
IN THE MATTER OF Orders in Council P.C. 6982 of 1940, P.C. 11081 of 1942 and P.C. 449 of 1944 and certain patents owned and/or controlled by DET NORSKE AKTIESELSKAB for ELEKTROKEMISK INDUSTRI,

BETWEEN:

THE HONOURABLE THE SECRETARY OF STATE OF CANADA acting in his capacity as Custodian under the Revised Regulations Respecting Trading with the Enemy (1943), ... APPELLANT;

1946
June 4, 6, 7, 11-14
1949
Nov. 16

AND

HIS MAJESTY THE KING .....

AND

ALUMINUM COMPANY OF CANADA LIMITED,..... RESPONDENTS.

Patents—Reasonable compensation for use of invention—The Patent Act, 1935, S. of C. 1935, c. 32, s. 19—Orders in Council P.C. 6982, dated December 4, 1940, P.C. 11081, dated December 8, 1942, and P.C. 449, dated January 24, 1944—Value of use of inventions a matter of evidence—Measure of compensation such fair and reasonable price

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or consideration as would be arrived at between willing licensor and willing licensee bargaining on equal terms—No interest against Crown unless under statute or contract—Appellate jurisdiction of Court under Order in Council P.C. 11081 of December 8, 1942, not limited to questions of law.

The respondent Aluminum Company of Canada Limited (Alcan) was a producer of aluminum for war purposes for His Majesty the production of which involved the use of 5 inventions owned by a Norwegian company (Elektrokemisk). On the invasion of Norway by the German forces it became proscribed territory and the patents were vested in the appellant as Custodian. Subsequently the Minister of Munitions and Supply gave the respondent Alcan a letter of indemnity under Order in Council P.C. 11081 of December 8, 1942. The appellant then brought proceedings before the Commissioner of Patents for reasonable compensation for the use of the inventions and then appealed from the Commissioner's decision.

Held: That the compensation payable by His Majesty under Order in Council P.C. 11081 of December 8, 1942, is for the use of the inventions in the production of aluminum for war purposes.

2. That the value of an invention for the purpose of determining what compensation is reasonable for its use cannot be estimated by what is claimed for it in the patent. Its commercial value is a matter not of construction of the claims but of evidence.

3. That when there is no dispute as to the validity of a patent or its user by or for His Majesty for war purposes the reasonable compensation payable by His Majesty under Order in Council P.C. 11081 of December 8, 1942, for the use of the inventions is such fair and reasonable price or consideration as would be arrived at between a willing licensor and a willing licensee bargaining on equal terms. *The King* v. *Irving Air Chute Inc.* (1949) S.C.R. 613 followed.

4. That the revised royalty agreed upon between Alcan and Elektrokemisk under the first amending agreement was fair and reasonable and ought to have been adopted by the Commissioner as the measure of the reasonable compensation payable by His Majesty, subject to the ceiling agreed upon in the second amending agreement.

5. That interest may not be allowed against the Crown unless there is a statute or a contract providing for it.

6. That the appellate jurisdiction of the Court under Order in Council P.C. 11081 of December 8, 1942, is not limited to questions of law, and that it is the duty of the Court when it finds that the Commissioner's decision was based on wrong principles to determine itself the compensation that is reasonable, when there is evidence from which it can properly do so, rather than put the parties to the expense and delay of sending the matter back to the Commissioner.

APPEAL from the decision of the Commissioner of Patents under Order in Council P.C. 11081, dated December 8, 1942.

The appeal was heard before the Honourable Mr. Justice Thorson, President of the Court, at Ottawa.

H. Gerin-Lajoie K.C. and *K. W. Wright* for appellant.

E. G. Gowling K.C. and *G. F. Henderson* for His Majesty.

J. A. Prud'homme K.C. and *G. Geoffrion* for respondent Aluminum Company of Canada Limited.

The facts and questions of law raised are stated in the reasons for judgment.

THE PRESIDENT now (November 16, 1949) delivered the following judgment:

This is an appeal from the decision of the Commissioner of Patents (1) reporting what he considered to be reasonable compensation to be paid by His Majesty to the appellant for the use of five inventions by the respondent Aluminum Company of Canada Limited, hereinafter called Alcan, in its production of aluminum for war purposes for His Majesty, the said inventions being covered by Canadian patents of invention owned by Det Norske Aktioselskab for Elektrokemisk Industri, hereinafter called Elektrokemisk, a corporation incorporated under the laws of Norway and having its head office in Oslo, Norway.

The five patents, in the order of their grant, were the following:

Patent No.	Date	Inventor	Invention
264,997	Oct. 12/26	C. W. Soderberg	Electrode Mass for Self-Baking Electrodes
287,700	Mar. 5/29	J. Westly	Electrodes
341,667	May 15/34	P. Torchet	Electrode Suspension
346,868	Dec. 17/34	P. Torchet	Manufacture of Aluminum in High Power Tanks
383,238	Aug. 8/39	J. L. Legeron	Arrangement with Electrodes and their Suspension

Alkan was a licensee of Elektrokemisk under these and other patents pursuant to a license agreement, dated July 14, 1937, the terms of which were modified by two amend-

(1) (1945) 4 C.P.R. 173; (1945) 5 Fox Pat. C. 17.

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ing agreements, the first dated January 27, 1941, and the second May 7, 1943. The original license agreement and the two amending agreements will be further referred to.

The circumstances under which the Commissioner was called upon to make his decision may be outlined briefly. Upon the invasion of Norway by the Germans on April 9, 1940, it became proscribed territory and all the Canadian patents of invention owned by Elektrokemisk, including the five in question, were vested in the appellant pursuant to the Regulations Respecting Trading with the Enemy, 1939, established by Order in Council P.C. 2512, dated September 5, 1939, as amended, later replaced by the Consolidated Regulations Respecting Trading with the Enemy (1939), established by Order in Council P.C. 3959, dated August 21, 1940, as amended, which were in turn replaced by the Revised Regulations Respecting Trading with the Enemy (1943), established by Order in Council P.C. 8526, dated November 13, 1943.

Subsequently, steps were taken by the Government to prevent the production of war supplies from being hampered by fear of claims or actions for infringement of patents or industrial designs and to prevent the cost of such supplies from being inflated by the payment of excessive royalties and the three Orders in Council referred to in the style of cause herein were passed. By Order in Council P.C. 6982, dated December 4, 1940, it was provided that no claim, action or proceeding for the infringement of any patent or registered industrial design based upon the use of the invention or design covered thereby in the production or sale of munitions of war or supplies or in the carrying out of defence projects should be made or instituted against any person, firm or corporation or his or its agents or subcontractors, whom the Minister of Munitions and Supply should have agreed to indemnify or protect against such claim, action or proceeding, but that His Majesty should pay to the owner of any such patent or registered design which is valid such compensation as the Commissioner of Patents reports to be reasonable for the use aforesaid of the invention or design covered thereby, and that the decision of the Commissioner should be subject to appeal to this Court. This Order in Council has no specific bearing on this case in view of the fact that Alcan

had no cause to fear infringement proceedings since it was operating under a license agreement. But subsequently the Minister of Munitions and Supply reported that it was desirable and in the public interest that the protection given by this Order in Council should be broadened to include and cover any claim, action or proceeding for non-payment of royalties or other sums payable under any agreement with respect to patents or registered industrial designs or the use of any invention or design covered thereby and by Order in Council P.C. 11081, dated December 8, 1942, Order in Council P.C. 6982, Dated December 4, 1940, was amended to read as follows:

That if the Minister of Munitions and Supply on behalf of His Majesty the King in right of Canada or on behalf of His Majesty's Government in the United Kingdom of Great Britain and Northern Ireland or the Government of any other Allied or Associated Power, including the Government of any British Dominion other than Canada, has agreed or hereafter agrees to indemnify or to protect any person, firm or corporation against any claims, action or proceedings for the infringement of any patent or registered industrial design based upon the use of the invention or design covered thereby in the production or sale of munitions of war or supplies or in the carrying out of defence projects or for the non-payment, in accordance with any contractual obligation, of any royalties for or in respect of such use by such person, firm or corporation, then no claim, action or proceeding for the infringement of any such patent or registered industrial design based upon such use or the non-payment, in accordance with any contractual obligation of any royalties for or in respect of such use, shall be made or instituted against such person, firm or corporation or his or its agents or sub-contractors; but His Majesty shall pay to the owner or licensor of any such patent or registered industrial design which is valid such compensation as the Commissioner of Patents reports to be reasonable for the use aforesaid of the invention or design covered by such patent or registered industrial design, and any decision hereunder of the Commissioner of Patents shall be subject to appeal to the Exchequer Court.

Still later, it was deemed desirable and in the public interest that the two Orders in Council referred to should be broadened to provide that the terms "subcontractors" as used therein should include "suppliers" and to include payments for "fees", for engineering or other technical services, and Order in Council P.C. 449, dated January 24, 1944, made the necessary amendments. The Orders in Council are extensions of the principle set forth in section 19 of The Patent Act, 1935, Statutes of Canada, 1935, chap. 32, which provides:

19. The Government of Canada may, at any time, use any patented invention, paying to the patentee such sum as the Commissioner reports

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to be a reasonable compensation for the use thereof, and any decision of the Commissioner under this section shall be subject to appeal to the Exchequer Court.

Under the authority of Order in Council P.C. 11081, dated December 8, 1942, which is applicable in this case, the Minister of Munitions and Supply agreed to indemnify Alcan as contemplated by the Order in Council by a letter, dated March 23, 1943, from the Deputy Minister of Munitions and Supply to Alcan. After the date of this letter Alcan made no further payments either under the original license agreement or the amending agreements. Prior thereto it had paid royalties either to Elektrokemisk or to the appellant up to October 1, 1941. The appellant has, therefore, an outstanding claim accruing since that date, which, but for the Order in Council, it could have pursued against Alcan direct.

It was under these circumstances that the appellant took proceedings by way of a petition to the Commissioner of Patents praying that he should report the amount of compensation payable under the Order in Council. After a lengthy hearing before him at which the parties hereto were represented the Commissioner made his report, the final paragraph thereof stating his decision as follows:

> The compensation which I consider fair and reasonable for use of the five patents by the Government of Canada in the production of aluminum for war purposes is one-fortieth of a cent for each pound of aluminum produced. When the compensation for any one year amounts to $100,000 then no further compensation shall be paid for that year. This compensation is effective from October 1, 1941.

This is the decision from which the present appeal is taken.

The Order in Council requires the Commissioner to report reasonable compensation for the use of inventions "in the production or sale of munitions of war or supplies or in the carrying out of defence projects". In the present case the compensation is for the use by Alcan of the inventions covered by the five patents in the production of aluminum for war purposes for His Majesty. This means that the value of the use of the inventions in the production of aluminum must be ascertained. To this end it is desirable, I think, to deal with the state of the art relating to the production of aluminum prior to the inventions covered by the patents specified or referred to in the

license agreement, the problems requiring solution, the efforts made to solve them, the nature of the five inventions and their place and importance in the art, it being constantly kept in mind that the art is that of the production of aluminum and that the value of the use of the inventions sought to be ascertained is commercial value.

Aluminum is the most widely distributed metal. Material of various kinds, including clay, containing 10 to 35 per cent of aluminum oxide is found almost everywhere but it is not economical to extract it as long as bauxite containing 50 to 60 per cent of alumina, as aluminum oxide is called, is available. We are not here concerned with the production of alumina from bauxite but only with the reduction of aluminum from alumina. This is the production of aluminum that is referred to in these proceedings. The formula for alumina is Al_2O_3, meaning that each molecule of it contains two atoms of aluminum and three of oxygen. The problem is to separate the aluminum from the oxygen. It is not an easy metal to reduce from its oxide. Most metals, such as iron, for example, lend themselves readily to reduction from their oxides by smelting, but aluminum does not. Some other method of reduction had to be found. This was discovered about 1886 by two persons working independently, Charles M. Hall in the United States and Paul L. R. Heroult in France. Their discovery consisted in using a substance called cryolite, which melts at 960 degrees centigrade, to dissolve the alumina and then subjecting the solution of the alumina in the molten cryolite to electrolysis, whereby the constituent elements of the alumina are decomposed and the aluminum by itself is recovered. The solvent power of cryolite for alumina and its suitability for making the solution an electrolyte made the aluminum industry possible. The only known commercial deposit of cryolite is in Greenland, but the aluminum industry is not dependent upon the Greenland deposits since cryolite can be made synthetically.

After the alumina has been dissolved in the molten cryolite the electrolysis is accomplished by passing a strong electric current of high amperage and low voltage through the solution or bath, as it is sometimes called. The container in which this is done is known as an electrolytic cell. In the aluminum industry it is called an aluminum pot.

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There are two poles in this cell, the anode and the cathode. As the electric current passes from the anode to the cathode and decomposes the alumina the aluminum goes to the cathode and the oxygen to the anode. But no breakup of the cryolite takes place; it is purely a solvent for the alumina. The bottom of the cell or aluminum pot serves as the cathode. As the aluminum separates from the oxygen it falls to the bottom of the cell or pot, its specific gravity being lower than that of the cryolite. There is thus a layer of molten aluminum below the solution of alumina and cryolite, which is drained off from time to time. The anode by which the electric current is led into the electrolyte is also called an electrode. It is made mainly of carbon and since it must enter into the molten solution it is gradually consumed, the carbon going off with the oxygen in the form of carbon dioxide gas CO_2 or carbon monoxide gas CO. As this consumption takes place the electrode must be lowered so that its end may be in the solution at the proper distance of from an inch and a half to three inches above the layer of molten aluminum.

There is thus a direct relation between the production of aluminum and the consumption of carbon, about one half to three quarters of a pound of carbon being used in the production of a pound of aluminum. The lower end of the electrode is consumed at the rate of about three quarters of an inch in 24 hours so that the periodic adjustment of the electrode to its proper place in the solution is a matter of great importance.

The electrode serves a twofold purpose. It is the anode in the electrolytic process from which the electric current passes through the solution to the cathode. It also generates heat by the resistance of the solution to the electric current passing through it, and such heat must be sufficient for the whole operation including the melting of the cryolite as well as the electrolysis. Because of the heat thus generated the electrolytic cell is an electric furnace. I have already referred to the fact that in the aluminum industry the electrolytic cell is called an aluminum pot; it is also called an aluminum furnace. It should be noted that the terms electric furnace and aluminum furnace are not interchangeable. Not every electric furnace is an aluminum one for electric furnaces may also be used for

smelting purposes; the term aluminum furnace is confined to an electric furnace in which aluminum is produced by electrolysis.

The electrodes used originally were pre-baked electrodes. They were made of carbonaceous material, usually petroleum coke with a binder of pitch, ground up and pressed under heavy hydraulic pressure into moulds and then baked at a high temperature. This made a solid electrode. The pre-baking was done in a separate plant and the pre-baked electrode was then inserted into the aluminum pot. The size of an electrolytic cell may vary. The amount of aluminum produced per cell per day is approximately proportional to the amount of electric current employed and that depends to some extent on the number of electrodes used, there being an upper limit set to this by the difficulty in adjusting them. In the diagram of an electrolytic cell on page 302 of Exhibit B, The Aluminum Industry, by Edwards, Frary and Jeffries, a row of six pre-baked electrodes is shown. In the ordinary course there would be four such rows in an aluminum pot. The six electrodes are held suspended by iron rods clamped to a central busbar, through which the current is distributed to the electrodes, and attached to the inside of the electrodes. No part of these iron rods should be allowed to go into the solution for it will be affected by the electrolysis and the iron will go with the aluminum and contaminate it.

There were three main drawbacks to the use of the pre-baked electrodes. The first was the difficulty of adjusting the electrodes to their proper place in the solution as the lower ends were consumed, even in the case of such small electrodes as are shown in the figure, six inches in diameter and eighteen inches in height. This adjustment had to be made by hand. The second drawback was the necessity of replacing the electrodes as they were consumed. They could not be used above the place where the iron rod was attached to them, so that when they were consumed up to that point the butts had to be removed and new electrodes put in their place. It was not easy to determine when this should be done. The third drawback was the economic waste involved in using small electrodes instead of large ones.

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The difficulties involved in the use of pre-baked electrodes have been substantially met by the use of continuous self-baking electrodes, known as Soderberg electrodes, named after their inventor, Mr. Carl W. Soderberg, the chief metallurgist of Elektrokemisk, as adapted to the production of aluminum by other inventors. This brings me to a consideration of the Soderberg inventions, which the Commissioner in his decision referred to as basic. During the first world war it was difficult to obtain pre-baked carbon electrodes and Mr. Soderberg and Dr. M. O. Sem as his assistant worked on the problem of how to replace them. Mr. Soderberg conceived the idea of making use of the heat generated by the passage of the electric current inside the electrode to bake it. His first invention, made in Norway, was covered in Canada by Patent No. 215,697, dated February 7, 1922, styled Process of Baking Carbon Electrodes. It was carried out with an iron rod imbedded in an electrode paste made from exactly the same materials as the pre-baked carbon electrodes. This invention completely failed to accomplish its purpose. It was easy to introduce the electric current into the electrode by means of the iron rod and generate the heat necessary to bake it but the rod melted off and the electrode fell into the electric furnace. The difficulty was that when the electric current passed through the rod the heat generated by the resistance in it to the current heated the rod and caused it to expand, but caused the electrode paste to shrink as it was being baked, and the expansion of the rod exposed the electrode to a heavy strain which it could not stand before it was baked, with the result that it went to pieces. Many tests of the invention were made with various arrangements of the iron rod but all of them failed. It should be pointed out that this invention was directed to making a self-baking electrode for use in a smelting furnace for the rp production of calcium carbide, ferro-alloys and the like. It was not directed for use in the recovery of aluminum and was never tried anywhere for the production of aluminum. Even if it could have been made to work in a smelting furnace it would not have worked satisfactorily in an aluminum furnace because of the fact that the end of the iron rod melted off and fell into the furnace. This would not have mattered in a smelting

furnace but if it happened in an aluminum one the iron would contaminate the aluminum because both metals would go off together as the result of the electrolysis. All that need be said about this invention at the moment is that whatever the claims in the patent may be and whatever arguments may be based upon their language, the plain fact is that the invention could not be made to work even in a smelting furnace, let alone in an aluminum one, and no self-baking electrode was ever successfully made by its use. The evidence of Dr. Sem is explicit on these points. He worked with Mr. Soderberg as his assistant and probably knows more about the subject than anyone else except Mr. Soderberg, who was unable by reason of age and failing health to come to this country to testify. Under the circumstances, I accept his evidence without hesitation.

Mr. Soderberg was so discouraged with the failure to make his invention work that he wanted to give up further tests but he was urged to continue them. While he was doing so he fell upon and developed two other inventions that made a continuous self-baking electrode possible for use in a smelting furnace. He found that it was necessary to use a different electrode paste from that used in the pre-baked electrodes and that this required an armament for holding the paste, supplying the electric current to bake it and suspending the electrode. Canadian patents were taken out for these two inventions.

I shall deal first with Patent No. 264,997, dated October 12, 1926, styled Electrode Mass for Self-baking Electrodes. The Soderberg electrode, as the continuous self-baking electrode was thereafter called, consists of a lower baked portion which is the one working in the furnace and an upper baked portion which is built up continuously by adding unbaked paste to it as the lower end of the electrode is consumed in the furnace. Between these two portions there is a baking zone which moves slowly upward relatively to the electrode as the lower end is consumed and the electrode is allowed to slip into the furnace. It is in this baking zone that the volatile matter is driven off and the paste becomes hard. The pre-baked electrode was made

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with as little binder as possible, whereas in the Soderberg electrode the reverse is true and quite a soft paste with a great deal of binder is used.

The new paste was too soft to be used with an iron rod imbedded in it and it was also necessary that it should settle as it was being baked without being exposed to the strain of the expansion of the iron rod by the heat of the electric current passing through it. It was therefore necessary to discard the use of an iron rod in the paste and arrange the iron around it in such a way as to act both as a container for the paste and as a conveyor of the electric current to it. The solution was found in the invention covered in Canada by Patent No. 216,092, dated February 21, 1922, styled Electrodes for Electric Furnaces and Process of Manufacturing the Same. This was carried out by the use of an iron casing or mantle to contain the paste and enclose and hold the baked electrode together with the use of iron ribs extending inward from the inside of the casing. The essential feature of the invention is the use of these ribs. They serve as a contact means to carry the electric current to the paste in the baking zone and to sustain the baked portion of the electrode. The electrode is built up in sections. As the lower end is consumed in the furnace a section of the casing with the ribs inside it is added to the top by welding and filled with fresh paste and the whole electrode lowered to the proper distance. The electrode is suspended from a hoist by chains attached to an electrode holder consisting of an iron ring clamped around the casing. The electric current is conducted through this ring to the casing and the ribs and through them to the paste in the baking zone and then to the baked portion of the electrode. The casing around this portion and the ribs in it melt and the molten iron flows into the furnace and the electric current passes through the baked carbon to the lower end of it and enters the furnace to supply the necessary heat to it. The electric current operates only in respect of the part of the electrode that is below the electrode holder. When it is necessary to let the electrode down into the furnace the clamp must be loosened, and when the electrode has been allowed to slip down the desired length the clamp is tightened again and the process of baking the fresh paste which has reached

the baking zone begins again. This invention together with that of the paste met the difficulties which the first invention had failed to solve and made it possible to make a self-baking continuous electrode for use in a smelting furnace by the use of the same electric current as that which supplied heat to the furnace. It was no longer necessary to depend upon pre-baked electrodes for use in such a furnace.

Only a brief reference need be made to another Soderberg invention covered in Canada by Patent No. 212,181, dated May 31, 1921, styled Electrode Holders. This was merely an improvement of the previous electrode holder. Instead of one clamp around the outside of the casing there was a series of clamps pressing on it, with a screw for each clamp by which it could be adjusted to let the electrode slip down into the furnace. The invention was designed particularly for large electrodes to allow a more even slipping of them and to do so without cutting off the current while the adjustment of the electrode was taking place.

While Mr. Soderberg's final inventions were successful in making continuous self-baking electrodes for use in a smelting furnace they could not be used with commercial success in the production of aluminum. Here it might, I think, be useful to refer to the distinction between a smelting furnace and an aluminum furnace. The purpose of a smelting furnace is either to separate or to fuse metals by heat, which may be supplied by any kind of fuel. Where it is supplied by an electric current the furnace is called an electric furnace and the sole function of the electric current is to supply the necessary heat. The electrode through which it passes into the furnace does not enter into the reactions at all. In an aluminum furnace, however, which is an electrolytic one, the primary purpose of the electric current is not to supply heat to the furnace so much as to effect the electrolysis by which the aluminum is separated from its oxide and the electrode does enter into the reaction to the extent that the consumed carbon goes off with the oxygen in the form of carbon dioxide gas or carbon monoxide gas. A further difference is that the electric current used in an electric smelting furnace, is alternating, whereas that used in an electric aluminum furnace is direct. Moreover, there is a great difference in

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the voltage required. In an aluminum furnace the required voltage is low, being only from four and a half to five and a half volts, whereas in a smelting furnace it is high, ranging from forty to one hundred volts.

The differences to which I have referred were of great importance when Mr. Soderberg sought to apply his invention to the production of aluminum. For the reason already indicated the iron casing and ribs that could be used in an electric smelting furnace were not satisfactory in an aluminum one for the iron would melt and introduce impurities into the aluminum. An effort was, therefore, made to use an aluminum casing and aluminum ribs but this was not successful for as the electric current was conducted through the aluminum ribs they melted away because of the low melting point of aluminum as compared with that of iron before the electrode paste could be baked and there was also a loss of voltage in the electrode of two or more volts. This loss was ruinous. Mr. Soderberg and Dr. Sem then experimented with an aluminum casing and thin iron ribs but this was subject to objection. Although the use of the thin iron ribs reduced the impurities in the aluminum to only 2 per cent yet the voltage required went up to seven volts. Nevertheless, they attempted to have the inventions put into practice. They first operated a small test in an aluminum furnace in the Elektrokemisk plant and then had furnaces made for tests in aluminum plants in Norway and France and in the plant of the Aluminum Company of America in Baden, North Carolina. Dr. Sem went to Baden in 1924 to start the tests there. The Aluminum Company of America was using a Hall type of electrolytic furnace with pre-baked electrodes. Dr. Sem thought that it was not efficient and that the Soderberg Electrode System as it had then developed could successfully compete with it, but in this he was disappointed. The tests at Baden were carried on with the use of an aluminum casing and thin iron ribs and the improved electrode holder and were on a full scale. Dr. Sem said that they embodied all the best knowledge that Elektrokemisk had of the production of aluminum. Nevertheless, the tests ended in failure. The aluminum furnaces in which the Soderberg electrodes were used consumed too much power and there were impurities in the aluminum. It was, of course, possible

to produce aluminum by the use of the Soderberg electrodes, but there was no commercial advantage in their use over that of the pre-baked electrodes. The tests showed that they could not successfully compete with them in the production of aluminum. The trial aluminum furnaces at Baden were shut down and so were the test furnaces that had been set up in Norway and France.

After the failure at Baden a fresh start had to be made and Elektrokemisk entrusted the task to Jens Westly, one of its employees. After many tests, several of which were made the subject of patent applications and later covered by patents, Mr. Westly conceived the idea of using individual iron studs as contact means instead of iron ribs and removing them before they could touch the molten electrolyte and contaminate the aluminum. His invention was covered in Canada by Patent No. 287,700, dated March 5, 1929, styled Electrodes. It was carried out by introducing individual iron studs at a downward angle through holes in the casing into the upper part of the electrode containing the soft paste, conveying the electric current through them into the paste in the baking zone and then extracting the studs from the baked portion of the electrode before they could come into contact with the solution of the alumina and the molten cryolite. At first the studs were threaded and screwed in but later they were inserted without threads. The studs extended beyond the casing and the electric current, which was supplied by copper or aluminum cables attached to them, went directly to them and through them into the electrode. It did not pass through the electrode holder and the casing as in the case of the previous invention. The result was that the studs were superior to the ribs as contact means. As the studs passed through the baking zone they became covered with a film of pitch attracted from the paste which made it possible to extract them from the baked portion of the electrode without breaking it. The studs had to extend beyond the casing so that the necessary pulling arrangement, which in the case of a large electrode exerted a force of 20 tons, could be attached to them. The holes left in the electrode were then filled with paste or alumina solution in order to prevent air pockets with their resultant loss of voltage from being formed. An aluminum casing

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was used instead of an iron one. This, of course, melted off as it went into the electrolyte, but since the iron studs were extracted before they could be affected by the electrolysis there was no longer any danger of introducing impurities into the aluminum. There was no interference with the flow of electric current while the studs were being extracted. In a large electrode there were five rows of studs from eight to ten inches apart with the electric current operating only on the studs in the two lower rows and before the studs in the lower of these rows were extracted the electric cables were raised and attached to the studs in the row next above the upper one and in turn the studs in this row became operative as the electrode was let down.

After Mr. Westly's invention was worked out Elektrokemisk informed the Aluminum Company of America of the new arrangement, and it adopted it in its four trial furnaces at Baden. It then decided to install a series of aluminum pots with the Soderberg electrodes and Westly studs in its large plant at Alcoa, Tennessee, and Dr. Sem helped it with its installation. This started in 1928. There were approximately 90 furnaces in the series, each using about 30,000 amperes of current. The electrode in each was a large round one, approximately seven feet in diameter and weighing about 15 tons. Dr. Sem thought that the Soderberg electrode with the Westly studs did better than the Hall furnace with pre-baked electrodes, but the Aluminum Company of America had developed a new European type of furnace using pre-baked electrodes that had better heat insulation than the Hall type and was more efficient. A race between this and the Soderberg Electrode System took a couple of years, but the operation of the improved European type of furnace gained the upper hand and in May, 1932, Dr. Sem was informed that the Soderberg Electrode System could not compete with it. Rather than have the series closed down Elektrokemisk waived all royalties for two years pending further research. The tests at Alcoa showed that, although aluminum could be produced with the use of Soderberg electrodes, there was no commercial advantage in such use over that of pre-baked electrodes in the improved European type of aluminum furnace.

There were several difficulties in the operation of the Soderberg electrode even with the Westly studs. In the first place, the electrode holder with the clamps through which the electrode had to slip could not easily be controlled by the workmen when they loosened the screws with the result that the electrode had a tendency to slip more on one side than on the other. This brought the lower end of it closer to the aluminum at the bottom of the pot on one side than on the other causing a concentration of the current at the lower side with the result that it was overheated and there was a loss of power. There was a second difficulty connected with the suspension of the electrode. The electrode holder consisted of contact clamps with a pressure ring surrounding the clamps and equipped with screws so that each clamp could be pressed around the surface of the electrode. The clamps, and through them the whole electrode, were suspended by a ring attached to a hoist whereby the position of the electrode could be controlled. But the difficulty was that although the clamps were so arranged that the studs could pass between them, they could not pass beyond the pressure ring and had to be extracted before they hit it, which meant that they could not be used to their full effect. But the main drawback continued to be that the electric power consumption in the pots was too high as were also the labour costs.

The next improvements in the Soderberg Electrode System came from France where La Compagnie de Produits Chimiques et Electrometallurgique Alais, Froges et Camarque had experimented with the Soderberg electrodes in its plant at Riouperoux. There two important inventions were made by Pierre J. M. Torchet, covered in Canada by Patent No. 346,868, dated December 18, 1934, styled Manufacture of Aluminum in High Power Tanks and Patent No. 341,667, dated May 15, 1934, styled Electrode Suspension. I shall deal with the former first since it was the prior invention. Torchet discovered that the Soderberg electrode should be restricted in width. He therefore used a rectangular electrode not wider than 43 inches instead of the big round one with its diameter of seven feet. The length of the electrode did not matter. It could be four or five times as long as it was wide. The reason why Torchet's narrower

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rectangular electrode worked better than the big round one was as follows. The carbon dioxide and carbon monoxide gases developed underneath the electrode by the union of the carbon in the electrode and the oxygen in the alumina had to escape by moving out beyond the circumference of the electrode where they could rise to the surface. As they did so they formed bubbles in the solution and the longer the distance to the circumference the bigger the bubbles would be. Since the distance between the lower end of the electrode and the aluminum at the bottom of the solution was only from one and a half to two and a half inches the aluminum could easily be upset by the turbulence caused by the bubbles and since the specific gravity of the aluminum was only slightly greater than that of the solution it was easy to make the aluminum rise and stir up waves that would touch the lower end of the electrode and cause a short circuit of the service and thereby lessen its efficiency for the production of aluminum. The use of a rectangular electrode that was narrower in width than the big round Soderberg electrode lessened the length of the distance that the gases had to travel in order to escape and so reduced the size of the resulting bubbles and minimized the risk of turbulence in the bath. The result was that aluminum could be produced with a lower power consumption, for the rectangular electrode could be lowered nearer the aluminum without running the risk of turbulence causing a short circuit. A saving of voltage could thus be made. This was a great achievement. Moreover, in the big round electrode there was always a risk of overheating the central part with a resultant loss of efficiency, which risk was less in the case of the narrower rectangular one. It followed from Mr. Torchet's invention that the Soderberg electrode could be made as large as was desirable provided it was restricted in width. The use of the narrower rectangular electrode thus maintained all the advantages of the large electrode and substantially removed the disadvantages that had led to high electric power consumption.

The other Torchet invention related to a new device for suspending the electrode whereby the difficulty of uneven slipping was eliminated. This suspension device made use of the Westly studs for suspension purposes in

addition to their use as contact means. An iron beam was arranged on the outside of the casing immediately under each row of studs and the structure so obtained was attached to a winch by which the electrode could be raised or lowered as required without slipping. The studs were arranged only on the long sides of the rectangular electrode and not on the short ones and so were the beams. The beams were removed from the lowest row of studs on each side before they came near the top of the electrolyte and put under the row of studs at the top before the studs in the lowest row were extracted. In this way there was a continuous operation of the electrode. The beams also served a further important purpose. The electrode paste was soft and tended to make the rectangular shape of the electrode bulge into a round one as it baked and became hard, but the beams served to prevent the casing of the electrode from bulging and helped it to retain its rectangular shape.

The suspension arrangement invented by Mr. Torchet was improved by Mr. Jean L. Legeron, another employee of the French company at Riouperoux. His invention was covered in Canada by Patent No. 383,238, dated August 8, 1939, styled Arrangement with Electrodes and their Suspension. Mr. Torchet had arranged his iron beams underneath the iron contact studs in such a way that there was a space between them for the insertion of the studs equal to the distance between the rows of studs. The gases from the furnace tended to escape between the beams and the casing and to melt the casing causing the electrode to be corroded and so increase the electrode consumption. Mr. Legeron met this difficulty by using U-shaped beams and arranging them on top of one another in such a way as to form a continuous wall. The Westly studs were inserted through holes in the beams instead of through the casing in the space between them as formerly. This arrangement made a stronger structure and gave better protection to the electrode against air corrosion. There was really a continuous container built up by removing the lower beam and putting it up on top as the electrode was let down into the furnace, as Mr. Torchet had done, except that there was no intervening space. There was thus really no need for any casing at all except to cover

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up the holes in the beams before the contact studs were introduced, but it was preferable to use a thin one for otherwise some of the paste would stick to the beam. The main purpose of the Legeron invention was to avoid air corrosion of the electrode, but it also enabled the use of a thin aluminum casing and made a stronger suspension. It was an improvement over the prior invention that materially added to its results.

The change from the large round electrode to the narrower rectangular one while seemingly a minor one was really revolutionary in character. The inventions at Riouperoux attracted world wide attention and aluminum people from all over the world came there to study the new arrangement. It met with great success wherever it was adopted. There is, I think, strong support for Dr. Sem's conclusion that the successful introduction of the Soderberg Electrode System into the aluminum industry came with the Torchet inventions. I accept his statement that it was not possible to produce aluminum with commercial success by the use of the Soderberg electrode without using the Westly studs, as was shown by the failure at Baden, and also his statement that it was the use of the narrower rectangular electrode instead of the wider round one that really made it possible to use the Soderberg electrode in the production of aluminum with commercial advantage. Certainly the wide extension of its use started with the Torchet inventions. The improved Soderborg Electrode System, as it was called, was installed by the Aluminum Company of America at Alcoa, notwithstanding its previous rejections of it at Baden and Alcoa, and was operated with great success. Alcan, as we shall see, adopted it in 1937. The Reynolds Metal Company, the second largest aluminum producer in the United States, used it exclusively when it started aluminum production in 1941. It has been installed in aluminum plants all over the world. Indeed, from 90 to 95 per cent of the extension of the aluminum industry has been effected with the use of the improved Soderberg Electrode System.

Alcan, which is one of the largest producers of aluminum in the world, adopted the Soderberg Electrode System soon after it had been adapted to the successful commercial production of aluminum by the Torchet invention. It

entered into a license agreement with Elektrokemisk, dated July 14, 1937. This recited that Elektrokemisk was the sole owner and/or had sole control of certain patents relating to self-baking electrodes and manufacture thereof, called the Soderberg Electrode System, and of certain patents relating to improvements on Soderberg electrodes and that Alcan was desirous of obtaining a licence to make and use, but not to sell, the inventions described in the said patents, 30 patents in all being specified. The agreement granted to Alcan a non-exclusive licence to make and use, but not to sell, for the production, treatment or manufacture of aluminum only, at its own works in Canada the inventions described and claimed in the said patents and set the royalties to be paid by it on all products made by the use of the licensed Soderberg Electrode System at "1/10 cent U.S. currency per pound of aluminum". By paragraph 7 of the agreement Alcan was permitted to use improvements of the Soderberg Electrode System made or acquired by Elektrokemisk during the life of the agreement without additional royalties. The agreement was to expire with the expiry of the latest patent specified or permitted to be used under paragraph 7.

It was also provided in the agreement that Elektrokemisk should prepare and deliver to Alcan working drawings of the Soderberg Electrode System for its first installation and send a competent expert to supervise its erection and starting and that Alcan should install it and put it into operation within 12 months after the execution of the agreement. These provisions were complied with and installations of the system were put in at Alcan's plants in accordance with the plans supplied by Elektrokemisk. A plan of these installations was filed as Exhibit A. It embodies the five inventions in question in these proceedings. Dr. Sem who supervised the plans for the installations said that Elektrokemisk, knowing that Alcan was one of the biggest producers of aluminum in the world, included everything it could to make the installations as efficient and economical as possible. He said that only the five inventions in question were used but on cross-examination agreed that in so far as a continuous self-

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baking electrode was used the invention thereof described in the basic Soderberg patents was to that extent also embodied in the Alcan installations.

With the outbreak of the war Alcan's production of aluminum greatly increased. In 1939 it produced 68,000,000 pounds by the use of the Soderberg Electrode System with royalties amounting to $68,000 and in 1940 this production went up to 92,000,000 pounds with a royalty of $92,000. In 1940 it decided to expand its Soderberg Electrode System plants and a new license agreement with Elektrokemisk was negotiated. It may be called the first amending agreement. Its terms are contained in a letter from Mr. Hagerup-Larssen, Elektrokemisk's representative in the United States, to Alcan, dated January 27, 1941. Alcan's licence was changed from a non-exclusive to an exclusive one for the Dominion of Canada and the new installation was to be in its entirety an installation of the Soderberg Electrode System. The royalty arrangement fixed by the license agreement of July 14, 1937, was modified as follows: the rate set forth in that agreement was to remain in effect for each annual production of aluminum up to 40,000 metric tons; for any additional amount up to a further 30,000 metric tons the rate was to be 66⅔ per cent of the original one; and for any amount produced over 70,000 metric tons it was to be 50 per cent. Alcan's exclusive licence was limited to the electrolytic production of aluminum. It was also noted in the letter that the three patents, which the Commissioner in his decision referred to as basic patents, had expired and that others whose use was permitted under paragraph 7 of the original agreement had issued.

After the new installations Alcan's production of aluminum under the Soderberg Electrode System increased enormously. In 1941 it amounted to 135,000,000 pounds, which under the new rates would mean a royalty of $119,000; in 1942 it grew to 350,000,000 pounds with a royalty of $231,000; in 1943 it reached a maximum of 666,000,000 pounds with a royalty of $388,000; and in 1943 the amount was only slightly less, namely, 663,000,000 pounds with a royalty of $386,000. In the spring of 1943 Elektrokemisk and Alcan agreed upon a ceiling of $215,000 in U.S. currency as the maximum amount of royalty pay-

able in any one calendar year, with effect as from January 1, 1941, and during each year of active hostilities. The terms of this agreement, which may be called the second amending one, are contained in a memorandum enclosed with a letter from Mr. Hagerup-Larssen to Mr. N. E. Russell of Alcan, dated May 7, 1943. Prior to this date the Deputy Minister of Munitions and Supply had intervened with his letter of March 23, 1943, with the result that the agreement was never signed. But there is no doubt that as between Elektrokemisk and Alcan the ceiling of $215,000 in U.S. currency was agreed upon. Alcan was quite willing to pay royalties based on the first amending agreement subject to the ceiling set by the second one.

It was under these circumstances that the appellant applied to the Commissioner of Patents for the determination of the reasonable compensation to be paid by His Majesty for the use by Alcan of the five inventions in question in its production of aluminum for war purposes. It should be noted that there is another petition before the Commissioner relating to production of aluminum for civilian purposes the hearing of which was deferred and with which we are not here concerned.

The Commissioner rendered his decision after a lengthy hearing before him. I briefly summarize his main findings. After setting out particulars of the number, date, name of inventor and subject matter of invention of the thirty patents specified in the licence agreement and the five patents and three patent applications subsequent to the date of the agreement the use of which was permitted to the licensee by paragraph 7 of it, the Commissioner examined the five patents, for whose use he was to find reasonable compensation, by reference to their claims and concluded that the inventions covered by them were merely improvements in the art. The basic patents, in his opinion, were, first, No. 216,092, Electrodes for Electric Furnaces and Process for Manufacturing the Same, which he held to be the foundation of the Soderberg System, second, No. 215,697, Process of Baking Carbon Electrodes, which he said was operative for the production of aluminum, and, third, No. 212,181, Electrode Holders, which he regarded as a valuable contribution to the development of the Soderberg System. Those three basic patents, as well as

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two others, had expired at the time of the hearing and the inventions covered by them had fallen into the public domain. The Commissioner then proceeded to determine the compensation payable for the use of the five inventions by two methods. The first was based on the assumption that each patent specified or referred to in the licence agreement must have some value. That being so, it followed, in the Commissioner's opinion, that since Alcan used only the inventions covered by five patents the compensation payable for such use should be less than one-tenth of a cent per pound paid by Alcan under the license agreement for the use of all of them. He considered that the three basic patents, all of which had expired, had a great value and thought, for the reasons enumerated in his decision, that the five patents used by Alcan had less value than the three expired basic ones. The remaining patents specified or referred to in the licence agreement, other than the three expired basic ones and the five used by Alcan, also had some value. Finally, it was his opinion that the basic patents and the remaining ones, other than the five under consideration, had 75 per cent of the value of the total royalty and that only 25 per cent of it should be attributed to the five. By this line of reasoning he reached a compensation of one-fortieth of a cent per pound of aluminum produced by the use of the five inventions. Then, taking the average production of aluminum between 1939 and 1944 at 329,771.68 pounds per year and applying 25 per cent of the existing royalty thereto, he reached a maximum compensation in any one year of approximately $82,500. The second method used by the Commissioner was to base the compensation on a percentage of the savings effected by Alcan through the use of the Soderberg Electrode System as compared with the use of pre-baked electrodes. The Commissioner accepted the evidence of Mr. Russell, based on the experience of Alcan at Arvida in 1944 where both systems were used, that this came to .11 of a cent per pound, taking into account the factors of consumption of power, consumption of electrodes, cost of labour and the cost of repairs and maintenance of equipment. Then he applied 25 per cent of this to the average annual production already referred to and reached a maximum compensation in any

one year of approximately $90,500, which worked out at one-thirty-ninth of a cent per pound. Then, after considering the two methods he came to the conclusion that a compensation of one-fortieth of a cent per pound of aluminum produced by the use of the five patents was fair and reasonable and that when it should reach the sum of $100,000 for any one year no further compensation should be paid for that year. The compensation was to be paid in Canadian currency. Finally, the Commissioner made his award retroactive to October 1, 1941, all royalties having been paid by Alcan up to that date either to Elektrokemisk or to the appellant.

The compensation which Order in Council P.C. 11081, dated December 8, 1942, directed the Commissioner to determine was reasonable compensation for the use of the five inventions by Alcan in the production of aluminum for war purposes for His Majesty. There is no dispute as to the validity of the patents covering the inventions or their use by Alcan. It is also clear that if the compensation is to be reasonable it must be based on the value of the use of the inventions in the production of aluminum and that the value to be considered is commercial value.

There was, I think, a basic error on the part of the Commissioner in assuming that each patent specified or referred to in the original license agreement had a separate commercial value in the production of aluminum and that the royalty payable thereunder represented the total of such separate values, and that since only five of the inventions were used by Alcan the reasonable compensation payable for their use must of necessity be only a fraction of the total royalty. The evidence is indisputably against the Commissioner's assumption. Many of the patents specified in the license agreement covered inventions that did not relate to the production of aluminum at all and had no value for use therein. The most that could be said of some of them is that they related to the Soderberg electrode and had some value in smelting furnaces. There were several other patents that covered inventions that had been superseded by later ones, as, for example, those made by Mr. Westly before he hit upon his important invention of using removable iron contact studs instead of the iron ribs referred to in Patent No.

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216,092. Still other inventions had not been put to any commercial or practical use at all. Then there were some inventions such as those made by Dr. Sem with regard to which he stated that although they had some value in the production of aluminum their use could not improve the economy of Alcan's use of the five inventions.

Moreover, in such a case as this where the inventions are used together in such a way as to form a process or system I think it would be wholly impractical to assess the value of the inventions separately even to the extent that the Commissioner attempted.

Finally, the Commissioner's assumption is not in accord with the manner in which the parties to the license agreement arrived at the royalty. Certainly they did not agree upon a royalty of one tenth of a cent per pound by attributing a value to each of the patents specified or referred to in the agreement and adding such values together. It is clear that what Elektrokemisk did was to give a licence to Alcan for a certain purpose; it listed all the patents it owned that could have any bearing on the Soderberg electrode for use for any purpose and regardless of whether the inventions covered by them were operable or had any value for use in the aluminum industry or not and then confined Alcan's right to use the inventions to the production of aluminum. The evidence shows that it was a common practice to make license agreements of this sort. That the parties did not contemplate a separate value for each patent is shown by the fact that there was no provision in the agreement for any abatement or reduction of the royalty as the patents expired and the inventions covered by them fell into the public domain. The royalty was a collective one and continued to be the same during the life of the agreement whether there were thirty patents covered by it or only one. It was, therefore, in my judgment, unsound to take one tenth of a cent per pound as representing the total of the separate values of each of the patents covered by the original license agreement and then work down from such total to one fortieth of a cent per pound as the total of the values of the five inventions. The Commissioner could not arrive at a reasonable compensation for the use of the five inventions by this or any similar mathematical method.

I am also of the view that the Commissioner erred in attempting to assess the value of the inventions by examining the claims in the patents and thereby determining whether they were basic or merely improvements and then holding that the inventions which he found to be basic had greater value than those which he found to be merely improvements. It is quite in order and, indeed, necessary to examine the claims to ascertain exactly what the invention for which the patent was granted consists of and what advance in the art was accomplished by it. But the value of an invention for the purpose of determining what compensation is reasonable for its use cannot be estimated by what is claimed for it in the patent. Its commercial value is a matter not of construction of the claims but of evidence. So that we are here concerned not so much with the place of the five inventions in the art or whether they are basic or merely improvements as with the commercial value of their use in the aluminum industry. There is no magic in the word "basic" so far as the commercial value of a patent is concerned. If in the present case an invention had no commercial value for use in the production of aluminum it does not matter whether it was basic in the metallurgical art or not.

An illustration of the error into which the Commissioner fell through not distinguishing between the claims made in a patent and the proved commercial value of the invention covered by it, or lack of such value, is to be found in his inclusion of Patent No. 215,697 in his list of basic patents and his statement that it was operable for the production of aluminum. The claims in this patent were not restricted to the use of the self-baking electrode in a smelting furnace and the disclosures state that the invention relates to the manufacture of electrodes for use in electric furnaces and as anodes or cathodes in various electrolytic furnaces without excluding aluminum furnaces therefrom. This no doubt led Mr. Mann to the expression of opinion that the invention was operable for the production of aluminum and the Commissioner's acceptance of it as a fact. On this appeal the Court had a great advantage over the Commissioner on this point in having the evidence of Dr. Sem who was a pioneer in the development of the Soderberg electrode and worked with Mr. Soderberg as

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his assistant on this very invention. I was very favourably impressed with him. His evidence establishes conclusively that not only was the invention described in this patent never tried in the production of aluminum but also that it was never operable for the production of a self-baking electrode even in a smelting furnace and that no self-baking electrode was ever made by its use. The invention might be regarded as basic only in the sense that it expressed the idea of baking an electrode by the use of the heat generated in it by its resistance to the electric current passing through it but it never became an operable device at all and Mr. Soderberg was so discouraged with his failure to make it work that he almost gave up all further attempts to embody his idea in an operable device. In view of this evidence, which I accept, it does not matter what the language of the claims or disclosures in the patent may show and any argument as to the value of the invention based thereon must fall; the conclusion is inescapable that Patent No. 215,697, far from being one of the more valuable basic patents, had no commercial value at all. No one would have paid any royalty for its use, because nobody could make it work.

The evidence is also against the Commissioner's finding that the two other so-called basic patents had greater value than the five patents covering the inventions used by Alcan. There would be support for such a finding if he had been considering the value of the use of such inventions in electric smelting furnaces, but the same is not true of their use in aluminum furnaces. The tests at Baden in 1924 as well as those in Norway and France showed that the original Soderberg electrode could not be used with commercial advantage over the pre-baked electrodes in the production of aluminum. Moreover, if there was any merit in distinguishing between basic and improvement patents so far as the production of aluminum is concerned the Commissioner should have regarded Patent No. 264,997, relating to the electrode paste, as basic rather than Patent No. 216,092, relating to the casing and the iron ribs. It was the electrode paste invention rather than the casing one that was basic in the production of aluminum for it was found later that it was possible to do without the casing, as the electrode was let down into the

furnace, by the suspension device improvement invented by Mr. Legeron with its container wall continuously built up above the portion of the electrode that went into the bath. And the evidence also shows that the Commissioner did not attach sufficient importance to the five inventions used by Alcan from the point of view of the value of their use in the production of aluminum. He dismissed the Westly studs patent much too curtly when he described it as reading on United States Patent No. 824,153, dated June 26, 1906, issued to G. O. Seward relating to Carbon Holder for Electric Furnaces and merely an improvement on it. Mr. Seward was not occupied with aluminum production and the problem which faced Mr. Westly was quite a different one from that with which he had dealt. And the Commissioner wholly failed to appreciate the importance of the Torchet inventions and the value of their use in the aluminum industry.

In ascertaining the commercial value of the five patents certain facts must be kept in mind. One is that the inventions cooperate with one another and form a process or system that can be used with commercial advantage in the production of aluminum. Another fact is that the five inventions or, to speak more precisely, the Westly and Torchet inventions completely dominate and control the production of aluminum by the use of the so-called Soderberg electrode. Without their use it could not be used in such production with commercial advantage over the pre-baked electrodes. It was not until after it had been adapted to the production of aluminum by the use of the dominating inventions that it had any commercial value in the aluminum industry over that of the pre-baked electrodes. While there were undoubted advantages in the use of a single large continuous self-baking electrode over that of many small pre-baked electrodes the advantages did not make up for two serious disadvantages, namely, too high a consumption of electric power and impurities in the aluminum. These disadvantages showed up in the tests of the installations at Baden which embodied the so-called basic Soderberg inventions. Undoubtedly, aluminum could be produced by their use but not in such a way as to give such use any commercial advantage over that of the pre-baked electrodes. Indeed, the Soderberg electrode could

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not compete with them. Under the circumstances, it had no value for which anyone in the aluminum industry would be willing to pay. Certainly, the Aluminum Company of America was not interested in it. And the experience of Dr. Luzatto in Europe was similar to that of Dr. Sem at Baden. Then came the efforts to adapt the Soderberg electrode to advantageous use in the aluminum industry. The Westly invention removed the complaint about the impurities in the aluminum by providing for the extraction of the iron contact studs from the baked portion of the electrode before they could enter the electrolyte. It also lessened the loss of electric power by reason of the improved contact means provided by the studs over that of the clamp, casing and iron ribs of the previous device. But even with these improvements the heavy disadvantage of undue power consumption still showed up in the tests at Alcoa between 1928 and 1932. The improved Soderberg Electrode was now able, by reason of the Westly invention, to compete with the pre-baked electrodes in a Hall type of aluminum furnace but could not compete with them in the improved European type. It is true that for four years the Aluminum Company of America paid a royalty of $20,000 per year for its use but then the Company notified Dr. Sem that it could not compete. The electric power consumption in the pots was too high and so were the labour costs. Part of the high power consumption was due to the difficulty of controlling the slipping of the electrode into the bath as its lower end was consumed. And later Mr. Torchet put his finger on another source of electric power loss and a way to lessen it. He found that the power consumption could be lessened without loss of the advantages of the big electrode if he restricted its width and thus shortened the distance for the gases to escape, reduced the size of the bubbles and lessened the risk of turbulence. This enabled the electrode to get nearer to the aluminum and also reduced the heat loss at the centre. Mr. Torchet also found that he could use the Westly studs for suspension purposes as well as for contact means and so provide a more efficient suspension which would eliminate the power loss resulting from uneven slipping of the electrode. I have already referred to the fact that the first Torchet invention was revolutionary.

That was so, not because of the change in the shape of the electrode from round to rectangular, for square electrodes were known, but because Torchet found that he could lessen the power consumption incidental to a big electrode, whether round or square, and yet maintain the undoubted advantages of the big continuous self-baking electrode, provided he restricted its width. This was a discovery of great practical and commercial value. To any one merely reading the claims in the patent and determining the value of the Torchet invention accordingly it would seem that it was merely an improvement on the previous art, but in the aluminum industry its effect was remarkable. It attracted attention all over the world. The reason was plain, for it was only after the Soderberg electrode had been finally adapted for commercially successful use in the production of aluminum by the use of the Torchet inventions that the so-called Soderberg Electrode System really won its way in the aluminum industry and acquired commercial value in it. It was really a misnomer, as Mr. Mann put it, to continue to describe the improved electrode as a Soderberg electrode for it had become quite a different thing from what Mr. Soderberg had invented. Certainly, any one who was familiar with the original Soderberg electrode would hardly recognize it in its improved form. It matters not, therefore, whether the Torchet invention is described as merely an improvement or not. As a matter of fact in the aluminum industry it was a basic invention in the sense that it turned the tide in favour of the so-called Soderberg electrode and the great expansion of its use in that industry started with it. Some indication of the value of the Torchet inventions is to be found in the fact that Elektrokemisk paid several million kroner for their use and continued to pay according to the extent of their adoption. Moreover, 90 to 95 per cent of the expansion in the aluminum industry has been effected by the use of the improved Soderberg electrode. Without the improvements of the Westly and Torchet inventions the original Soderberg electrode would have had none of this value. It would have remained in the same position as it was at Baden. The fact is that such commercial value as the improved Soderberg electrode now has in the production of aluminum was wholly the result of the so-

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called improvement inventions. Under the circumstances, and even if it were conceded, which it is not, that the royalty agreed upon in the original license agreement was the proper foundation for the Commissioner's assumption and calculations of value of the patents covered by it, I am quite unable to agree with his finding that the five inventions used by Alcan had less value than the original Soderberg inventions which he considered basic.

Nor did the Commissioner, in my opinion, sufficiently consider the benefits and advantages resulting to Alcan from the use of the five inventions. Even if no exception is taken to his acceptance of the evidence of Mr. Russell that the savings in operating costs through the use of the Soderberg Electrode System as compared with that of the pre-baked electrode system, based on Alcan's experience at Arvida in 1944, came to .11 cents per pound, taking into account the factors of consumption of power, consumption of electrodes, cost of labour and cost of repairs and maintenance of equipment, these savings of operating costs did not exhaust the list of benefits and advantages. There were others which the Commissioner failed to take into proper account. Some of them were referred to by Dr. Sem in the course of his evidence. There was the greater convenience in having only one large electrode that continued to operate through the whole lifetime of the furnace instead of many small electrodes that continually required changing. This meant that the system did not require the use of skilled labour, as was proved in places like Hungary and Yugoslavia. Secondly, the system was safer in its operation in that the furnaces using it could stand a longer period of shutdown without freezing the aluminum pots than those using pre-baked electrodes. The latter could stand a shutdown of only two hours, whereas the former could stand six. The reason for this is that the massive electrode has a higher heat capacity and can conserve it longer. This advantage was of particular importance in war time in view of the fact that if the pots did freeze they had to be chipped out by hand and it would take weeks to put them back into operation. A third advantage referred to by Dr. Sem was that aluminum of greater purity could be produced by the use of the Soderberg Electrode System, namely, from 99·75 to

99·80 per cent. This was ·2 per cent higher than that produced by the use of the pre-baked electrodes. There was no evidence before the Commissioner that Alcan received any higher price for the aluminum produced by it because of its purity, but there was evidence in this Court that the United States paid a higher price for the purer aluminum. This was a matter of importance to the Canadian Government in its sales of aluminum to the United States. In addition there were better working conditions in that the pre-baked electrode furnaces were open and exposed the workmen to the heat and escaping gas, whereas the Soderberg electrode furnaces could be closed and the fumes led off to the outside. There was a further advantage in that in the case of the pre-baked electrode system it was necessary to have a plant for making the electrode paste, rams for pressing the electrodes and ovens for baking them, whereas all that was necessary in the case of the Soderberg Electrode System was to have facilities for making the paste. It was also stated that it was possible to produce more aluminum with the same power than was possible by use of the pre-baked electrodes. This was important where the supply of power was limited. Dr. Sem said that these advantages in addition to the direct savings in operating costs were of importance and that in many cases the aluminum industry found them so important that Elektrokemisk was able to sell a licence against a royalty that was three to four times higher than that which was charged to Alcan. Moreover, Mr. Russell mentioned other benefits and advantages. With the use of the Soderberg Electrode System Alcan was able to produce the maximum amount of aluminum in the shortest possible time and to provide the required expansion in the industry more rapidly than would otherwise have been possible. Thus the evidence shows that in so far as the Commissioner based his finding on the benefits and advantages to Alcan from the use of the five inventions he was wrong in confining himself to the savings of direct operating costs.

Under the circumstances I have come to the conclusion that the reasons given by the Commissioner for arriving at his compensation were not sound and that his decision must be set aside.

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Some assistance in determining what principles ought to have been applied by the Commissioner may be found in some of the compulsory license cases, for in a sense His Majesty is in the position of a statutory licensee. A leading decision on the subject is that in *Applications by Brownie Wireless Co., Ld.* (1). There applications were made for the grant of compulsory licences on the ground that the patentees had refused to grant them on reasonable grounds. One of the questions in the case being whether the royalty of 12s. 6d. on a certain article insisted upon by the patentee was reasonable, Luxmoore J. at page 475, laid down the following test:

> The best test of whether a royalty is reasonable in amount or the reverse is: How much are manufacturers who are anxious to make and deal with the patented article on commercial lines ready and willing to pay? Here the evidence is that numbers of licensees have taken licences to manufacture and deal with the patented article on the footing that the royalty to be paid is 12s. 6d. per valve holder, and notwithstanding the amount of such royalty have continued to work under such licence and to pay the royalties, although under the terms of such licences there is power to terminate them on notice. In my opinion it is impossible, in the face of the evidence, to say that the amount of the royalty is unreasonable.

The established royalty rule has been applied for a long time by the Court of Claims of the United States in dealing with claims for just and reasonable compensation for the use of inventions by the United States. Thus in *Carley Life Float Company* v. *United States* (2) that Court held that where a patentee gave an exclusive licence and received from his licensee 10·86 per cent of the selling price of an article the patentee should be awarded 10·86 per cent of the cost of the purchases of the article by the United States from an unlicensed manufacturer. Likewise in *Barlow* v. *United States* (3) the Court held that a royalty of 10 per cent established by a license contract was reasonable compensation. And in *Marconi Wireless Telegraph Co. of America* v. *United States* (4) Chief Justice Waley said:

> If the plaintiff has already established a royalty by a licence or licences, he has himself fixed the average of his compensation, and if this has been established prior to the infringement, the task of the court then becomes easy.

(1) (1929) 46 R.P.C. 457.
(2) (1932) 13 U.S. P.Q. 112.
(3) (1937) 34 U.S. P.Q. 127.
(4) (1942) 53 U.S. P.Q. 246 at 251.

A similar principle has been followed in the United Kingdom by the Royal Commission on Awards to Inventors set up by Royal Warrant in 1919 to deal with disputes or differences between patentees and the Crown as to the amount of compensation payable by the Crown for the use of inventions under section 29 of the Patents and Design Act, 1907, as amended. The principles upon which the Royal Commission acted in the various classes of cases referred to it are set out in a series of reports, the first of which was made in 1921: *vide* Graham on Awards to Inventors, page 111. The principle to be applied when there is no dispute as to the validity of the patent or its user by the Crown and the reasons for its adoption are set out in paragraphs 8, 9 and 10 of this report. These deal with the subject so lucidly as to warrant their being set out in full:

8. It is clear in the first place that, however vital the invention may be to the service of the Crown, or however imperative the necessity of acquiring it for that service, the patentee cannot exploit the needs of the nation by insisting on an extortionate price for its use. The proviso to the section is obviously framed so as to prevent any such claim. On the other hand it would be unfair that the Crown should be enabled to use the invention at an inadequate price on the ground that it was useful only for naval and military operations and the like, and that Government departments were therefore the only possible customers. The section places the Crown, by its Departments and contractors, in the position of a statutory licensee with these two great advantages, namely, first that the licence may be exercised at the option of the Crown for such periods, continuous or discontinuous, and to such extent as the exigencies of the public service may demand, and secondly, that the Crown may have the terms of user settled either prospectively or retrospectively at their option. But, when and so far as the Crown has admittedly decided to avail itself of this statutory licence, and the only remaining question is as to the terms of user, the proper interpretation of the section would seem to be that such a fair and reasonable price or consideration should be fixed for the user as would be arrived at between a willing licensor and willing licensee bargaining on equal terms. It has indeed been suggested that statutory selection of the Treasury as the adjudicating authority shows an intention to minimize the consideration that should be paid for user by the Government. But this view appears to be inconsistent with the general character of the section, and would place the Treasury (and the Commission as their substitute) in a most invidious position, as an adjudicating authority with a statutory bias against all claimants under the section. And the recent substitution by the Act of 1919 of an obviously independent tribunal for the Treasury appears to be a statutory recognition of the fact that, whatever the tribunal, the basis of the award has throughout been intended to be a fair and impartial adjudication.

9. Taking then as the standard such a price or consideration as would be arrived at on a private bargain between a willing licensor and

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a willing licensee, it is to be observed that in private bargains this consideration is usually fixed on the basis of a royalty, that is of a definite sum or percentage on each patented article, or in the case of small and cheap articles on each unit consisting of a definite number or bulk of such articles. And there seems to be no valid reason for departing from this method in assessing the consideration under section 29. It has been urged that, where there has been an enormous user by and on behalf of the Crown, this method may result in an exaggerated or extravagant remuneration to a patentee whose patent may perhaps show little inventive merit But to this argument there are several answers. In the first place, as a matter of ordinary business arrangement the rate or percentage of royalty is often much diminished when the quantity taken by the licensee is very large, and this principle is equally applicable where the Crown is a statutory licensee. Further, in common experience, the profits obtained by patentees for the use by the public of their inventions bear little relation to the technical merit of their inventions, and sometimes are or seem disproportionately large; while there is no express provision in the section to put the Crown in any better economic position in this respect than the general mass of its subjects. And lastly, if practical utility is the main test of the commercial value of an invention, as appears generally to be the case, then obviously great importance must be attached to the fact that exceptional use has been made of an invention.

10. Normally, then, this basis of a fair royalty as between a willing licensor and a willing licensee has been accepted by the Commission as the proper basis of award or remuneration in the case of inventions protected by valid patents and unquestionably used by the Crown. But it has also been necessary to determine separately in each case what is, or would be, as between a willing licensor and a willing licensee, the proper rate of royalty. This rate is usually ascertained or expressed as a percentage of the cost or selling price of the patented article, but there are a great number of factors that must affect the amount of this percentage. Much must depend, for instance, on the advantage or saving in use given by the patented invention over other competing devices; and much on the cost of the patented article, and the relation borne by that part of it which is essentially the subject of the patent to that part which is of ordinary construction. The problem is very similar to that which arises when a compulsory licence is applied for by a subject under the relevant sections of the Patents and Designs Act, 1907. It is perhaps impossible, and is certainly inexpedient, to lay down any general rule in the matter other than that all the circumstances of each particular case have to be considered.

The principle followed by the Royal Commission on Awards to Inventors, namely, that "such a fair and reasonable price or consideration should be fixed for the user as would be arrived at between a willing licensor and willing licensee bargaining on equal terms" was expressly adopted by the Supreme Court of Canada as applicable in determining the reasonable compensation payable by His Majesty

for the use of an invention under Order in Council 6982, dated December 4, 1940: *vide The King* v. *Irving Air Chute Co. Inc.* (1).

The same principle is applicable in the present case but the Commissioner did not apply it. He did not attempt to ascertain the compensation from the standpoint of the price or consideration that would be arrived at between a willing licensor and a willing licensee bargaining on equal terms but sought to determine it otherwise. In so doing he took a mistaken view of the true nature of the original license agreement. Alcan was not buying nor was Elektrokemisk selling the unrestricted right to use all the inventions covered by the patents specified or referred to in it for all purposes. If that had been so there might have been some substance in the Commissioner's assumption that each patent had a separate commercial value and his estimate that the so-called basic Soderberg patents had greater value than the so-called improvement ones. But that was not the situation. What Alcan was interested in was not the right to use all the inventions for all purposes but only the right to use those that had commercial value in the production of aluminum in such production. And Elektrokemisk expressly confined Alcan's rights to such use. Consequently, whatever value the inventions covered by the agreement might have had for uses other than the production of aluminum did not enter into the calculation of the royalty fixed by the agreement. What the license agreement really covered was the right to use the inventions that made it possible to use the so-called Soderberg Electrode System to commercial advantage in the production of aluminum and such improvements in it as might be made for a collective royalty that was to remain the same during the lifetime of the agreement regardless of whether some of the patents expired or not. The Commissioner did not correctly appreciate this important fact. In this view of the agreement all of the royalty was properly attributable to the Soderberg Electrode System as it had been adapted to the production of aluminum and that meant the five inventions used by Alcan. Whatever there was of commercial value in the use of the Soderberg Electrode System in the production of aluminum was comprised

(1) (1949) 10 C.P.R. 1; (1949) 9 Fox Pat C. 10.

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in them and really in the Westly and Torchet inventions. The parties did not attach any value to the use of the so-called basic Soderberg inventions. Through the use of the five inventions Alcan received all the benefits and advantages that were possible from the use of the Soderberg Electrode System in the production of aluminum. Without them Alcan would have received nothing of commercial value and would have paid nothing. Moreover, Elektrokemisk would have received as great a royalty for a licence to use only the five inventions as it did under the license agreement. This may, I think, properly be inferred from the evidence of Dr. Sem that when the new installations were made for Alcan everything that was of commercial value in the production of aluminum was embodied in them. That meant the use of the five inventions; there was nothing of commercial value in any of the other inventions that could have been added thereto.

But the Commissioner was even more seriously at fault in his complete disregard of the revised royalty arrived at in the first amending agreement of January 27, 1941. If he had used this as a base for determining the compensation he could not possibly have arrived at his fractional compensation of one fortieth of a cent per pound for he could not have found that the so-called basic Soderberg patents had greater value than those covering the inventions used by Alcan, for at the date of the first amending agreement all the said patents had expired and the inventions covered by them had fallen into the public domain. The fact of such expiry was expressly stated in the said agreement, so that it is clear that no part of the revised royalty could possibly have been attributed to any of them. This means that only the five inventions used by Alcan were left.

This I think disposes of the main contention of counsel for His Majesty in support of the Commissioner's finding. His submission was that even if it were conceded that it was the five inventions used by Alcan that made it commercially advantageous to use the Soderberg Electrode System in the production of aluminum, they were all valueless without the basic Soderberg invention. I have already indicated my disagreement with this view, even if the royalty fixed by the original license agreement be

taken as the total of the values of the inventions covered by it, but I think it has no force at all when viewed in the light of the fact that the so-called basic Soderberg patents had expired when the first amending agreement was made and the revised royalty was arrived at with full knowledge and appreciation of that fact.

Counsel for the appellant contended that the revised royalty under the first amending agreement should be adopted as the measure of the reasonable compensation to be paid for the use of the five inventions subject to the ceiling agreed upon in the second amending agreement. In my judgment, there are several reasons for accepting this submission. While it is true that by reason of the Order in Council Alcan could not be sued under either the first or second amending agreements, and they cannot bind the Crown, it does not follow that the royalties agreed upon in them are automatically to be rejected as unreasonable. The right to receive reasonable compensation was substituted for the right to sue under the agreements and it should not be assumed, in the absence of good reason for it, that the quantum of the compensation must be less than that which would have enured under the agreements. Indeed, if the revised royalty and ceiling meet the conditions of the principle followed by the Royal Commission on Awards to Inventors in the United Kingdom and adopted by the Supreme Court of Canada in the *Irving Air Chute Company* case (*supra*) they afford the best possible test of the value of the use of the five inventions for no one could know such value better than Elektrokemisk and Alcan did. Primarily, the use of the inventions was worth what the parties were willing to pay and receive for it. There can be no doubt that the revised royalty and ceiling were arrived at between a willing licensor and a willing licensee bargaining on equal terms with full knowledge of the value of the inventions that were being used. These were only the five that are in question. The so-called basic patents had all expired and no other inventions than the five have been shown to have had any additional commercial value in the production of aluminum. When the so-called basic patents expired nothing of commercial value for which the aluminum industry would have paid anything passed to the public. Certainly, they had no

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value in the minds of the parties. The whole of the revised royalty was attributable to the right to use the five inventions and it was to remain the same during the lifetime of the agreement. Thus the expiry of the Electrode paste patent in 1944 would not affect the amount of the royalty. The same amount would continue to be payable for the use of the remaining inventions.

The revised royalty being thus attributable to the use of the five inventions or such of them as remained covered by surviving patents during the lifetime of the agreement, the matter really resolves itself into the question whether it was fair and reasonable. I find no ground for thinking that it was not. The evidence is that in most countries the rate of royalty charged by Elektrokemisk was double that of the original license agreement and that it gave a favourable rate to Alcan because of the large production that was contemplated. There is also the statement of Dr. Sem that in many cases the aluminum industry found the savings other than the direct savings in operating costs so important that Elektrokemisk was able to sell a licence for a royalty that was three to four times higher than that charged to Alcan. Moreover, both parties willingly revised the royalty in 1941 because of the proposed expansion of Alcan's facilities to meet the demands of the war. This revision was based on full knowledge by each of the parties as to what use was being made of the inventions and what benefits and advantages Alcan received therefrom. The fact that it was made in contemplation of increased production due to the war is an important factor as paragraph 9 of the first report of the United Kingdom Royal Commission on Awards to Inventors shows. Moreover, the revision was made notwithstanding the fact that the aluminum industry all over the world showed its knowledge of the value of the use of so-called Soderberg Electrode System as it had been adapted to the production of aluminum by the Westly and Torchet inventions by using it in 90 to 95 per cent of the expansion of the industry that took place. The evidence also shows that even on the basis of only the direct saving in operating costs of ·11 cents per pound there was a substantial gain by Alcan after payment of the revised royalty. And in addition it had all the other very important benefits and advantages that

Dr. Sem and Mr. Russell mentioned. Under the circumstances it seems to me that the revised royalty under the first amending agreement meets the test of the principle referred to and ought to have been adopted by the Commissioner as the measure of the reasonable compensation payable by His Majesty for the use by Alcan of the five inventions in question, subject to the ceiling agreed upon in the second amending agreement.

I find no grounds for thinking that the ceiling of $215,000 for any one year agreed upon between Elektrokemisk and Alcan was not a reasonable one. On the other hand, I am of the opinion that the ceiling of $100,000 set by the Commissioner was arrived at on wrong principles. He was not justified in taking the average yearly production in the years 1939 to 1944 as the basis for his ceiling and applying his 25 per cent to the low average thus produced. There was no need of a ceiling in a year of normal production and the revised royalty was reasonable for the increased production envisaged by the first amending agreement. It was only in the years of production beyond that, such as 1943 and 1944 particularly, that a ceiling became desirable. This was recognized by the parties. Moreover, the Commissioner ought not to have disregarded as he did the ceiling agreed upon by the parties. What I have said on this subject with regard to the revised royalty is applicable in large measure to the ceiling. Since it was arrived at freely by a willing licensor and a willing licensee bargaining on equal terms it should have been adopted unless there were grounds for finding that it was unreasonable. I have already stated that I find no such grounds. I am strengthened in this view by the decision of the Royalty Adjustment Board in the United States in proceedings before it in 1944 and 1945. These were similar in principle to those before the Commissioner and involved similar patents owned by Elektrokemisk and used by or for the United States in the production of aluminum. There the Royalty Adjustment Board fixed a ceiling of $200,000 in United States currency for any one year. It is interesting to note that this was fixed in contemplation of an annual production that was less than half of that of Alcan in the years 1943 and 1944. Moreover, the United States ceiling was made effective only as of January 1, 1944, whereas

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under the second amending agreement the ceiling of $215,000 was made retroactive to the same date as that of the revised royalty, namely, January 1, 1941. Furthermore, it is to be noted that the original royalty in the United States remained at one mill per pound, and was not reduced on a sliding scale as was done in Canada under the first amending agreement. Under the circumstances, while the decision of the United States Royalty Adjustment Board has no binding effect it is persuasive to the conclusion that the ceiling of $215,000 was a reasonable one. I so find.

Moreover, I see no reason for thinking that it was unreasonable to fix the revised royalty and the ceiling in United States currency.

On the hearing before me counsel for the appellant claimed interest as part of the compensation. No such claim was made before the Commissioner, but, quite apart from that fact, no allowance for interest may be made against the Crown in a case such as this. In *The King* v. *Carroll* (1) Taschereau J. of the Supreme Court of Canada, speaking for the Chief Justice and Estey J. as well as for himself, laid it down that "it is settled jurisprudence that interest may not be allowed against the Crown, unless there is a statute or a contract providing for it": *vide The King* v. *Roger Miller & Sons Ltd.* (2); *Hochelaga Shipping & Towing Co. Ltd.* v. *The King* (3); and *The King et al* v. *Racette* (4). Here there is no statute or contract providing for interest.

Whether this Court, having concluded that the compensation found by the Commissioner was based on wrong principles, should confine itself to such finding and send the matter back to the Commissioner or determine the compensation itself has been a matter of concern to me in view of the opinion expressed by Rinfret C.J. in the *Irving Air Chute Company* case (*supra*), namely, that by section 19 of the Patent Act the Commissioner is *persona designata* to report to the Government of Canada the reasonable compensation for the use of any patented invention used by the Government, that such section ascribes the power and duty to fix a reasonable compensation to the Commissioner alone, and that the right of appeal to this Court is limited to the question whether the Commissioner

(1) (1948) S.C.R. 126 at 132.
(2) (1930) S.C.R. 293.
(3) (1944) S.C.R. 138.
(4) (1948) S C.R. 28.

proceeded on a wrong principle. But, as I read the various reasons for judgment in that case, the majority of the judges did not adopt this opinion. Their view was that while I had been right in allowing the appeal from the Commissioner's decision, I ought not to have proceeded to determine the compensation myself in view of the fact that there was not sufficient evidence of the value of the inventions either before the commissioner or this Court to warrant any finding of compensation and that the matter should, therefore, be remitted to the Commissioner for further enquiry by him as to the value of the inventions. In the present case there is plenty of evidence of the value of the inventions in question and I see no reason for remitting the matter to the Commissioner for any further enquiry by him. And, with great respect for the opinion expressed by Rinfret C.J., I am not able to take as restricted a view of this Court's appellate jurisdiction under Order in Council P.C. 11081, dated December 8, 1942, as he indicated. It seems to me that in dealing with an appeal under the Order in Council this Court ought to follow a similar practice to that followed by the Supreme Court of Canada in dealing with appeals from judgments of this Court in expropriation cases. In such cases, it was said in *The King* v. *Elgin Realty Company Limited* (1) by Taschereau J., delivering the judgment of the Supreme Court of Canada, that when a Court of first instance, in determining the amount of compensation to be awarded, has acted upon proper principles, has not misdirected itself on any matter of law, and the amount arrived at is supported by the evidence, a Court of Appeal ought not to disturb its finding. But, when the Supreme Court of Canada has found that this Court has applied a wrong principle it has not hesitated, when there was evidence from which it could do so, to determine itself the compensation that it considered proper rather than send the matter back to this Court: *vide Canadian National Railway Co.* v. *Harricana Gold Mine Inc.* (2); *The King* v. *Halin* (3); *Irving Oil Company Ltd.* v. *The King* (4); and *Diggon-Hibben Limited* v. *The King* (not yet reported). I see no reason why this Court should do otherwise in an appeal under the Order in Council. It provides that any decision

(1) (1943) Ex. C.R. 49.
(2) (1943) S.C.R. 382.
(3) (1944) S.C.R. 119.
(4) (1946) S.C.R. 551.

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of the Commissioner under it shall be subject to appeal to the Exchequer Court and there is no limitation of the appeal to questions of law. Under the circumstances, it is the duty of the Court, in my opinion, when it finds that the Commissioner's decision was based on wrong principles, to determine itself the compensation that is reasonable, when there is evidence from which it can properly do so, as I think there is in this case, rather than put the parties to the expense and delay of sending the matter back to the Commissioner. The fact that the proceedings before the Commissioner do not constitute litigation between parties in the ordinary sense and that he has powers under the Inquiries Act, R.S.C. 1927, chap. 99, does not alter my views in the matter.

Counsel for the appellant contended that whatever compensation is awarded should be effective only as from March 23, 1943, the date of the letter of indemnity to Alcan, and that up to that time the rights of Elektrokemisk as vested in the appellant as against Alcan should be governed by the agreements between Elektrokemisk and Alcan. The defect in this argument is that under Order in Council P.C. 11081, dated December 8, 1942, once the indemnity was given Alcan was protected from any claim, action, or proceeding for the non-payment of "any royalties". This must, I think, mean that Alcan could not be sued for any royalties, even although they had accrued prior to the date of the indemnity. The patentee whose invention was used was given a right to reasonable compensation in substitution for his previous right to sue under his contract. Under the circumstances, I am of the view that the argument of counsel for His Majesty both before the Commissioner and before this Court, namely, that under the Order in Council the compensation should be effective as from October 1, 1941, should be accepted. This was the view taken by the Commissioner and I agree with his decision on this point. In view of the decision to which I have come the question is not of practical importance to the appellant, and the Crown cannot now be heard to object if the award is made effective as from that date.

There remains for consideration the fact that the ceiling of $215,000 for any one year agreed upon between Elektrokemisk and Alcan covered the production of alumi-

num both for war and civilian purposes and that the Order in Council requires His Majesty to pay reasonable compensation only for the use of the inventions in the production of aluminum for His Majesty for war purposes. The total production by Alcan by the use of the so-called Soderberg Electrode System in each of the years 1939 to 1944 is shown on Exhibit Z4. All royalties have been paid by Alcan up to September 30, 1941, so that we are concerned only with compensation in respect of production since that date. It is established that all the production for the years 1941, 1942 and 1943 was for war purposes and that for 1944 only approximately 1 per cent of it was for civilian purposes. There is no evidence as to the amount of production in the years subsequent to 1944 or as to the proportions that were for civilian purposes. It was suggested by counsel for the respondent that whatever ceiling was adopted ought to be reduced by the same proportion as the amount of production for civilian purposes bore to the total production. I adopt this suggestion as sound.

For the reasons given, the appeal from the Commissioner's decision must be allowed and his award of compensation set aside. There should be substituted for it the finding of this Court that reasonable compensation for the use by Alcan of the five inventions in question should be an amount equal to that of the revised royalties that would have been payable by Alcan under the first amending agreement, subject to the ceiling of $215,000 in United States currency for any one year as agreed under the second amending agreement, less the reduction in respect of production for civilian purposes that I have referred to, and without interest. For the years 1941 to 1944 the computation of the royalties at the 1941 rate appears on Exhibit Z4. From these figures the compensation payable up to the end of 1944 is as follows, namely; for 1941, the sum of $119,646.50 less the amount already paid by Alcan up to September 30, 1941; for each of the years 1942 and 1943, the sum of $215,000; and for the year 1944, the sum of $215,000 less 1 per cent for the production for civilian purposes. All the said sums are in United States currency for which the Canadian equivalent is payable. If the parties are unable to agree as to the amount of production in any year subsequent to 1944, for which compensation

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may be payable, and the percentage thereof that was for civilian purposes, a further application to the Court may be made. The appellant is also entitled to costs against His Majesty, but there will be no costs for or against the respondent Alcan.

Judgment accordingly.