for both and a person of skill would naturally look to high voltage solutions for inspiration. In doing so, that person would have found the effective use of both windows and cameras.

[58] Although I accept that there may be fewer options for siting a window in a medium voltage GIS than in a high voltage GIS, the essential problem and its solution remain the same between both applications – the designer must find a location that permits the switch to be viewed through the window. Dr. Hyrenbach testified that he was surprised when, on the first attempt to cut a hole in ABB's prototype, he could clearly see the switch in question. I do not accept this evidence. Dr. Hyrenbach knew where the switch was located in the GIS chamber and he would have been well aware of the presence of any other impediments for viewing the switch. He cut the hole ostensibly as a lighting source where any sensible person would and should not have been the least bit surprised by what he was able to see. Hyundai similarly had no difficulty in positioning their windows. They placed the camera window in a direct line to the switches with the other two windows offset respectively to the left and right. This is the type of trial and error work that any skilled technician is capable of performing without any inventive skill. They are workbench adaptations to an existing and proven approach to a problem that had been solved by exactly the same means.

[59] The evidence from Mr. Molony and Mr. Nilsson conclusively establishes that the 781 Patent is invalid for obviousness[1]. Inspection windows were well-known in the prior art, were recognized as a means to view switch positions in several prior art references and standards applicable to GIS, and were required by many end users. The idea that all of this can be ignored because ABB "invented" the use of windows to visualize a known switch type is specious.

[1] It is noteworthy that these witnesses were not subjected to any meaningful cross-examination on the content of their reports and their evidence was mostly left unchallenged.

[60] On the issue of obviousness, I accept Mr. Molony's and Mr. Nilsson's assessments of the prior art as reflected in their respective reports including the following conclusions:

> 189. Based on the North American experience and operational safety requirements for GIS of all voltage ratings it is clear that the provision of viewing (inspection) windows to verify GIS disconnect (isolator) switch and ground switch contact positions, and the provision of a means of illumination where necessary, has been the normal North American practice for the past 30 or more years, that this fact is obvious to a person having normal skills in the art and as such does not constitute a new requirement or a new invention. [Molony evidence]
>
> …
>
> 146. Thus, it is clear that the use of viewports, which is a synonym for windows, was normal features for GIS switchgear equipment in general for GIS switchgear substations and associated equipment. A person skilled in the art would therefore expect such windows or viewports to be a part of the purchase specifications for GIS switchgear substations for various purposes including the use of viewports or windows for determining disconnect and grounding switch positions. [Nilsson evidence]

The 781 Patent - Infringement

[61] Mr. Leone asserts, with almost no evidentiary support, that the guide pins attached to Hyundai's moveable switch contact constitute topographical markings that infringe Claim 4 of the 781 Patent. He maintains that all three positions of Hyundai's GIS three-position switches can be verified by reference to these pins which are "approximately flush" with the entrances to the switch contact housings. His reports offer no guidance as to the intended purpose of these pins despite it being quite obvious on the evidence that they were designed to keep the moveable contact from rotating under movement.

[62] Mr. Tymchyshyn was asked about using these guide pins in the manner suggested by Mr. Leone, that is, as topographical references to verify the position of Hyundai's moveable switch contacts. He answered that the pins are difficult to see and that they do not, in any event, offer reliable indications of the positions of the switches. His evidence on point was the following:

> But you will see on the next page at 125 there are two little white items that -- actually, if you look to the top picture, the extreme right, and then the bottom picture to the right in a red circle, could you describe what those are? Have you seen them before?
>
> A. I have seen them a few times while we have been test operating the equipment. They are very difficult to see. The lighting in there is not as good as this even when the camera is on, and it's the LED lights from the camera giving you the view.
>
> It's my understanding that's been installed like a key way to keep the shaft from rotating, to keep it in alignment when it's opening or closing. I have never used that as a reference to determine whether something is open or closed, no.
>
> Q. Why would you not use that as a reference?
>
> A. Because it's not always in a steady state. It's moving. It's only part of the operating time. It doesn't really give you an indication of fully closed or fully open. It's very difficult to see in real life.

[63] Mr. Kim testified that the purpose of the guide pins is only to prevent the rotation of the contact under movement. The pins achieve this result by their insertion in a narrow groove that is cut into the interior walls of the housing sections of the switch assemblies. Throughout the range of movement of the switch contact, at least one of the pins is captured in the groove and keeps the contact from turning. According to Mr. Kim, these pins were not designed to assist the user to ascertain the resting positions of the moveable contact. There is no evidence that Hyundai represents to BC Hydro that they can be used in this way.

[64] Mr. Nilsson was asked in cross-examination if a mechanical feature could serve more than one purpose including an unintended purpose. He gave an expected affirmative response. It is noteworthy, however, that he was never asked whether a prudent operator would use the guide pins to verify the position of the Hyundai switches.

[65] ABB argues that the pins are capable of fulfilling two purposes including an unintended purpose of marking the positions of the switches and, in that way, infringe Claim 4.

[66] Mr. Leone's evidence that the guide pins can be used as indicators of switch positions is untenable in the context of Mr. Tymchyshyn's evidence. No user of this system, mindful of the dangers involved, would use these guide pins as positioning references. They are not designed for that purpose, they are not promoted by Hyundai to be used in this way and they are inadequate and unreliable proxies for determining switch positions. No prudent user (ie. BC Hydro) would consider these pins to be anything more than what they were designed to be and that is to prevent rotation of the sliding switch contacts. I, therefore, reject ABB's argument and Mr. Leone's evidence that Hyundai's guide pins infringe Claim 4 or the claims that depend upon it.

[67] ABB argues that the camera used in the Hyundai medium voltage GIS can be removed by the operator and the window to which it is affixed could then be used for direct viewing. Mr. Tymchyshyn testified that because BC Hydro has had concerns about the sufficiency of the Hyundai camera to fully display all three switches in all three positions he has frequently assessed the windows as an alternative means of observation. He described the view as poor and, after

viewing Mr. Leone's simulation video, said that it is not an accurate depiction of what can be seen by the naked eye. This characterization of Mr. Leone's simulation is consistent with my own comparison of the video to the still photos taken through the viewing windows. I am satisfied that, even with the described limitations, Hyundai's camera affords the best viewing option for assessing the position of the subject switches. Given the apparent impracticalities and deficiencies associated with using the windows for direct viewing, there would be no reason for BC Hydro to remove the camera and, even if they did, no infringement by Hyundai would arise.

[68] The Hyundai windows are not conveniently accessible and they do not permit informative direct viewing. The problem of accessibility is compounded by the dangers associated with direct viewing in a confined space in the presence of potentially live circuits. Mr. Tymchyshyn testified that no prudent operator would expose himself to this risk which could only be removed by de-energizing the control circuits in the vicinity of the viewing windows. According to Mr. Tymchyshyn, the way the equipment is designed makes it "virtually impossible to get a proper view". Why direct viewing would be undertaken when a camera is available for safe remote viewing that offers an equally and if not more effective view of the switches was never explained by ABB or by any of its witnesses. Mr. Kim described these windows as redundant and explained that their presence represented a design error after a camera option was adopted by Hyundai. I have no reason to doubt this evidence but even a design error can give rise to an infringement. Here, however, the inability of a viewer to use the Hyundai windows to obtain any helpful information about the position of the switches, particularly in the presence of a safer, more convenient and effective non-infringing camera, renders the windows functionally obsolete. In these circumstances, no infringement arises.

The 772 Patent - Construction

[69] The 772 Patent was filed on June 27, 2005 based on PCT Application No. EP 2005/006892. The PCT Application claimed priority to two German Patent applications. The 772 Patent was published on January 5, 2006 and issued on August 10, 2010.

[70] The 772 Patent is described by ABB as a dimensional patent. It claims to address the problem of adapting a medium voltage GIS assembly to comply with a North American market imperative that requires grounding of the outgoing section of the circuit (ie. below the circuit breaker). This grounding requirement is met by adding a three-position switch below the circuit breaker. The 772 Patent describes the problem said to confront the inventors as follows:

> The isolator in the outgoing section, in addition to the isolator in the busbar compartment, isolates the ground potential in the outgoing section and the high-voltage potential of the busbar from one another.
>
> However, this requirement can often not be implemented owing to the predetermined dimensions and arrangement of the individual functional compartments.

The inventive solution to this problem is then set out:

> According to the invention the circuit breaker compartment is dimensioned such that both the circuit breakers and the isolators and ground conductors on the outgoing section side are arranged therein.
>
> That is to say, in order to be able to maintain a design which is as compact as possible and virtually unchanged external dimensions as regards the width, height and depth of the switchgear assembly, only the circuit breaker compartment is changed to the extent that it is enlarged in the direction of the cable connection, i.e. in terms of its height, and all three required devices can be arranged in it, i.e. the circuit breaker and the isolator on the outgoing section side and the

isolator on the outgoing section side and the ground conductor on the outgoing section side.

[71] The 772 Patent also contains a diagram and accompanying language references to assist the reader in understanding the claims. The diagram and the references are combined below:

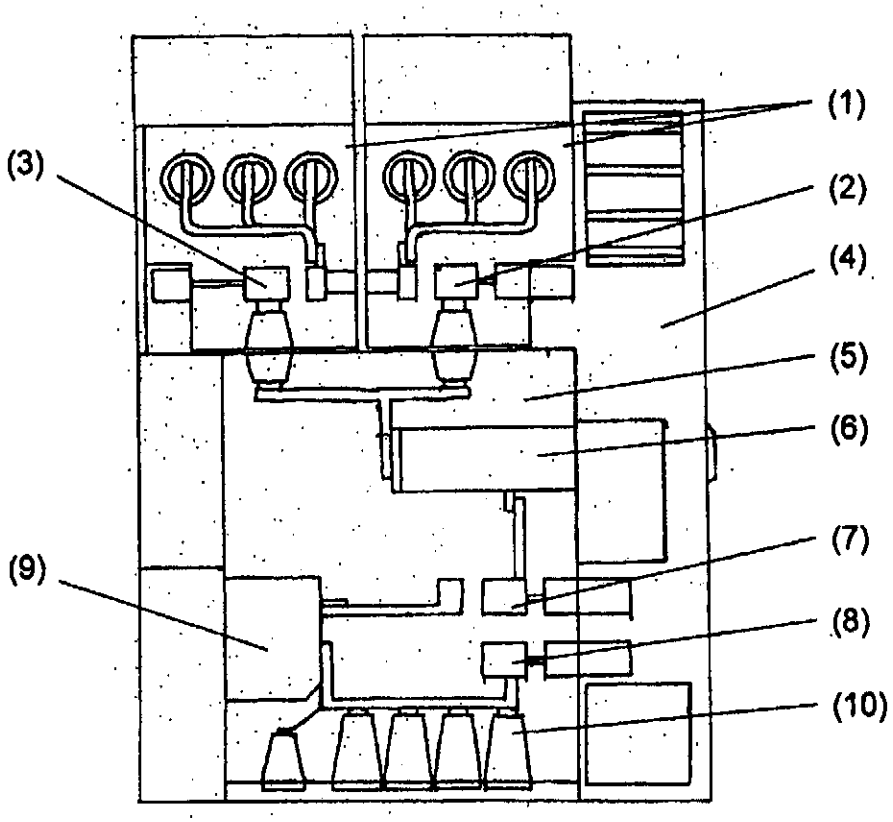

Fig. 1

Reference symbols:

(1) Busbar compartment
(2) Three-position isolator
(3) Two-position isolator
(4) Low voltage compartment
(5) Circuit breaker compartment
(6) Circuit breaker
(7) Isolator on the outgoing section side
(8) Ground conductor
(9) Current transformers or current sensors
(10) Outgoing feeders

[72] Although the expert witnesses expressed differences about the meaning of a number of terms used in the 772 Patent, the only issues that demand legal interpretation concern the scope of the invention as asserted by Claim 1. The remaining 6 claims are all dependant on Claim 1 and every one of them describes a feature that was well-known in the prior art. The Claims state:

> The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:
>
> 1. A gas-insulated medium-voltage switchgear assembly comprising circuit breakers, isolators and ground conductors, wherein a circuit breaker compartment thereof is dimensioned such that both (i) the circuit breakers and (ii) the isolators and ground conductors in an outgoing section, are arranged therein.
>
> 2. A gas-insulated medium-voltage switchgear assembly as defined in claim 1, further comprising latching means which make it possible for the ground conductor in the outgoing section only to be introduced into the assembly when an isolator associated with a circuit breaker is open.
>
> 3. A gas-insulated medium-voltage switchgear assembly as defined in claim 2, wherein the isolator can be opened only via the latching means when the circuit breaker previously has been disconnected.
>
> 4. A gas-insulated medium-voltage switchgear assembly as defined in claim 1, 2 or 3, further comprising drive mechanisms for switching devices, wherein the drive mechanisms are located entirely in a low-voltage compartment, and can be actuated both by a motor or by a manual drive.
>
> 5. A gas-insulated medium-voltage switchgear assembly as defined in any one of claims 1 to 4, further comprising current transformers and/or current sensors arranged in the circuit breaker compartment.
>
> 6. A gas-insulated medium-voltage switchgear assembly as defined in any one of claims 1 to 5, further comprising female connectors are provided to connect voltage transformers externally.

> 7. A gas-insulated medium-voltage switchgear assembly as defined in any one of claims 1 to 6, wherein both an isolator in the outgoing section and a ground conductor in the outgoing section are sliding-contact switches.

[73] ABB argues that Claim 1 does not include as an essential feature the presence of a second switch below the transformer capable of grounding the outgoing feeders or cables. ABB says that because the 772 Patent invention is directed at the North American market requirement for independent circuit breaker grounding on the outgoing side, Claim 1 should not be interpreted to include as essential the cable grounding feature because that advantage is optional. They point out that cable grounding can be achieved outside of the GIS assembly and, despite illustrating that feature in the patent diagram and separately distinguishing it from the other identified components, it should be seen to be non-essential. This is an important issue because the Hyundai GIS assemblies sold to BC Hydro do not incorporate a cable grounding feature.

[74] The test for distinguishing between essential and non-essential elements of a patent claim is described in *Free World Trust*, above, at paras 55-57:

> 55 It would be unfair to allow a patent monopoly to be breached with impunity by a copycat device that simply switched bells and whistles, to escape the literal claims of the patent. Thus the elements of the invention are identified as either essential elements (where substitution of another element or omission takes the device outside the monopoly), or non-essential elements (where substitution or omission is not necessarily fatal to an allegation of infringement). For an element to be considered non-essential and thus substitutable, it must be shown either (i) that on a purposive construction of the words of the claim it was clearly not intended to be essential, or (ii) that at the date of publication of the patent, the skilled addressees would have appreciated that a particular element could be substituted without affecting the working of the invention, i.e., had the skilled worker at that time been told of both the element specified in the claim and the variant and "asked whether the variant would

obviously work in the same way", the answer would be yes: Improver Corp. v. Remington, supra, at p. 192. In this context, I think "work in the same way" should be taken for our purposes as meaning that the variant (or component) would perform substantially the same function in substantially the same way to obtain substantially the same result. In Improver Corp. v. Remington, Hoffmann J. attempted to reduce the essence of the Catnic analysis to a series of concise questions, at p. 182:

> (i) Does the variant have a material effect upon the way the invention works? If yes, the variant is outside the claim. If no: --
>
> (ii) Would this (i.e.: that the variant had no material effect) have been obvious at the date of publication of the patent to a reader skilled in the art? If no, the variant is outside the claim. If yes: --
>
> (iii) Would the reader skilled in the art nevertheless have understood from the language of the claim that the patentee intended that strict compliance with the primary meaning was an essential requirement of the invention? If yes, the variant is outside the claim.

56 The three questions are not exhaustive but they encapsulate the heart of Lord Diplock's analysis, and have been endorsed in subsequent English cases.

57 In AT & T Technologies, supra, at p. 257, Reed J. derived a series of interpretive principles from Catnic, supra, O'Hara, supra, and other cases. Her third principle is as follows:

> (3) if a variant of an aspect of a claim has no material effect on the way the invention works there is a presumption that the patent is infringed and that the patentee intended that that variant falls within the scope of the claim... . [Emphasis added.]

The desirability of such a presumption is supported by some commentators (see, e.g., J.-C. Boudreau, "AT&T Technologies: A Contribution to the Purposive Construction Approach for Patent Infringement Analysis in Canada" (1998-99), 15 C.I.P.R. 323). If this proposition is taken to mean that a presumption of non-essentiality will arise if it is established in light of the knowledge of substitutability existing at the date of the infringement (AT & T

> Technologies, supra, at p. 262) that a variant would have no material effect on the way the invention works then, with respect, I disagree with it. The effect would be that the ambit of the monopoly would grow over the life of the patent as new substitutes are developed and absorbed into the common knowledge of the skilled worker. The inventor cannot be thought to have the necessary "intent" in relation to after-created knowledge except in the irrelevant sense of intending to reap the benefit of the maximum coverage available. In my view, Catnic, supra, and O'Hara, supra, were correct to put the onus on the patentee to establish known and obvious substitutability at the date of publication of the patent. If the patentee fails to discharge that onus, the descriptive word or expression in the claim is to be considered essential unless the context of the claims language otherwise dictates.

(iv) According to the Intent of the Inventor Expressed or Inferred from the Claims of the Patent

[75] I accept that cable grounding can be achieved by means other than a grounding switch placed in the GIS chamber. The evidence also establishes that cable grounding within the GIS assembly is considered to be an option in the North American market. The question, though, is whether the inventors included an independent cable grounding switch as an essential feature of Claim 1.

[76] Mr. Leone testified that the cable grounding switch depicted in the diagrams is a non-essential feature of the patent. According to his testimony the North American grounding requirement described in the patent specification was concerned only with circuit breaker grounding functionality that could be obtained by the three position switch referenced as an “isolator on the outgoing section side”. According to this interpretation the words “the isolator on the outgoing section side and the ground conductor on the outgoing section side” refer to a single component that can both isolate and ground the circuit breaker. This interpretation assumes that the inventors did

not draft the claims on the basis of a misunderstanding of the North American grounding requirement and that the above phrase refers to functionality and not to two distinct switching components for grounding both the circuit breaker and the outgoing cables.

[77] Claim 1 is awkwardly written and not particularly clear. Nevertheless it is open to being construed and all of the expert witnesses were able to give it meaning.

[78] When read in conjunction with the accompanying diagram (Figure 1), Claim 1 very clearly distinguishes the outgoing circuit breaker grounding switch from the cable grounding switch. The circuit breaker grounding switch is described in the patent as an "isolator on the outgoing section side" and the cable grounding switch is described as a "ground conductor". This distinction appears repeatedly throughout the specification and is carried over to the claims. ABB's construction of the disputed phrase is also belied by the context of the surrounding descriptive language. The circuit breaker switch (isolator No. 7) and the cable switch (ground conductor No. 8) are referred to as "the two additional devices" or, in association with the circuit breaker, as "all three required devices can be arranged in it" [ie. the circuit breaker compartment]. These are clear references to the devices that are depicted in the Patent diagram the physical arrangement of which is the subject matter of the invention. They do not refer to a single device that performs different functions.

[79] Mr. Leone testified that because Claim 2 of the 772 Patent describes a refinement to Claim 1 this supported his interpretation that the grounding function performed by the cable grounding switch was optional and non-essential to Claim 1. This evidence was strained and unconvincing. In my view the language of Claim 2 is more consistent with Hyundai's interpretation. The

descriptions of the components in Claim 2 are the same as found elsewhere in the Patent and Claim 2 describes a well-known interlock function intended to prevent switching errors that operates in the presence of two separate components. One of those components is the "grounding conductor" depicted in Figure 1 as number 8. Mr. Nilsson's infringement report effectively makes this point at paras 51 to 60 and convincingly dispenses with Mr. Leone's contrary views. I accept Mr. Nilsson's opinion over that of Mr. Leone. I would add that there is very little in the Patent language to support Mr. Leone's construction opinion and, for the most part, his reports ignore the passages that detract from that opinion.

[80] Although a cable grounding switch may not have been required to be placed in the GIS compartment, there was nothing that prevented the inventors from putting one there and the practice appears to be common. Indeed, Dr. Hyrenbach explained the advantages of grounding inside the GIS compartment in the following testimony:

> THE WITNESS: First of all, you have to have a possibility to ground inside. So you cannot make grounding on the outside unless you take care that the complete thing is de-energized. But you will not be sure, for example, if a panel is connected by a cable to another substation. So you can do everything to take care that there is no energy from the busbar, for example, to the cables, but you can also phone the other side, please ground the cable. But to be sure, if you at this moment remove the cable, if he has still grounded it, you have to trust him.
>
> So therefore it's much better to have the possibility to ground the panel inside the panel safely, which has making capability even if there is voltage alive. So if the other side has reswitched because the work is done, let's de-energize, and if you then decide to ground using the circuit breaker, it will recognize, oh, there's a short circuit and interrupt again. So it's safe. Nothing will happen. And if it has grounded and everything was successful, then it's safe. Then you can remove, for example, the socket where the power transformer is connected, can remove this, and then you can insert a grounding device because nothing can happen, the complete thing is grounded.

I would add that the solution to the dimensioning problem that is described in the 772 Patent is enhanced by the number of components that the inventors believed to be desirable for inclusion.

[81] It appears to me that the inventors likely misunderstood the North American grounding requirements because at page 2 of the patent they say "[a]s regards the American market, however, both an additional isolator and an additional ground conductor are required in the outgoing section…". The interpretation of patent claims should not be influenced by errors of this magnitude. The person of skill would assume the correctness of the inventor's material assertions and would interpret the claims accordingly. Here the inventor represented that cable grounding was required and included that component without reservation into Claim 1. If cable grounding was not an essential feature of Claim 1 there was no need to mention it. If it was intended to be an optional embodiment, it could have been described that way and included as a dependant claim. There is nothing in the claims or in the specification that would suggest to the skilled reader that including the cable grounding switch (ground conductor) in the GIS compartment fulfilled some inventive purpose subordinate in importance to the circuit breaker isolator. Having included cable grounding as an essential feature of the claims, it is too late for ABB to resile from it.

The 772 Patent - Validity

[82] It is clear from the evidence and from the 772 Patent (see page 1, line 30) that to fulfill its purpose all of the high voltage circuitry in a GIS assembly must be enclosed in the gas compartment. The inventors, therefore, had no option of leaving the additional components outside of the gas compartment. The options they had included variations in sizing of the GIS compartment

or the configuration of the high voltage components within, or both. The option they chose was to increase the size of their circuit breaker compartment thereby reducing the size of the outgoing cable compartment. In this way the additional grounding components were accommodated leaving the external dimensions of ABB's GIS compartment "virtually unchanged".

[83] It is important to note that the 772 Patent does not claim as inventive any particular dimensions of the GIS compartment or its interior spaces. Instead ABB asserts a monopoly over a medium voltage GIS assembly of any size or configuration that includes its outgoing grounding components in the so-called circuit breaker compartment.

[84] ABB contends that the inventiveness of the 772 Patent lies in the "counterintuitive idea of putting all of the described components into a single gas compartment". How the basic idea of putting the additional grounding components into the circuit breaker compartment answers the problem stated by the inventors is, however, difficult to understand. In fact Claim 1 of the 772 Patent describes the inventive solution as one of dimensioning the circuit breaker compartment so as to fit in the grounding components. No where in the patent is there an assertion of inventiveness vis-à-vis putting all of the grounding components in one place nor, having regard to the prior art, could there be. The obvious place to incorporate these grounding components is immediately below the circuit breaker. Whether or not they could have been further isolated in their own gas insulated chamber is not discussed in the patent as being part of the problem or its solution.

[85] In its final submissions to the Court, ABB asserted that the state of the art at the relevant time for medium voltage GIS was directed at multiple compartment solutions that separated the

circuit breaker from the outgoing grounding components. According to this argument it was counterintuitive to put all of these parts into one gas compartment because the use of separate spaces had several advantages, most notably that of structural integrity. The single compartment solution also potentially compromised access to the outgoing cables. The inventive solution offered by the 772 Patent is described by ABB as follows:

> 33. Based on the above, the inventors showed that a gas-insulated medium-voltage switchgear assembly, which meets the North American market requirement of isolation and grounding on both sides of the circuit breaker, could be made while maintaining external dimensions. The new medium-voltage GIS that they conceived met the unfilled need that the inventors recognized with respect to maintaining a compact assembly. The disadvantages of instability and loss of the cable compartment were shown to be surmountable.

[86] The fundamental problem with the above assertion is that the 722 Patent does not discuss the problems ABB says it was required to overcome or, indeed, any of the engineering hurdles it claims to have faced. The Patent does not address a unique engineering solution for unresolved structural integrity issues. Similarly no solution to the corresponding reduction of the so-called cable compartment is described. ABB simply reduced the size of its cable compartment and now says that it proved that the loss of space was "surmountable".

[87] Nothing at all was surmounted by this approach. The approach was a compromise where the circuit breaker compartment was enlarged at the expense of the cable compartment. ABB simply rearranged its own GIS assembly in a way that would be acceptable in the marketplace. I do not doubt that there were any number of engineering problems that needed to be overcome but those are not the subject of the 772 Patent.

[88] Mr. Leone described ABB's approach to the dimensioning problem addressed by the 772 Patent as "a drastic departure from the state of the art" and one that the person of skill would not "have immediately jumped straight to". Mr. Leone then asserted that the person of skill would have "first looked at, and had no difficulty, implementing a multi-compartment solution" (see para 81 of his reply report). This evidence is not at all consistent with the prior art. It was well-known in the prior art to include multiple components in a common GIS compartment including the precise grounding components that are referenced in the 772 Patent. The Tohya Patent describes a GIS assembly that incorporates circuit breakers, disconnectors and grounding switches in a common pressurized compartment. The only difference is that the Tohya system used compressed gas as an insulating medium and not SF_6. Under cross-examination Mr. Leone's attempt to distinguish this patent was unconvincing (see p 629).

[89] The Arioka Patent describes a GIS assembly that accommodates a circuit breaker and a three-position isolator in a common gas compartment. Although this arrangement does not include a separate cable grounding feature, it would conform to Claim 1 if the cable grounding switch is construed as non-essential.

[90] Combining a circuit breaker with any number of different switchgear components into a common GIS capsule was also well-known to ABB. Dr. Hyrenbach's testimony confirmed several combinations of components in ABB's earlier GIS assemblies along with variations in the sizing of its gas compartments (see pp 307, 327, 328 and 329). This evidence establishes that ABB made adjustments to the size and configuration of its GIS compartments as required and it undermines

Mr. Leone's assertion that the 772 Patent represents a "drastic departure" from the prior art or from ABB's own design practices.

[91] Even Mr. Leone conceded that it was known to combine a circuit breaker with other switchgear devices in a single compartment including current transformers (see p 630-631).

[92] I agree with Mr. Molony's view that making adjustments to a GIS capsule to accommodate the placement of the components of an existing and linked technology would be obvious to a person of skill. The same is true for the idea of putting the circuit breaker grounding switch and a cable grounding switch into the circuit breaker compartment. As Mr. Molony states, that was the most obvious place to put them. Mr. Nilsson came to the same opinion after his review of several prior art references. I agree with Mr. Nilsson that putting GIS switch components and a circuit breaker into a common gas compartment "is a well-known design expedient" as was the need to enlarge the compartment if required. If the designer did not want to expand the external dimension of the assembly, the obvious option would be to internally reduce the space allocated to other parts which, in this case, came from reducing the space allocated to the outgoing cables.

[93] According to the evidence there was nothing profound about ABB's approach to the invention claimed in the 772 Patent. Dr. Hyrenbach acknowledge that ABB considered only two options – either putting the additional grounding components into an enlarged circuit breaker compartment or into two separate gas compartments. ABB adopted the one compartment solution very quickly. It prepared a drawing for a single compartment prototype but no drawing was prepared for a two compartment option (see p 304). Dr. Hyrenbach agreed that the decision to

move ahead with a single compartment was based on considerations of cost and thermal performance (see p 400). He also conceded that if the structural issues could be resolved the one-compartment approach was preferable (see p 400 and p 403). Having determined that the one-compartment prototype was stable, ABB had no need to try something different (see p 402). The inference I draw from this evidence is that it was not counterintuitive to adopt a one-compartment approach. Rather, that was understood by ABB to be the preferred approach if the structural integrity issues could be managed. Dr. Hyrenbach's evidence directly contradicts Mr. Leone's opinion, set out at para 64 of his reply report, that a person of skill "would not have been inclined and would have had no motive to add components to a circuit breaker compartment in a gas-insulted medium-voltage switchgear assembly intended for the North American market" and, instead "would have been inclined and predisposed to do just the opposite".

[94] All of the dependant claims in the 772 Patent were ultimately acknowledged by Dr. Hyrenbach to be known in the prior art. These included the use of pressure relief discs (p 309), the connection of a voltage transformer to the exterior of a GIS using female connectors (p 309), the use of a pressure overload triggering device (p 424), the use of a low voltage compartment containing drive mechanisms for operating switches (p 424), the use of various interlocks among the switching components (pp 223-224; p 318), the use of sliding contact switches (p 315, p 423), the use of test sockets (p 310) and the use of hermetic seals with viewing windows (p 424). Mr. Leone similarly acknowledged this prior art in a lengthy exchange under cross-examination (see pp 629-638).

[95] ABB claims support for the inventiveness of the promise of the 772 Patent by referring to a similar patent issued to Hyundai that seeks to monopolize a medium voltage transfer bus GIS assembly that encloses a circuit breaker in its own gas-insulated chamber. This is said to represent an improvement over a single chamber approach because it completely isolates the circuit breaker from the by-pass circuit. This facilitates access to the circuit breaker without disrupting the self-contained by-pass circuit.

[96] I do not think that the Hyundai patent has any probative value in supporting the 772 Patent. The validity of the Hyundai patent cannot be assessed in this proceeding. Suffice it to say that efforts by any party to monopolize an existing technology by packaging it in different ways are likely to be viewed with some scepticism.

[97] ABB argues that simplicity is no bar to patentability and that a "scintilla of inventiveness" can support a patent. It draws support for this position from Mr. Leone's attribution of inventiveness of the 772 Patent claims when viewed in combination with one another.

[98] I recognize that a simple idea or one that adds only slightly to the base of existing knowledge may be inventive. Unique combinations of existing art may also support a patent. But simply listing a number of well-known features as further embodiments to a patent claim does not convert an otherwise obvious idea into an invention. The inventiveness of a combination lies in the interaction or synergy of features, previously known or not, that, when taken as a whole, create a subject matter that is useful and new. The suggestion by ABB and Mr. Leone that the addition of bursting discs, hermetic seals, illumination means, interlocks, drive mechanisms for switches,

transformers and other known features as dependant claims somehow adds inventiveness to its "discoveries" is unfounded. For the most part the dependant claims in both the 781 Patent and the 772 Patent describe well-known features or devices that bear no apparent functional relationship to the working of the claimed inventions as described in the specifications and as expressed in the independent claims and they add nothing inventive to those claims.

772 Patent - Infringement

[99] The evidence from Mr. Kim and Mr. Nilsson establishes that the Hyundai GIS assemblies sold to BC Hydro do not include a cable grounding feature. Since that was an essential component of Claim 1 of the 772 Patent, there is no infringement: see *Free World Trust*, above, at para 32.

Disposition

[100] For the foregoing reasons, the Plaintiffs' action against the Defendant is dismissed. The Defendant's counterclaim is allowed and the 772 Patent and the 781 Patent are declared invalid.

[101] I will hear from the parties with respect to costs. The Defendant will have two weeks to provide submissions in writing. The Plaintiffs will then have two weeks to respond. Neither submission is to exceed 10 pages in length.

JUDGMENT

THIS COURT'S JUDGMENT is that the Plaintiffs' action against the Defendant is dismissed. The Defendant's counterclaim is allowed and the 772 Patent and the 781 Patent are declared invalid.

THIS COURT'S FURTHER JUDGMENT is that the issue of costs is reserved pending the receipt of further submissions from the parties.

"R.L. Barnes"

Judge

FEDERAL COURT

SOLICITORS OF RECORD

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