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Feb. 4-8, 18-22, 25-28

Mar. 1, Mar. 4-8, 11-15, 18-19

Mar. 30

BETWEEN:

RADIO CORPORATION OF AMERICA ..PLAINTIFF;

AND

RAYTHEON MANUFACTURING COMPANY ..... DEFENDANT.

Patents—Conflict proceedings—The Patent Act, 1935, S. of C. 1935, c. 32, ss. 35(1), (2), 44(1)(a), (3), (4), (5), (6), (7), (8)—Statutory duty to describe invention—Claims invalid unless supported by disclosures in specification—Evidence of knowledge or use of invention prior to that asserted by applicant for patent subject to closest scrutiny—Findings in conflict proceedings not an imprimatur of validity of claims in conflict.

The claims in conflict in these proceedings were contained in two applications for letters patent for an invention relating to methods of sealing a glass stem in a glass bulb in the manufacture of miniature glass radio receiving tubes on a mass production scale. They appeared first in the application of H. R. Seelen, filed on November 19, 1941, and assigned to the plaintiff. They appeared later in the application of C. A. Horn, filed on August 6, 1942, assigned to Raytheon Production Corporation and by it to the defendant. The Commissioner of Patents, following the procedure prescribed by section 44 of *The Patent Act*, 1935, required each applicant to furnish an affidavit as provided for under section 44(5). In his affidavit Seelen stated that he had conceived the idea of the invention described in the claims between the last part of October, 1938, and December 1, 1938, that he wrote a description of the invention on April 13, 1939, and that tubes made by the method of the invention were made on a production basis in May, 1939. In his affidavit Horn stated that he conceived the idea of the invention and made the first drawing of it on or about December, 1937, and that tubes utilizing the invention were put into commercial production on or about August, 1938. On the strength of these affidavits the Commissioner allowed the claims in conflict to Horn and rejected them in Seelen's application and notified the parties that he would act accordingly unless proceedings were commenced in this Court within the prescribed time for the determination of the rights of the parties. The plaintiff thereupon brought the present proceedings under section 44(8) of the Act.

There were two issues in the action. It was contended for the plaintiff that the defendant was not entitled to any of the claims in conflict on the ground that the disclosures in Horn's application did not support them and that the plaintiff was entitled to them. It was contended for the defendant that if the defendant was not entitled to the claims for the reason stated the plaintiff was not entitled to them on the ground that Horn was the first inventor of the invention defined by them, even although he did not make the requisite disclosures to entitle him to them.

Held, in respect of the first issue: That an inventor may not validly claim what he has not described and that if the disclosures of the specification do not support the claims they are invalid.

2. That there is a statutory duty, under section 35 of *The Patent Act*, 1935, of disclosure and description of the invention that must be complied with if a claim for it is to stand.
3. That the onus of disclosure that the section places on an inventor is a heavy and exacting one.
4. That the specification in the Seelen application may not be used as a dictionary for the purpose of ascertaining the meaning of the claims in conflict in the Horn application. Only the Horn specification may be used for that purpose and only to the extent that resort may be had to it to ascertain the meaning of the terms in the claims.
5. That when a specification discloses the invention of a process for the manufacture of an article in which the use of a special feature of the invention is essential to its success the inventor is not entitled to claim a process for the manufacture of the article in which the special feature is not used. He is not entitled to claim a monopoly more extensive than is necessary to protect that which he has invented.
6. That the Horn specification disclosed the use of features essential to his invention that were not mentioned in the claims in conflict and that the invention defined in them was different from and wider than that disclosed in the specification.
7. That the disclosures in the Horn specification did not support the invention defined in the claims in conflict and that the defendant was not entitled to them.

Held, in respect of the second issue: That evidence of the knowledge or use of an invention prior to that asserted by an applicant for a patent should be subjected to the closest scrutiny.

2. That the onus of proof that Horn was the first inventor of the invention defined in the claims in conflict was a very heavy one.
3. That Horn was not a prior inventor to Seelen of the invention defined in the claims in conflict.

Held, generally: That as between the parties the plaintiff was entitled to the issue of a patent containing the claims in conflict.

2. That the findings herein did not put an imprimatur of validity on the claims in conflict and that their validity was a matter for determination only in an action for infringement or for impeachment if such proceedings should be taken.

ACTION to determine rights of parties in conflict proceedings.

The trial was held before the President of the Court at Ottawa.

Gordon F. Henderson, Q.C. and *David Watson* for plaintiff.

Christopher Robinson, Q.C. and *George Riches, Q.C.* for defendant.

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

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THE PRESIDENT now (March 30, 1957) delivered the following judgment:

These proceedings are brought pursuant to section 44(8) of *The Patent Act*, 1935, Statutes of Canada, 1935, Chapter 32, for the determination of the respective rights of the parties to certain claims, hereinafter called the claims in conflict, contained in two applications for patents of invention pending in the Canadian Patent Office of which applications and inventions the parties hereto are respectively the owners by assignment.

It is necessary to a proper appreciation of the issues in the action that the circumstances leading to its commencement should be understood. They are not in dispute. The claims appeared first in the application of Harry R. Seelen for letters patent of invention which was filed in the Canadian Patent Office on November 19, 1941, as No. 487,747. The invention was entitled Glass Envelope Seals and the plaintiff is the owner of Seelen's rights to it under an assignment from him. The claims in question are five in number and read as follows:

1. The method of making a radio tube envelope having a glass shell closed at one end with a glass disc type header comprising telescoping the shell over the header so that the rim of the shell overlies the edge of the header, heating the shell rim and header edge to welding temperature, and artificially cooling the central portion of the disc to control the strains in the disc and in the seal region at said rim.

2. The method of making a glass envelope having a glass shell closed at one end with a flat glass disc through which metal lead-in conductors are sealed, comprising holding the disc in the end of the shell with the rim of the shell overlying the edge of the disc, blowing air at room temperature against the center of the disc, and heating the shell rim and disc edge to sealing temperature, and continuing the air blowing after the seal is made.

3. The method of fabricating a radio tube envelope with a shell and flat header of glass having a thermal coefficient of expansion less than 10^{-5}, and metal contact pins having a thermal coefficient of expansion more than 10^{-5} sealed in the header and arranged in a circle concentric with the disc, comprising heating the disc and pins to a temperature below 300°C., heating the edge portion of the disc and the contiguous rim of the shell to sealing temperature while maintaining the temperature of the central portion of the disc and pins to said temperature below 300°C., and cooling the central portion more rapidly than the rim of the disc.

4. The method of sealing a glass disc in the end of a glass shell comprising heating the contiguous edges of the disc and shell to sealing temperature, and at the same time blowing air at about room temperature onto the central portion of the disc, the air flow being adjusted to prevent the temperature of said portion from rising above the deformation tem-

perature of the glass, then increasing the air flow after the seal is made to rapidly cool the glass, and finally heating the glass to annealing temperature.

5. The method of making a radio tube envelope having a glass shell closed at one end with a glass disc containing a plurality of lead-in conductors arranged in a circle substantially concentric with said disc and projecting normal to the outer surface of said disc, comprising mounting said lead-in conductors on a support with said disc close to but spaced from said support, placing said shell over said disc, heating the edge of the disc and the contiguous portion of the shell to glass sealing temperature, and admitting cooling air through an opening in said support opposite the central portion of said disc and forcing the air against said central portion and hence radially outward in all directions between the disc and the support and around said conductors, controlling the rate of air flow during and after sealing to prevent cracking strains in the disc and the disc-to-shell seal region as the glass cools to room temperature.

These claims appeared later, under circumstances that will be stated, in the application of Clarence A. Horn for letters patent of invention which was filed in the Canadian Patent Office on August 6, 1942, as No. 494,962. The invention is entitled Method of Making Molded Stems and the defendant is the owner of Horn's rights to it under an assignment from him to Raytheon Production Company and from it to the defendant.

The claims are identical with the claims in United States patent No. 2,296,579, dated September 22, 1942, issued to H. R. Seelen based on his application filed in the United States Patent Office on November 30, 1940, as No. 367,933.

The circumstances under which they came to be included in Horn's application may be stated briefly. Claims 1 and 2 in the Seelen United States application had been copied into the Horn United States application for purposes of interference in the United States and by a letter, received in the Patent and Copyright Office on July 22, 1943, Horn's Canadian patent attorneys requested that these two claims be added to his Canadian application as claims 10 and 11 and this amendment to his application was made accordingly. Thereupon, since the two claims thus added to Horn's application were identical with claims 1 and 2 in Seelen's application, there was conflict between the two applications within the meaning of section 44(1)(*a*) of *The Patent Act* which provides:

44. (1) Conflict between two or more pending applications shall exist

(*a*) when each of them contains one or more claims defining substantially the same invention; or . . .

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And this is so notwithstanding the fact that the applications became conflicting ones by reason of the situation created by Horn's patent attorneys in copying claims 1 and 2 of the Seelen application as stated.

In view of this conflict it was incumbent on the Commissioner of Patents to take the steps prescribed in section 44 of the Act. On August 24, 1943, acting under section 44(3) of the Act, he notified Mr. Seelen and Mr. Horn through their respective patent attorneys that conflict existed between their two applications and transmitted to each a copy of the claims made by the other. In his notification to Horn's patent attorneys he informed them that claims 1 to 5 in the Seelen application, designated as Claims C1 to C5, were readable on the copending application and had been submitted to the other applicant. Thereupon, on September 17, 1943, Horn's patent attorneys added claims C3, C4 and C5 from Seelen's application to Horn's application as claims 12, 13 and 14. Thus claims 10, 11, 12, 13 and 14 in Horn's application were identical with claims 1, 2, 3, 4 and 5 in Seelen's application. These are the claims in conflict. They were directed by the Commissioner to be designated as Claims C1 to C5 and they will hereafter be so referred to.

On November 25, 1943, the Commissioner under section 44(3) of the Act notified the applicants through their respective patent attorneys that action under section 44(5) of the Act was deferred for three months in order to enable the applicants to present arguments under section 44(4). Some arguments were presented, as appears from the correspondence set out in the Patent Office file wrappers filed as Exhibits 1 and 2, but they had no effect and on April 3, 1944, the Commissioner, acting under section 44(5) of the Act notified each of the applicants through their respective patent attorneys that as the claims C1 to C5, having been found allowable over the prior art, appeared in the copending application, each applicant was required to furnish an affidavit as provided for under section 44(5), which provides as follows:

> 44. (5) If the subject matter is found to be patentable and the conflicting claims are retained in the applications, the Commissioner shall require each applicant to file in the Patent Office, in a sealed envelope duly endorsed, within a time specified by him, an affidavit of the record of the invention. The affidavit shall declare:—

(*a*) the date at which the idea of the invention described in the conflicting claims was conceived;

(*b*) the date upon which the first drawing of the invention was made;

(*c*) the date when and the mode in which the first written or verbal disclosure of the invention was made;

(*d*) the dates and nature of the successive steps subsequently taken by the inventor to develop and perfect the said invention from time to time up to the date of the filing of the application for patent.

Pursuant to the Commissioner's requirement each of the applicants filed an affidavit. Mr. Seelen's affidavit was made on July 13, 1944, and was forwarded to the Commissioner on July 18, 1944. He stated, *inter alia,* that he conceived the idea of the invention described in the conflicting claims between the last part of October, 1938, and December 1, 1938, that he wrote a description of the invention on April 13, 1939, that in May, 1939, tubes made by the method of the invention were being made on a production scale and that on October 11, 1939, a standardizing notice was issued describing the procedure. Mr. Horn's affidavit was made on May 25, 1944, and sent to the Commissioner on June 15, 1944. He stated, *inter alia,* that he conceived the idea of the invention on or about December, 1937, that the first drawing of the invention was made on or about December, 1937, and that on or about August, 1938, tubes utilizing the invention were put into commercial production.

The affidavits were opened at the same time, pursuant to section 44(6), on March 12, 1945, by the Commissioner in the presence of the Chief Examiner and the Examiner of Division 18 and, on that date, the Commissioner allowed the claims in conflict to C. A. Horn, assignor to Raytheon Production Corporation, assignor to the defendant, and rejected the conflicting claims in the application of H. R. Seelen, assignor to the plaintiff.

The Commissioner made this decision under section 44(7) of the Act which provides:

44(7) The Commissioner, after examining the facts stated in the affidavits, shall determine which of the applicants is the prior inventor to whom he will allow the claims in conflict and shall forward to each applicant a copy of his decision. A copy of each affidavit shall be transmitted to the several applicants.

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It should be noted that there is no provision in the Act for cross-examination of the applicants on their affidavits, that the applicants are not present or represented when their affidavits are opened, that there is no hearing before the Commissioner and that no opportunity is afforded for argument on the affidavits. The Commissioner does not make an adjudication of the rights of the applicants to the claims on the merits. He bases his decision merely on the priority of the dates alleged in the affidavits.

On March 27, 1945, the Commissioner advised the applicants through their patent attorneys that on the facts stated in the affidavits he would allow the claims in conflict to Horn in his application No. 494,962 and reject the conflicting claims in Seelen's application No. 487,747, unless within two months from March 27, 1945, action was taken under section 44(8) of the Act.

It is now important to set out the provisions of this section. It reads as follows:

> 44(8) The claims in conflict shall be rejected or allowed accordingly unless within a time to be fixed by the Commissioner and notified to the several applicants one of them commences proceedings in the Exchequer Court of Canada for the determination of their respective rights, in which event the Commissioner shall suspend further action on the applications in conflict until in such action it has been determined either
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> (i) that there is in fact no conflict between the claims in question, or
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> (ii) that none of the applicants is entitled to the issue of a patent containing the claims in conflict as applied for by him, or
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> (iii) that a patent or patents, including substitute claims approved by the Court, may issue to one or more of the applicants, or
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> (iv) that one of the applicants is entitled as against the others to the issue of a patent including the claims in conflict as applied for by him.

On May 15, 1945, the Commissioner extended the time within which action might be taken to July 27, 1945, and on July 23, 1945, he extended the time further to August 27, 1945.

The plaintiff then commenced its action in this Court on August 27, 1945. The effect of the action is that the Commissioner suspends further action on the applications in conflict until the determination of the Court has been made. The issue of patents awaits the decision of the Court.

As I see it there are two issues in the action. The first is raised for the plaintiff and the second for the defendant.

It is contended for the plaintiff that the defendant is not entitled to any of the claims in conflict on the ground that the disclosures in Horn's application do not support them and that the Court ought, therefore, to determine the respective rights of the parties to the claims against the defendant and order that the plaintiff is entitled to the issue of a patent containing them.

The second issue is propounded on behalf of the defendant. It is contended that if the Court should determine that the defendant is not entitled to the claims in conflict for the reason stated it should also determine that the plaintiff is not entitled to them on the ground that Seelen was not the first inventor of the invention defined by them but that Horn was, even although he did not make the requisite disclosures to entitle him to them.

On the second day of the trial it was argued for the plaintiff that it was not open to counsel for the defendant on the pleadings to adduce evidence in support of his contention on the second issue but I gave leave to amend the statement of defence to enable him to do so, if he saw fit. Since then I have reviewed the pleadings carefully and am of the opinion that the statement of defence did permit the leading of the desired evidence and that leave to amend it was not necessary.

It is, of course, clear that if the Court determines the first issue in favor of the defendant that is the end of the matter and the second issue need not be considered. It falls to be determined only in the event that the Court determines the first issue against the defendant.

It is also clear that a patent would have issued to the plaintiff as assignee of H. R. Seelen containing the claims 1, 2, 3, 4 and 5 as made by him, if Horn's patent attorneys had not copied claims 1 and 2 into his application in the manner described and thus, in a sense, created the situation that made the applications conflicting applications within the meaning of section 44(1)(*a*), so that the Commissioner had to act as section 44 required him to do in the circumstances. That this is so is demonstrated beyond dispute by reference to the Patent Office file wrapper relating to the Seelen application, filed as Exhibit 1, in which it appears that on April 13, 1943, the Commissioner informed Seelen's patent attorney that his application for patent had been

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examined and allowed and that a patent would issue. It was only after the possible conflict with the Horn copending application that this allowance was cancelled on July 27, 1943.

It follows from what I have said that if the Court determines the two issues against the defendant it should determine as between the parties that the plaintiff is entitled to the issue of a patent containing the claims in conflict.

Evidence for the plaintiff was given by Mr. George M. Rose, the manager of the plaintiff's advance development group at Harrison, New Jersey, Mr. Harry R. Seelen, the inventor referred to in one of the conflicting applications, who, at the time of his invention, was in charge of the plaintiff's development shop operation, and Mr. Kenneth M. McLaughlin, who was charged with obtaining equipment and supplies under Mr. Seelen's direction. The witnesses called for the defendant were Mr. Norman B. Krim, the president and manager of the defendant's receiving and cathode ray division, Mr. James Kyle, the defendant's foreman in charge of the maintenance and construction of equipment, who worked under the direction of Mr. Charles A. Horn, the inventor referred to in the other conflicting application, Mr. F. Edward Anderson, the defendant's distribution and sales manager, Mr. Homer G. Anderson, a former employee of the defendant chiefly concerned with the evacuation of radio tubes, and Mr. Jesse B. Shapiro, the defendant's divisional glass engineer of its commercial radio tube division.

The trial of the action lasted 27 days and the various facets of the issues involved in it were carefully examined. Since the first issue is largely concerned with the construction of the specification in Horn's application and the second is basically an issue of fact it is not necessary to review the evidence in detail.

The inventions made by Horn and Seelen were both related to the making of miniature glass radio receiving tubes on a mass production scale. Conventional glass tubes of various types and sizes and also metal tubes were on the market but there was a demand for miniature glass tubes that would be efficient and could be economically produced, but their manufacture on a mass production basis presented special problems. How Horn and Seelen envisaged

these problems and the objects they sought to accomplish in the course of their solution will appear in their respective applications.

The various parts of the miniature glass radio receiving tubes with which Horn and Seelen were concerned and the parts of the sealing-in machines they used are described in their respective specifications and illustrated in the drawings accompanying them, but there is no uniformity in the use of terms to describe them. Basically, the two parts of the tube are a glass stem and a glass bulb. The stem is also called a header, a wafer, a disc, or disk in Horn's specification, a button or a bottom. The bulb is also called a shell or envelope, but in Seelen's specification envelope means a bulb with a stem in it. When the stem is made wires or pins or rods, arranged in a circle, called the pin ring, are sealed into the glass. The upper end of these are connected with the electrical parts of the tube, called in their total the mount assembly or mount, whereas the lower ones serve as contact members for insertion into a socket or the prongs of a base. The lower ends are called lead-in pins but they are also referred to as lead-in rods or lead-in conductors. Glass is built up around the wires where they go through the stem and these additions are known as fillets or bosses. The Horn stem is fitted with an exhaust tube extending from its lower side whereas the exhaust tube in the Seelen invention is at the top of the bulb. The glass bulb may be cut or uncut. When an uncut bulb is used, as in the case of the Horn process, it is necessary to separate the lower part, called the cullet or skirt, from the upper when the bulb is joined to the edge of the stem in the course of the sealing-in process. This process is done on an automatic sealing-in machine, either an 8 head Eisler machine or a 16 head Sealex machine. The sealing-in head of such machine consists of a spindle which rotates, called a rotatable member in the Horn application, on which there is placed a spindle chuck, generally called a mount pin, but also referred to as a sealing pin or mount block. In addition, there are devices for holding the stem and bulb in position after they have been loaded on the mount pin and during the sealing-in operation, such as a collet, or clamping jaws. I should, perhaps, note here that the Court had the advantage, during the trial, of seeing, in the Court-room,

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a moving picture of a Sealex machine in operation showing the manner in which flames play on the bulb as the rotating sealing-in head moves in a circular manner from one position on the machine to the next. The sealing-in process will be referred to later when the respective specifications of the two inventors are examined. But it may be mentioned here that, after the bulb and stem are joined as the result of the play of the flames on the bulb, there is a shaping of the join. In the Horn sealing-in process this is done by an operation known as pull-down whereas in the process adopted by Seelen the shaping is by air blown in from the top of the bulb.

Before I deal with the first issue certain observations should be made. It is a cardinal principle of patent law that an inventor may not validly claim what he has not described. In the patent law jargon it is said that the disclosures of the specification must support the claims. If they do not, the claims are invalid. Moreover, there is a statutory duty of disclosure and description that must be complied with if a claim for an invention is to stand. Section 35 of *The Patent Act*, 1935, provides, in part:

> 35. (1) The applicant shall in the specification correctly and fully describe the invention and its operation or use as contemplated by the inventor, and set forth clearly the various steps in a process, or the method of constructing, making, compounding or using a machine, manufacture or composition of matter, in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most closely connected, to make, construct, compound or use it. In the case of a machine he shall explain the principle thereof and the best mode in which he has contemplated the application of that principle. In the case of a process he shall explain the necessary sequence, if any, of the various steps, so as to distinguish the invention from other inventions. He shall particularly indicate and distinctly claim the part, improvement or combination which he claims as his invention.
>
> (2) The specification shall end with a claim or claims stating distinctly and in explicit terms the things or combinations which the applicant regards as new and in which he claims an exclusive property or privilege.

In *Minerals Separation North American Corporation v. Noranda Mines Limited*[1] I had occasion to consider the duties of disclosure required of an inventor in consideration of the grant of a valid monopoly in respect of his invention. At page 316, I said:

> Two things must be described in the disclosures of a specification, one being the invention, and the other the operation or use of the invention as

[1] [1947] Ex. C.R. 306.

contemplated by the inventor, and with respect to each the description must be correct and full. The purpose underlying this requirement is that when the period of monopoly has expired the public will be able, having only the specification, to make the same successful use of the invention as the inventor could at the time of his application. The description must be correct; this means that it must be both clear and accurate. It must be free from avoidable obscurity or ambiguity and be as simple and distinct as the difficulty of description permits. It must not contain erroneous or misleading statements calculated to deceive or mislead the persons to whom the specification is addressed and render it difficult for them without trial and experiment to comprehend in what manner the invention is to be performed. It must not, for example, direct the use of alternative methods of putting it into effect if only one is practicable, even if persons skilled in the art would be likely to choose the practical method. The description of the invention must also be full; this means that its ambit must be defined, for nothing that has not been described may be validly claimed. The description must also give all information that is necessary for successful operation or use of the invention, without leaving such result to the chance of successful experiment, and if warnings are required in order to avert failure such warnings must be given. Moreover, the inventor must act *uberrima fide* and give all information known to him that will enable the invention to be carried out to its best effect as contemplated by him.

and I cited the cases from which this statement was abstracted. The statutory requirement then in effect was section 14 of *The Patent Act,* Statutes of Canada, 1923, Chapter 23, and I made the statement that it merely puts the requirements of the law, as laid down in the cases, into statutory form. While my judgment in the *Minerals Separation* case (*supra*) was reversed, the statement I have cited has not been challenged. And it is applicable in a case to which section 35 of *The Patent Act,* 1935, applies: *vide Di Fiore v. Tardi*[1]. The onus of disclosure that the section places on an inventor is a heavy and exacting one.

It is contended for the plaintiff that Horn did not discharge this onus in respect of the claims in conflict and could not validly make them and, consequently, that the defendant is not entitled to them. This is the first issue in the case. In order to determine it the disclosure portion of Horn's application, which I shall refer to as the specification or the Horn specification, must be carefully examined.

While Horn says in his specification that he has invented certain "new and useful improvements in Method of Making Molded Stems" it discloses more than that. It is really in three sections, one dealing with a novel stem,

[1] [1952] Ex. C.R. 149 at 154.

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another with the method of making it and the third with a sealing-in process in which it is used. It should be noted that the application with which we are concerned in this action is a division of an original application, filed on January 11, 1940 as No. 470,184.

The specification shows that Horn was concerned with the problem of producing glass radio receiving tubes with envelopes in which the stem serves as the tube base itself, and which carries lead-in conductors which also serve as the external contact pins and that difficulties have been encountered in constructing a stem which could readily be sealed to the envelope. He then sets out the objects of the invention, namely, to devise a stem of the type stated which can be sealed to an envelope in a simple, inexpensive and reliable manner, to devise such a stem which is inexpensive to manufacture and to devise a novel method of making such a stem.

After a description of the component parts of a tube reference is made to certain difficulties and requirements if it is to be commercially successful. One of these is that, since the lead-in rods serve as the external contact members for the tube, they must be kept parallel and maintained accurately in their predetermined circular relationship in order that the tubes may fit interchangeably in standard sockets provided therefor. Then it is stated that the glass of the stem must not extend too far up or down along the lead-in rods. And it is pointed out that another requirement is that the stem may be easily sealed to the envelope by the usual type of sealing-in machine. A further requirement is also stated, namely, that during the sealing-in process the main body of the stem carrying the lead-in rods shall not be subjected to any distortion which might tend to upset the requisite positional accuracy of the lead-in rods. Thus four essential requirements are specified. Then there is the following statement "Stems made in accordance with my present invention satisfy each of these requirements, and produce a tube which satisfies all of the objects of my invention as stated above."

The specification then describes the novel stem in detail. It consists of a substantially flat "disk" of glass having a central thickened portion into which the lead-in rods are sealed. It is stated that this thickened portion must have

certain characteristics. It must be sufficiently strong to withstand atmospheric pressure exerted on its lower flat surface upon completion of the tube. It must also be thick enough to support the lead-in rods firmly and definitely without cracking. And it must be sufficiently massive so that during the sealing of the stem to the envelope it is not heated sufficiently to soften to any appreciable extent. Dimensions of this thickness are then given. But the novelty of the stem consists in a special feature, namely, that surrounding the thickened portion of the stem there is a thinned edge. The characteristics of this thinned edge are specified. The top is preferably disposed in the same plane as the top of the thickened portion. But it must have a thickness sufficiently less than that of the central portion so that during the sealing-in process it can soften sufficiently to seal readily to the glass envelope without producing any appreciable softening of the central portion. The thickness of the thinned edge may conveniently be made about half the thickness of the thickened portion. Then reference is made to upper and lower bosses around each lead-in rod.

The specification then describes certain essential features of the machine for molding the novel stem, such as its upper and lower molds, and the method of operation of the stem-making machine. During the molding operation the exhaust tube, the lower end of which has been softened by the application of a gas flame thereto, is brought into contact with the central portion of the plastic mass so as to be sealed thereto. After the completed stem has been permitted to cool it is removed from the machine. I need not make any further reference to the method of making the novel stem, for in these proceedings we are not concerned with it.

I now come to what may be called the third section of the specification, namely, that which relates to the sealing-in process in which the novel stem with its thinned edge, or thin lip, is used. This must be carefully considered for all the claims in conflict may be described generally as sealing-in claims.

Before the sealing-in process is dealt with in the specification there is a description of the parts that are used in the process. In the first place the mount is assembled on the lead-in rods of the stem. It is disclosed that a sealing

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machine is used for the sealing-in process but the kind of machine, whether Eisler or Sealex, is not specified. But one part of the machine, namely, the sealing-in head, is described. This includes a rotatable member provided with a central bore through which air may be blown. This rotatable member carries a mount block at its upper end, which is also provided with a central bore communicating with the bore of the rotatable member. The mount block is provided with a series of holes adapted to receive the pins of the stem. There is a series of lugs on the mount block, one between each two holes, and they are spaced sufficiently far apart so that the lower bosses of the stem may be received between each pair of lugs. Every other lug is made shorter than the adjacent one so that, when the stem is supported upon the mount block and air is blown through the bore, passages are left so that air may flow freely over the bottom face of the stem for a purpose described later. The mount block is provided at its lower portion with an annular shoulder above which there are bores passing from the central bore to the exterior of the mount block. The lower portion of the rotatable member is provided with a pair of clutch jaws and a tapered sleeve surrounds the rotatable member and is adapted when moved downwardly to force the clamping jaws inwardly.

The sealing-in process is then described. The stem carrying the mount is inserted on the sealing-in head by inserting the exhaust tube into the central bore. The lead-in rods are received into the holes of the mount block and the bottom of the lower bosses of the stem rest upon the face of the mount block between the lugs. The glass envelope is then applied over the stem and mount. It is conveniently positioned by resting against a pair of standards formed as part of the mount. The sealing-in then proceeds by stated steps. Heat is applied by means of suitable glass flames adjacent the thinned edge of the stem which brings about a softening of the glass at this point, causing a constriction towards the stem until contact is made with the thinned edge and fusion of the wall of the envelope and the thinned edge occurs. The sealing head is then moved to another position on the sealing machine where the gas flames are directed to a point slightly below the thinned edge, the heat produced being sufficient to cause a melting of the glass so

that the weight of the lower skirt of the glass envelope tends to cause a separation at the thinned edge. At this stage air is blown up through the bore in order to assist the separation. The previous softening of the glass has caused sufficient constriction so as to contact the annular shoulder thus producing a closed pocket between the annular shoulder and the stem. The air coming up through the central bore and the bores above the annular shoulder causes an air pressure within the pocket which bursts the plastic glass bubble and produces the desired separation at the thinned edge. This, in the language of the art, is called cutting off the cullet. Then the gas flames are continued for a short time around the thinned edge so as to produce a uniform rounding of the glass at the sealing-in point. Then the next stage takes place. The sealing-in head moves out of the region of the gas flames and air is continued to be blown through the bore for a short period. This air passes up through the central bore and out through the spaces left by the short lugs on the mount block as well as other intervening spaces between the stem and the mount block. It is clear that this air, which is relatively cool, continues to cool the body of the stem up to and during what is called the pull-down operation—but not afterwards.

The pull-down operation is described in detail. The clamping jaws move inwardly and engage the envelope while the tapered sleeve is moved downwardly to force the clutch jaws into clamping engagement with the exhaust tube. Then relative motion is produced between the clutch arms and the rotatable member so that the stem is pulled down with respect to the envelope. This pull-down produces the requisite working and rounding of the glass at the sealing-in point. The envelope is now ready for exhaustion which takes place through an exhaust tube after which the exhaust tube is sealed off.

Two things are clear. One is that while air is blown against the body of the stem up to and during the pull-down operation air is not blown afterwards. It is specifically stated that the pull-down operation is *subsequent* to the air blowing operation. Moreover, it is stated that after the pull-down operation the tube is ready for exhaustion. That means that immediately after the pull-down operation the

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tube is taken off the sealing machine and put on an exhaust machine. The other thing that is clear is the purpose of blowing air against the stem during the period after the sealing-in head moves out of the region of the gas flames and up to the completion of the pull-down operation. This is to cool the body of the stem so as to insure that it is solid and rigid "during the subsequent pull-down operation". The purpose of maintaining a rigid body is emphasized in the statement that due to the fact that the main body of the stem is rigid and the lead-in rods are firmly received in the holes of the mount block no distortion of the stem or dislocation of the lead-in rods takes place during the pull-down. Thus distortion of the stem and dislocation of the lead-in rods which might happen during the pull-down is prevented by two means, one being the blowing of air against the stem during the period mentioned to make it solid and rigid and the other the fitting of the lead-in rods tightly into the holes of the mount block.

The remainder of the specification is important. It contains the statement "I have found that tubes made in accordance with my invention produce satisfactory seals which have very little tendency to crack at the sealing-in point". Then it is stated that this is due partly to various aspects of the invention involving the thickened central portion and thinned edge of the stem. There is no specific reference to any other cause. Then Horn says that he has found that, if the internal surface of the envelope is kept free of all sharp bends and a smooth and rounded contour preserved, substantially all tendency to crack at this point will be eliminated. He attributes this to the use of his novel stem with the thinned edge. He says that by forming the stem with the thinned edge in the same plane as the upper surface of the stem the elimination of sharp bends and the preservation of a smooth contour is readily obtained. He then explains why this is so, namely, that, due to the particular construction which he has described, when the thinned edge is made plastic during the sealing-in process, the wall of the envelope will fuse to the thinned edge and form a continuation thereof, that during the pull-down operation the thinned edge will have some slight tendency to be bent upwardly, thus producing a smooth transition curve from the thinned edge to the interior walls

of the envelope, and that, since the thinned edge is originally formed as a continuation of the upper surface of the stem, this smooth transition will be carried down without any break or interruption onto the upper surface of the stem. He then says that even if the thinned edge were not formed in this way, the requisite sealing might still be accomplished with proper precautions and considerable advantage still obtained from the thinned edge irrespective of its relationship with respect to either surface of stem.

The specification concludes with the admonition that the invention is not limited to the particular details described as many equivalents will suggest themselves to those skilled in the art and he gives one example, namely, that it may be desired to utilize the invention in tubes having the conventional base with additional contacting prongs.

It is, in my opinion, beyond dispute that Horn considered that his invention consisted of his novel stem with its thickened central portion and its thinned edge. He thought that a stem of this kind satisfied each of the requirements that had to be met if a tube was to be commercially successful. And it seems clear that by the term "my invention" in his statement "I have found that tubes made in accordance with my invention produce satisfactory seals which have very little tendency to crack at the sealing-in point", he meant his novel stem with the thinned edge. He points out that the production of satisfactory seals which have very little tendency to crack at the sealing-in point is due partly to various aspects of the invention pointed out above involving the thickened portion and thinned edge of the stem and does not specifically mention any other cause to which it is due, except that he has found that if the internal surface of the envelope adjacent the sealing-in point is kept free of all sharp bends and a smooth and rounded contour preserved substantially all tendency to crack at this point will be eliminated. And it seems plain to me that he attributes the substantial elimination of all tendency to crack at this point to the fact that the elimination of sharp bends and the preservation of a smooth contour is readily obtained by forming the stem with the thinned edge in the same plane as the upper surface of the stem because of the fact that when the thinned edge is made plastic during the sealing-in process the walls of the envelope will fuse to it

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and during the pull-down operation the thinned edge will tend to bend upwardly and form a smooth transition curve from the thinned edge to the interior walls of the envelope. It would not, in my opinion, be unfair to say that Horn considered that his contribution to the art consisted of his invention of his novel stem and his method of making it and using it in a sealing-in process.

Counsel for the defendant conceded that at the date of his application Horn thought that this was his invention but submitted that what the Court is concerned with in dealing with the first issue is not what Horn thought his invention was but what the disclosures in his specification show it to be. There is merit in this submission but while I say this I do not mean that Horn's view of his invention as disclosed in the specification is to be disregarded.

Counsel argued that the Horn specification discloses invention beyond that of the novel stem and the method of making it, namely, the blowing of air through the bore for a short period, as stated in the specification. With that contention I agree but, in my opinion, the invention so disclosed is subject to the limitations disclosed, namely, that the air blowing is for the short period from the time that the sealing-in head moves out of the region of the gas flames and up to and during the pull-down operation, but not afterwards, and that the air-blowing is done so that the air cools the body of the stem so as to insure that it is solid and rigid during the pull-down operation thus preventing any distortion of the main body of the stem and dislocation of the lead-in rods during the pull-down operation. Thus, in my opinion, it would be fair to say that the invention disclosed by the Horn specification so far as it relates to a sealing-in process consists in the use of his novel stem with its thickened central portion and its thinned edge, or thin lip, and the blowing of air through the central bore of the sealing-in head for the period and purpose stated.

There is one further comment. It was suggested by counsel for the plaintiff that the claims in conflict contain words or expressions whose meaning may be determined by reference to the Seelen application in which they first appeared in it before they were imported into the Horn application by Horn's patent attorneys. In my view, it is

not permissible in the determination of the first issue to resort to the Seelen application in order to ascertain the meaning of the claims in conflict. They are now claims in the Horn application and the issue whether the defendant is entitled to them depends on whether the disclosures in the Horn specification support them. The specification in the Seelen application may not be used as a dictionary for the purpose of ascertaining the meaning of the claims in conflict *vis-a-vis* the Horn application. Only the Horn specification may be used for that purpose and, of course, only to the extent that resort may be had to the disclosures in the specification to ascertain the meaning of the terms in the claims.

I now come to the claims in conflict and do not hesitate to say that, in my opinion, the disclosures in the Horn specification do not support them and, consequently, the defendant is not entitled to them.

There are several reasons for this conclusion. The thinned edge, or thin lip, of the novel stem which Horn devised and found so essential to the production of satisfactory seals with very little tendency to crack at the sealing-in point is not mentioned in any of the claims in conflict. In my opinion, that makes the invention defined in the claims different from and wider than the invention disclosed in the specification. It is, I think, consistent with principle to say that when a specification discloses the invention of a process for the manufacture of an article in which the use of a special feature of the invention is essential to the success of the invented process the inventor is not entitled to claim a process for the manufacture of the article in which the special feature is not used. He is not entitled to claim a monopoly more extensive than is necessary to protect that which he has invented. There is authority for this statement in *The Mullard Radio Valve Co., Ld. v. Philco Radio and Television Corporation of Great Britain, Ld. et al*[1]. In that case two claims were under consideration in respect of an invention for "Improvements in or relating to circuit arrangements and discharge tubes for amplifying electric oscillations". Claim 1 read as follows:

> A circuit arrangement for amplifying electric oscillations by means of one or more thermionic discharge tubes connected in series or cascade, characterised in that the discharge tube of the last stage of amplification

[1] (1936) 53 R.P.C. 323.

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comprises a screening grid kept at a constant high potential between the control grid and the anode and that such discharge tube is so arranged by the introduction of an auxiliary grid kept at a constant and relatively low potential that, when the anode potential falls below the potential of the screening grid, the increase of the screening grid current at the expense of the anode current will be substantially avoided.

This claim was held to be valid. Lord Macmillan said of it, at page 343:

> Claim 1 describes with precision the special feature of the circuit arrangement claimed—namely that the discharge tube of the last stage of amplification in the circuit shall have an auxiliary grid, kept at a constant and relatively low potential, interposed between a screening grid, kept at a constant high potential, and the anode, the control grid being on the further side of the screening grid from the anode. Starting with the anode, the order of arrangement in the discharge tube is to be as follows: (1) anode, (2) auxiliary grid or "suppressor grid", kept at a constant and relatively low potential, (3) screening grid kept at a constant high potential, (4) control-grid, (5) cathode. The three grids may physically be identical as pieces of meshed metal, but it is of the essence of the claim that they should have characteristic potentials imparted to them which give them their functional importance in relation to the anode current. The auxiliary grid or "suppressor" is to have a potential "constant and relative low"; the screening grid is to have a "constant high potential"; the potential of the control grid, being the grid which receives the oscillations communicated from the outside by the aerial, naturally varies.

Later, he stated, at page 345:

> The Patentee has told us quite definitely that his invention deals with the case of a final amplifier which comprises a screening grid between the control grid and the anode and that he has invented means by which, in such a case, the screening grid current is prevented entirely or partially from increasing at the expense of the anode current when the anode potential falls. The problem which he set out to solve and the disadvantages which he professes to overcome relate solely to discharge tubes with a screening grid between the control grid and the anode. His discovery was that, if in a discharge tube with a screening grid between the control grid and the anode he inserted between the screening grid and the anode an additional "suppressor" grid, he achieved the advantageous results which he describes. That is the ambit of his invention and for that he is entitled to protection.

But claim 2 in the case was different. It read:

> A discharge tube having at least three auxiliary electrodes between the cathode and the anode characterised in that the auxiliary electrode nearest to the anode is directly connected to the cathode so as to be maintained continuously at the cathode potential.

This claim was held to be invalid. Lord Macmillan said of this claim, at page 345, immediately after the passage cited above:

> But claim 2 makes no reference to screening grids or control grids at all. It simply speaks of three or more electrodes irrespective of their function as screening grids or control grids or suppressor grids or of their arrangement relatively to each other. Now it is quite true that, regarded simply as pieces of meshed metal, a screening grid, a control grid and a suppressor grid may be indistinguishable, and that a grid may serve as a screening grid, a control grid or a suppressor grid according to the potential communicated to it. But if that is so, then the three or more electrodes which the discharge tube claimed is to contain may be so used that the grid used as a screening grid is not between the grid used as the control grid and the anode. In a discharge tube in which the electrodes are so used the connecting of the grid nearest to the anode with the cathode will not achieve the object of the invention, which has solely to do with discharge tubes which comprise means for preventing the screening grid current "entirely or partially from increasing at the expense of the anode current when the anode potential falls". This will not be achieved unless the suppressor grid is placed between the screening grid and the anode.

Thus, the special feature of the invention was, to put it briefly, the placing of the suppressor grid between the screening grid and the anode and the inventor was not entitled to claim an invention in which that was not done. Lord Macmillan put the principle of the case as follows, at page 347:

> If an inventor claims an article as his invention but the article will only achieve his avowed object in a particular juxtaposition and his inventive idea consists in the discovery that in that particular juxtaposition it will give new and useful results, I do not think that he is entitled to claim the article at large apart from the juxtaposition which is essential to the achievement of those results.

In my view, this principle applies, *mutatis mutandis* in the present case. If the "very little tendency to crack at the sealing-in point" of the tubes made in accordance with Horn's invention is due to the advantages of the use of his novel stem with the thinned edge in his sealing-in process, as his specification discloses to be the case, he is plainly not entitled to claim a process for the making of tubes in which his novel stem with the thinned edge is not used.

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I may also refer to the case of *In re an Application for a Patent by Hubert Alexander Gill*[1] in support of the principle which I have stated.

But, quite apart from any decisions on the subject, it seems plain to me that in respect of the claims in conflict *vis-a-vis* the Horn application, the requirements of section 35 of *The Patent Act,* 1935 have not been met and they are, therefore, not properly included in it.

My finding on this aspect of the issue follows from my finding of the essence of Horn's invention. If his own opinion is to stand there can be no doubt that he considered that his invention consisted of his novel stem with its thinned edge and his method of making it, in which case the claims in conflict assert a wholly different invention for which there is no support in his specification. And likewise, if Horn's invention as disclosed is not confined to his novel stem and his method of making it but includes the blowing of air that he discloses and describes, as I have found, the claims in conflict are for inventions different from and wider than such invention. Here resort must be had to the disclosures of the specification. Horn said in his specification "I have found that tubes made in accordance with my invention produce satisfactory seals which have very little tendency to crack at the sealing-in point". He then says that this is due partly to various aspects of the invention involving the thickened central portion and thinned edge of his novel stem and does not specifically state any other cause for the satisfactory result. If it is conceded, notwithstanding his lack of statement of it, as I have done, that the blowing of air which he discloses is a contributing factor to the production of "satisfactory seals which have very little tendencey to crack at the sealing-in point", the disclosures reveal that certain specific results, making in their total for satisfactory seals, are attributable to the several features of the invention. What the blowing of air does, according to the disclosures, is to cool the body of the stem, which is its thickened central portion, to insure that it is solid and rigid during the pull-down operation. But this is only a contributing factor to the rigidity of the stem during the pull-down, the other factor being that the

[1] (1937) 54 R.P.C. 119.

lead-in rods are firmly received in the holes in the mount block. These two factors insure that there is no distortion of the stem and no dislocation of the lead-in rods during the pull-down. That is the only reference in the disclosures of the specification to the effect of the air blowing on the production of satisfactory seals. But "the very little tendency to crack at the sealing-in point" is attributable, according to the disclosures, to the use of the novel stem with the thinned edge or thin lip in Horn's sealing-in process. Of this, there is no doubt. For the specification states, as I have pointed out, that all tendency to crack at the sealing-in point will be eliminated if the internal surface of the envelope adjacent the sealing-in point is kept free of all sharp bends and a smooth and rounded contour preserved. The achievement of this purpose is accomplished by forming the stem with the thinned edge in the same plane as the upper surface of the stem, because, when the thinned edge is made plastic during the sealing-in process, the wall of the envelope will fuse to the thinned edge and form a continuation of it and during the pull-down operation, while the thinned edge is still plastic, it will be bent upwardly so that there will be a smooth transitional curve from the thinned edge to the interior walls of the envelope. Thus it may fairly be said, according to the disclosures in the specification, that the blowing of air is one of the factors responsible for keeping the body of the stem solid and rigid during the pull-down operation and that the use of the novel stem with its thinned edge is responsible for the fact that the seals have very little tendency to crack at the sealing-in point. In other words, "the very little tendency to crack at the sealing-in point" is due to the avoidance of discontinuities of the glass in the seal region which the use of the novel stem with the thinned lip in Horn's sealing-in process has been able to accomplish.

Under the circumstances, it would be quite improper to allow Horn a monopoly for a method of making tubes in which his novel stem with its thinned edge is not used but other features, such as those stated in the claims in conflict, and not disclosed in the specification, are employed. In my view, the claims in conflict are wider than the disclosures warrant and are improperly included in Horn's application.

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This, in my opinion, warrants the determination of the first issue against the defendant but, in view of the arguments of counsel, I proceed to consideration of the claims in conflict individually.

While the Commissioner awarded the five claims to Horn it was conceded in the pleadings that the disclosures in his specification do not support Claim C3 and, consequently, the defendant is not entitled to it. During the course of the trial counsel for the defendant made a similar concession with regard to Claim C4. Thus, the first issue is confined to whether the disclosures in Horn's specification support Claims C1, C2 and C5.

The argument about Claim C1 centred around the concluding limitation in it, namely, "and artifically cooling the central portion of the disk to control the strains in the disk and in the seal region at said rim". The main support for the claim with this limitation was found by counsel for the defendant in Horn's statement in his specification "I have found that tubes made in accordance with my invention produce satisfactory seals which have very little tendency to crack at the sealing-in point". It was submitted that at the date of the specification it was considered by persons skilled in the art that all strains in glass were bad and should be minimized, that there was a definite relationship between the existence of strains in glass and tendency to crack, so that if tubes were produced with very little tendency to crack this meant that they were produced with very few strains in them and that, consequently, the strains, to that extent, had been controlled. And it was urged that whether the claim read "artificially cooling the central portion of the disk to produce seals having very little tendency to crack at the sealing-in point" or "artificially cooling the central portion of the disk to control the strains in the disk and in the seal region at said rim" made no difference, since both meant the same thing. The basic submission was that the concluding words of Claim C1 "to control the strains in the disk and the seal region at said rim" had the same meaning as if they had read "to produce satisfactory seals having very little tendency to crack at the sealing-in point." As counsel for the defendant put it, the claim must be read in the light of the knowledge that a person skilled in the art would have had at the date of the specification,

that to such a person all strains in glass were to be avoided and that to such a person the lack of tendency of a tube to crack and the absence of strains in it were merely two sides of the same medal. It was, therefore, submitted that Claim C1 was properly included in the application.

I cannot accept this submission. The Horn specification does not refer to strains in glass or show the need for controlling them or disclose how they are to be controlled. It does not direct that there should be any artificial cooling of the central portion of the stem to control strains in the stem or in the seal region. Indeed, the air blowing referred to in the specification is for a different purpose. Air is blown up through the bore of the mount block twice. The first time it is for the purpose of causing air pressure in the closed pocket between the stem and the annular shoulder after the envelope has become constricted and assisting in cutting off the cullet. With this we are not concerned. The second blowing of air is for a short period between the time that the sealing-in head moves out of the region of the gas flames and the completion of the pull-down operation, but not afterwards. The purpose of this air blowing is specified, namely, so that it cools the body of the stem so as to insure that it is solid and rigid during the subsequent pull-down operation, which, it is said, prevents any distortion of the main body of the stem and dislocation of the lead-in rods during the pull-down. This is to meet one of the requirements for a commercially successful tube mentioned in the specification, namely, that during the sealing-in process the main body of the stem carrying the lead-in rods shall not be subjected to any distortion which might tend to upset the requisite positional accuracy of the lead-in rods. The air is blown to keep the body of the stem solid and rigid during the pulldown operation and prevent the distortion referred to. There is no mention of air blowing for the purpose of having any effect on the seal region. Nor can it be agreed that a person skilled in the art at the date of the specification would know from the specification how the artificial cooling referred to in the claim is to be done in order that the desired control of strains, implying thereby their disposition and regulation, should be effected. In order to entitle Horn to Claim C1 he should have set out, in such full, clear and exact terms

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as would enable a person skilled in the art to use the method, a direction that there should be an artificial cooling of the central portion of the stem in such a way as to control the strains in it and in the seal region at the rim of the stem and how it should be done. In my opinion, he has not done so. Indeed, there is a complete absence of any direction for the control of strains. The reader of the specification would be at a loss to know what the claim meant.

Moreover, if the suggestion is that the artificial cooling of the central portion of the disk to control the strains in the disk and in the seal region at said rim is a method of producing seals with very little tendency to crack at the sealing-in point there is no foundation in the disclosures for it and it runs counter to the means disclosed in the specification for producing such seals.

I next come to Claim C2. The argument about this claim related to two limitations in it, one being "blowing air at room temperature against the center of the disk" and the other "and continuing the air blowing after the seal is made". It is obvious, of course, that with a stem of the kind invented by Horn it would be impossible to blow air against its geometric centre for it is taken up with the exhaust tube which is inserted in the central bore through which the air is blown. Counsel for the defendant urged that to any one skilled in the art "centre of the disk" would mean more than its geometric centre and would be equivalent to "central portion of the disk". But it is significant that in the specification the term "central portion" is used more than once and it appears in Claim C1 and there is no explanation for the change of terminology. But while I do not reject the objection to the claim I would not hold it inappropriate for inclusion in Horn's application solely on the ground to which objection is taken.

The real controversy about claim C2 related to the expression "continuing the air blowing after the seal is made". Most of the argument concerned the meaning of the word "seal". It was urged for the plaintiff that the word "seal" is a term of art and that a seal is not made until the stem and the envelope have been joined in the course of the sealing-in process and the envelope has been shaped, whether by a pull-down operation or otherwise. On the other hand, counsel for the defendant submitted that in the

specification it appears that the seal is made before the pull-down operation and that since air is blown up to pull-down it is blown after the seal is made. The evidence of Mr. Rose as to the meaning of the term in the jargon of the art supports in general the meaning urged for the plaintiff, but in his examination in chief he was not himself consistent in his use of it. Sometimes he used it as being synonymous with "join" and sometimes as meaning "join and shape". He was not able to refer to any documents supporting his view that a "seal" is not made until after there is a shaping of the bulb after it has been joined to the stem. Mr. Rose was subjected to searching cross-examination on the subject in the course of which it appeared that in the art the making of a seal involves the whole sealing operation. This, according to Mr. Rose, is the general usage but the term is sometimes used in a restrictive sense as being synonymous with "join". The upshot of his evidence was that the meaning of the term "seal" would be indicated by its context and that a person skilled in the art would gather from its context the sense in which it is used. It follows that since the term, being a term of art, is used in more than one sense resort may be had to the specification to determine the sense in which the inventor used it. But here there is a difference of use. For example, in claim 1 of the Horn application the forming of a seal includes a pull-down operation but counsel for the defendant rightly pointed out that forming a seal is not necessarily the same thing as making one but may include an operation after the seal is made. But counsel's main argument was that a distinction is drawn in the specification between the sealing-in process and the pull-down operation and it is stated that the latter is subsequent to the former. But I am not at all satisfied that the pull-down operation is not part of the making of the seal. It is pointed out that when the thinned edge of the stem is made plastic during the sealing-in process the wall of the envelope will fuse to the thinned edge but it remains plastic during the pull-down operation. Thus it seems to me that the seal is not finally made until after the pull-down operation is completed and the thinned edge is bent upwardly and produces a smooth transition curve from the thinned edge to the interior walls of the envelope and so avoids discontinuities in the glass at the seal region.

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But even if it should be conceded that the seal is made before the pull-down operation it does not follow that Horn would be entitled to a monopoly of "continuing the air blowing after the seal is made". There is no warrant in the specification for such a claim. He has specified that his air blowing is for a short period and he has defined the period as being from the time when the sealing-in head moves out of the region of the gas flames until the pull-down operation. After that operation the envelope is ready for exhaustion. This indicates clearly that in the process disclosed by him there is no operation between pull-down and taking the envelope off the machine for exhaustion. Horn should not be allowed to claim an invention involving air blowing after pull-down when his specification clearly shows that his air blowing is only up to pull-down and not afterwards. It might well be that the continued blowing of air after the seal is made, in the sense that "seal" means "join", would bring about results different from those produced by a process where air is blown only up to pull-down. Certainly, claim 2 covers a wider operation than that disclosed in the specification. That being so, the specification does not support it and the defendant is not entitled to it.

I turn now to claim C5. This is narrower than claim C1 and much of the argument about the latter is applicable to the former. The limitation in the claim that has to be considered is the concluding one, namely, "controlling the rate of air flow during and after sealing to prevent cracking strains in the disc and the disc-to-shell region as the glass cools to room temperature". In my opinion, the disclosures in Horn's specification do not support a claim with this limitation. It does not contain any direction relating to control of the rate of air flow and does not impart any teaching that the control of air flow is for the purpose of preventing cracking strains. Horn does not indicate that his blowing of air is for the control of strains. Moreover, if counsel for the defendant is right in his contention that "seal" means "join" and does not include "shaping" then the statement in the claim that the air flow is "during" the sealing runs counter to the Horn specification for, according to it, air is not blown until after the sealing-in head moves out of the region of the gas flames, at which time the thinned edge of the novel stem and the envelope have plainly been joined

and, as disclosed in the specification, joined in such a way as to produce a uniform rounding of the glass at the sealing-in point. And, if "sealing" includes "shaping", then plainly, as I have stated, there is, according to the Horn specification, no air flow "after" sealing for it plainly indicates that the blowing of air is only up to the pull-down operation, and not afterwards, for immediately after the pull-down the tube is ready for exhaustion. But there is another serious objection to the claim. Counsel for the defendant urged that the term "cracking strains" means strains which lead to cracks and that, consequently, the limitation under discussion means the same as if it read "controlling the rate of air flow during and after sealing to produce seals having very little tendency to crack". Then counsel contended that Horn, in effect says in his specification "blow air during sealing and up to pull-down" and "by so doing you get seals that have very little tendency to crack". And his contention was that a person who was operating according to the Horn disclosures and who was using the normal skill of the art to get the best results would do what the claim calls for. Consequently, if such person obtained tubes with very little tendency to crack he would necessarily control the strains and prevent cracking strains, whether he had ever heard of them or not, and he would, therefore, be within claim C5 as well as within claim C1. And it followed, according to this submission, that the claims are supported by the disclosures. I cannot be too emphatic in my disagreement with this submission. It is, in my opinion, erroneous to say that Horn teaches that if air is blown as he directs, that is to say, for the short period after the time when the sealing-in head moves out of the region of the gas flames and up to the time when the pull-down operation is completed, but not afterwards, satisfactory seals are produced which have very little tendency to crack at the sealing-in point. I say categorically that the Horn specification does not, directly or indirectly, convey any such teaching. On the contrary, it is as plain as words can make it that Horn attributes the "little tendency to crack at the sealing-in point" to the use of his novel stem with its thinned edge in his sealing-in process. There is thus no merit in counsel's submission. In my view, there is no support for claim 5 in the disclosures of the Horn specification.

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In my opinion, it is clear that the invention disclosed in Horn's specification is a different one from that defined in the claims in conflict. If the results of each are the same, which is not conceded, the methods by which they are respectively produced are different. Certainly, according to the Horn specification, the air blowing taught by him is not the cause of the "very little tendency to crack at the sealing-in point" and is a very different operation from the artificial cooling or air blowing referred to in the claims in conflict.

In view of what I have said it is not necessary to consider the evidence of Mr. Rose or that of Mr. Shapiro but, since counsel for the defendant relied so strongly on Mr. Shapiro's evidence, I should, perhaps, comment on it.

The circumstances leading to the evidence being adduced are of interest. Mr. Rose expressed the opinion that if air was blown on the stem only up to pull-down, as disclosed in the Horn specification, the strain pattern would be random or haphazard. He also pointed out that strains cannot be set in glass when it is plastic and that, consequently, strains could not be set in Horn's novel stem with the thinned edge during the pull-down operation for it was then still plastic. Other opinions were also expressed, namely, that if the central portion of the stem is allowed to cool naturally tension strains will result in it and that if the central portion was above the lower point of the annealing range and air is blown against it only up to pull-down, as taught by the Horn specification, it will cool naturally after pull-down and end up with a tension strain in it. Furthermore, Mr. Rose stated that a stem made according to Horn's method of making his novel stem will have a tension strain in the central portion and Mr. Shapiro agreed that this would probably be so. In that event, since Horn starts with a stem having a tension strain in the central portion, he will likely end with such a strain since he does not take steps to prevent it. But when Mr. Rose was asked whether cracks occur in the stem when there has been a sealing-in operation according to the Horn teaching he could not give a direct answer for he had not made any experiments to see.

This fact led counsel for the defendant to give instructions for the making of the tests regarding which Mr. Shapiro gave evidence. The purpose of the tests was two-fold, firstly, to prove the truth of Horn's statement in his specification that he has found that tubes made in accord-

ance with his invention produce satisfactory seals which have very little tendency to crack at the sealing-in point and, secondly, to prove that if a person skilled in the art at the date of Horn's specification proceeded as he directed he could control strains and prevent cracking strains and thus demonstrate that the Horn specification supports claims C1 and C5. The tests have no bearing on claim C2.

Counsel for the plaintiff was not given any notice of the proposed tests and objected to evidence of them but I allowed it to be given. Whether I was right in so doing is really a matter of academic interest in view of the conclusion I have reached as to the value of the evidence.

I need not review Mr. Shapiro's evidence in detail. It will be sufficient merely to mention its salient features. He made two sets of tests. The first was on a single head sealing-in machine, but it was not satisfactory for several reasons which need not be referred to. The second was on an old 8 station Eisler sealing-in machine of the kind that Horn probably used, although there is no statement in his specification that he did so. Mr. Shapiro did his second series with the blowing of air against the body of the stem only up to pull-down in purported conformity with Horn's direction but he did the pull-down operation between stations 6 and 7 and applied a radiant heater to the completed tube after the pull-down operation. Mr. Shapiro stated that he made the tests to see whether he could control strains in the stem and the seal region of the completed tube and said that he was able to control the strain pattern in the stem and in the seal region. There were compression strains in the central portion and radial tensions strains at the seal region. He checked these strains on a polariscope. He also found some cracks but they were partly pre-cut-off cracks but, basically, his finding was that the tubes which he produced on his tests had very little tendency to crack at the sealing-in point.

I must say that I was not favorably impressed with Mr. Shapiro's evidence. In the first place, it is plain that the tests were not done with the same kind of materials or by the same kind of methods as those disclosed in Horn's specification. On his cross-examination Mr. Shapiro admitted that there were several differences between the materials and methods he used in his tests and those that would have been available to a person skilled in the art at the date of

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the Horn specification who had only its disclosures to guide him. I enumerate these differences briefly. Mr. Shapiro used a Bantol stem and clipped its lead-in pins. These were three-piece pins of various metals, 52 alloy, Dumet and nickel, whereas Horn's lead-in pins were of chrome iron. There was a difference in the thermal conduction of the two types that would affect the result. The pins were also of smaller diameter than those specifically referred to in the Horn specification, which would also make a functional difference, although it was contended by counsel for the defendant that the Horn specification covers lead-in pins of the kind used. And Mr. Shapiro admitted that Dumet lead-in pins were less likely to result in strip leads, that is to say, cracks along the lead-in pins where they join the glass stem. The stem which Mr. Shapiro used was different from the novel stem which Horn found so essential. It was a Bantol stem. It did not have the thickened central portion of the Horn novel stem but was thinned at the centre where it met the exhaust tube, nor did it have the same thinned edge as the Horn stem, and the top of the edge was not in the same plane as the top of the stem. Moreover, the stem was not made in the same way as the Horn stem. That stem, according to the undisputed evidence, had a tension strain in the central portion when it came off Horn's stem making machine, whereas the Bantol stem which Mr. Shapiro used had a compression strain in its central portion. Moreover, the mount pin used in the tests was not like that used by Horn, the lower shoulder being smaller in diameter than the upper, the reverse of the Horn mount block, with the result that it would take slightly longer to make the join between the stem and the bulb than with Horn's mount block and so affect the cooling. And it was shown that Mr. Shapiro used a radiant heater for annealing purposes after the pull-down which would affect the strain pattern in the glass in that it would reduce strains in it, whereas, according to the Horn specification, there is no intervening operation between the pull-down and taking the tube off the sealing-in machine for exhaustion. And, finally, it was shown that Mr. Shapiro did the pull-down operation between stations 6 and 7, whereas the weight of evidence is that Horn did it between stations 7 and 8 although there is no direct reference in his disclosures to that effect. It was also shown that Mr.

Shapiro did several things in the course of his tests to which there is no reference in the Horn specification, such as tacking the bulb wall to the stem before leaving station 3 on the machine in order to avoid puffy seals prior to cutting off the cullet. In view of these differences counsel for the plaintiff submitted that the evidence of the tests has no weight. I agree.

Moreover, it is plain that the tests were made by Mr. Shapiro, whose professional qualifications are of a high order, with full and detailed knowledge of the Seelen process, for he had been an employee of the plaintiff before being engaged by the defendant, and with the expert knowledge of the present time. He admitted that it would be very difficult to divorce himself from that knowledge and put himself in a position similar to that of a person skilled in the art at the date of the specification and with that admission there cannot be any disagreement. But Mr. Shapiro said that he thought that a person having only the knowledge of a person skilled in the art at the date of the specification could then have done what he did and come to the same conclusion. I do not see how such a person could have done so and I reject this statement and opinion.

Indeed, Mr. Shapiro came out of his tests basically with a Bantol tube, which is not surprising since he started out with a Bantol stem. Counsel for the defendant contended that this was covered by the Horn specification but it is not for this Court in these proceedings to express an opinion on this submission and I refrain from doing so.

Finally, the evidence is plain that the tests were rushed and that there were no tests conducted with artificial cooling after the pull-down operation. There was no time for them. It might have been interesting to see what the result of such tests would have been. They might have shown compression strains at the seal region instead of the tension strains which Mr. Shapiro found.

In my opinion, the tests are subject to serious criticism and do not serve the purposes for which they were made. I find the evidence unsatisfactory. In my judgment, it does not destroy the value of the opinions expressed by Mr. Rose. And, most certainly, it does not show that the disclosures in Horn's specification support the claims in conflict.

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Under the circumstances, I find without hesitation that the defendant is not entitled to any of the claims in conflict.

Having thus determined the first issue against the defendant I now proceed to consideration of the second one. Put briefly, this is that although Horn and, therefore, the defendant, is not entitled to the claims in conflict on the ground that his specification does not support them he was in fact the first inventor of the invention defined in them, even although he did not disclose the fact in his specification, and that, consequently, Seelen and, therefore, the plaintiff is not entitled to them.

The onus of proof in this issue rests on the defendant. It is a heavy one. *In Christiani & Nielsen v. Rice*[1] Rinfret J., as he then was, in delivering the judgment of the Supreme Court of Canada and after referring to the decision of the Judicial Committee of the Privy Council in *The Canadian General Electric Company, Limited v. Fada Radio, Limited*[2], said, at page 456:

> The holding here, therefore, is that by the date of discovery of the invention is meant the date at which the inventor can prove he has first formulated, either in writing or verbally, a description which affords the means of making that which is invented.

Counsel for the defendant referred to this statement and made a submission to the effect that it was not an exclusive statement, to which I shall refer later, but, at the moment, I refer to the statement in the case relating to evidence of knowledge or use of an invention prior to that asserted by an applicant, at page 452:

> Evidence of this character should be subjected to the closest scrutiny.

It is with that admonition in mind that I should scrutinize the evidence purporting to prove that, although Horn did not disclose the fact in his specification, he was in fact the first inventor of the invention defined in the claims in conflict. The onus of proof of this assertion is a very heavy one.

Before the issue can be determined it is essential to ascertain what Mr. Seelen actually invented. This depends not only on the disclosures in the specification of his application but also on the facts for just as the second issue, so far as the defendant is concerned, depends not on what Horn disclosed in his application as being his invention but

[1] [1930] S.C.R. 443. [2] [1930] A.C. 97.

on what in fact he did invent, so also the fact of whether Horn was the first inventor of the invention defined in the claims in conflict depends not only on what Seelen disclosed in his specification but also on what his invention really was apart from whether he disclosed it in his specification or not. Here I should comment briefly on the argument advanced by junior counsel for the plaintiff that once it has been decided that the defendant is not entitled to the claims in conflict it has no status to contest the right of the plaintiff to them. In view of the conclusion I have reached on the facts of the second issue, I need not express an opinion on the objection thus taken.

I should, perhaps, recall what I said earlier in these reasons for judgment about the different terms used in the art, at the time of the specifications in question, to designate the same thing. Consequently, in discussing the Seelen specification I shall refer to the parts mentioned by him by the terms which he applies to them just as when I referred to the Horn specification I used the terms that he did. But for purposes of convenience I shall put into brackets, on the first appearance of the use of a term by Seelen, the corresponding term used by Horn.

Mr. Seelen states in his application that he has made an invention entitled Glass Envelope Seals and that his invention relates particularly to seals for glass envelopes of radio tubes. He points out that difficulty is experienced in making the disc-to-shell seal without producing excessive strains in the relatively large glass mass of the disc (stem) or in the wall of the shell (envelope) near the disc and that it is particularly difficult to rapidly make good seals in the factory where speed is essential and that cracking during or after sealing results in large numbers of defective tubes. He then says that the object of his invention is an improved method of making a strong hermetic seal between the glass disc header (stem) and shell of a radio tube envelope, the disc and seal region being free of harmful strains. It is thus clear at the outset that Seelen was addressing himself to the problem of making miniature glass radio receiving tubes on a mass production basis and that his object was that the disc and seal region should be free of harmful strains so that cracking should not result. It is also clear that he was thinking of radio tubes where the lead-in pins

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(lead-in rods) of the disc would serve as the contact pins of the tube. For that reason he specifies that if the lead-in conductors (lead-in rods) are large and employed as the contact pins of the tube, the disc must be quite thick and strong to support the lead-in conductors.

Seelen starts with a general description of his sealing-in process including loading and pre-heating. The shell of the radio tube envelope is telescoped over the electrode assembly (mount) with the rim of the shell contiguous the edge of the glass disc header. Preferably, the rim overlies the edge of the header although the shell rim may abut the upper side of the header. The contact pins, arranged in a circle, and hermetically sealed through the disc and connected to their respective electrodes of the assembly are inserted in holes or wells in the upper end of the spindle chuck (mount block). The depth of the wells (holes) is preferably less than the length of the pins so as to hold the glass disc slightly above the upper surface of the chuck. The envelope shell is held in place by the flexible edges of the insulating spacers of the electrode assembly, or if desired, a separate collet auxiliary aligned with the chuck may be employed to hold the shell until it is joined to its header. So far, the loading portion of the Seelen Sealing-in process has been described. The process is then further described. Gas burners (flames) are pointed and focused upon the rim of the shell opposite the edge of the header and for uniform heating along the periphery of the header the chuck is rotated in the flames. Then there is a reference to preheating. The chuck is preheated with burners to a temperature preferably below 300°C or the deformation temperature of the glass in order to heat the header by radiation to a slightly elevated temperature until it enters the sealing fires. Good results have been obtained by heating the chuck to 260°C. In this way no excessive heat shock is transmitted to the stem on encountering the sealing fires. Sealing speeds may be increased by also preheating the headers. By heating the header to about chuck temperature, say 260°C, the header temperature will drop but little and the hard sealing fires can be applied soon after the header and the shell are loaded on the chuck. Thus, there is a detailed statement of the steps in the sealing-in process prior to the application of the sealing fires.

Then Seelen states what he proposes to do according to his invention, namely, to cool the center portion of the glass disc while its edge is raised to sealing temperature and also to hold the temperature of the relatively large mass of metal of the contact pins well below glass sealing temperature so that the temperature of the pins and the center portion of the disc is prevented from being raised above the preheat temperature by the sealing fires. Then he says that in the case of commercial soft glass this temperature is preferably held at 300°C or less, which is below the deformation temperature of the glass. The evidence is that it is also below the bottom of the annealing range. It is then stated that by controlling the temperature of the centre of the disc and the pins during sealing, the seals may be heated and cooled rapidly, imposing sudden temperature changes on the glass that would be expected to fracture it. Oxidation of the metal parts connected to the pins is minimized. Seelen then says that he has found the most convenient way of cooling the center of the disc and the pins is by a blast of air slightly above room temperature directed to the bottom center of the disc from the air duct comprising a small vertical bore through the center of the spindle chuck or, alternatively, the disc may be cooled by mechanical contact with the center of the chuck or by air admitted to the lower ends of the contact pin wells.

The next statements are of such particular importance that I quote them in full: "I have found the distribution of compressional strains and tensional strains, usually represented by isoclinic lines concentric with the disc and slightly wavy opposite the contact pins, may be accurately controlled by adjustment of the sealing flames and the supply of air at the centre, and I have found it to be possible to control the nature of the strains in the seal region itself. In factory practice best results may be obtained by adjusting the flames and air so as to produce a neutral to slight compressional strain along the outside edge of the disc."

The evidence establishes the desirability of having compressional strains and avoiding tensional strains in points of weakness in the finished tube and such points would be where the lead-in pins are sealed into the glass of the stem and at the seal region where the stem and bulb are joined.

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The current philosophy in the art was that all strains in glass were bad and should be prevented, if possible, or, at any rate, minimized, but Mr. Seelen stated that in his experiments he found certain strains in completed tubes and yet the tubes were good. He studied the strain patterns in such tubes with the aid of a polariscope and came to the conclusion that if he produced tubes with similar strains in them the tubes would be good. To that extent, the teachings of the old philosophy about strains had to be modified. There were some strains such as compressional ones that were desirable. Seelen found that the distribution of strains could be accurately controlled by adjustment of the sealing flames and the supply of air at the center and he also found it possible to control the nature of the strain in the seal region. For example, he could produce a slight compressional strain along the outside edge of the disc. This invention of the means for controlling strains in miniature glass radio receiving tubes is his contribution to the art.

After descriptions and dimensions of some of the parts Seelen describes a sealing-in process and says that it will be obvious to those skilled in the art that many variations and adjustments may be made in the fires and air flow to obtain the desired results and reveals that experience has shown that for any burner setting, the strain pattern in the glass is quite sensitive to the air flow.

His sealing-in process is done on a conventional 16-head "Sealex" machine on which the spindle chucks are held about seven seconds in each indexing position and the chucks are rotated as they come to rest in front of variously adjusted burners with flames of commercial illuminating gas. A detailed description of what happens at each of the 16 positions of the machine is given in the specification, but I need refer only to certain features of it. In position 8 the rim of the shell is sufficiently soft to weld with the header. This is the joining of the stem and the bulb. In positions 8 and 9 the fires are removed and air at the proper pressure is admitted to the interior of the shell through the exhaust tube to force out and shape the soft wall of the shell just above the seal. This is the shaping according to the Seelen invention, as contrasted with the shaping according to the Horn one by the pull-down operation. But the outstanding difference is in the use of air. In the Seelen invention air is admitted through the central bore in position 7 and the

air rate is increased in positions 8 and 9. This is before shaping. But the air blowing is continued after shaping. In position 9 the stem is cooled by admitting air to the spindle chuck and the cooling continues in positions 10, 11 and 12. And in position 11 the shell is annealed.

Thus, apart from other differences between the Horn and Seelen inventions, as disclosed in their respective specifications, there is the marked difference that in the former the blowing of air against the stem is only for the short period already described up to the pull-down operation, whereas in the latter the air cooling of the stem continues for a considerable period after the shaping of the bulb. This enables a control of strain pattern in the body of the stem and in the seal region to be effected which the Horn invention, as disclosed in his specification, cannot accomplish.

Notwithstanding the difference in the disclosures of the specification, evidence was led in an effort to show that, in fact, Horn did blow air against the body of his novel stem after the pull-down operation and did air cooling after shaping before Seelen did and was, consequently, the first inventor of the invention defined in the claims in conflict. This second issue depends not on what Horn disclosed in his specification but on what, in fact, he invented, regardless of whether he disclosed it or not.

The principal witness in support of this issue was Mr. James Kyle, a mechanic in the defendant's employ, who had worked under Horn's direction. I need not set out his evidence in detail. It will be sufficient to mention its salient features. At the time with which we are concerned he was in charge of the maintenance of equipment and helped set it up for Horn's use. He helped him with his stem machine. Early in 1938 he worked with him when he was conducting his experiments towards the production of what was subsequently the Loktal tube. He was very close to him as his utility man and helper. Horn started sealing in tubes early in July of 1938 and Kyle made a sealing-in pin for him, of which he later made several modifications under Horn's direction. At first, the experiments conducted by Horn were with dummy tubes, that is to say, tubes with stems without any mount assembly, and later, experiments were made on an 8-head Eisler sealing-in machine. At first, the pull-down operation was done manually. The tubes so produced had toed-out and toed-in lead-in pins and there were cracked

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seals and cracked stems. Kyle then put a new track around the base of the Eisler machine to provide for an automatic pull-down. He put a drop in this track, so he said, between positions 6 and 7 of the machine. At position 6 he drilled a hole in the track so that a jet of air might be blown up into the central bore of the spindle and the mount block as it got to position 6. This track was built in July of 1938. At this stage of the experimentation the bulb and the stem were joined at position 5, a jet of air was blown through the central bore at position 6 and the cullet was blown off. The pull-down operation was, he said, between positions 6 and 7. There were annealing fires at position 7, but nothing was done at position 8, except that the sealed tube was taken off the sealing-in machine and put into the exhaust machine which was nearby. In this test, Kyle said, there were no cracks in the tubes, but there were toed-out and toed-in lead-in pins. The toed-out pins were the result of the sealing-in pin then used, which had apertures between its so-called castles, which did not hold the pins securely. The pins were toed-in because the stem was soft when it was taken off the machine at station 8 so that when its exhaust tube was pushed into the rubber port of the exhaust machine it pushed the centre of the stem up and caused the pins to toe-in. The results of this test did not bother Horn. But on his instruction Kyle made a new sealing-in pin with holes drilled in it to receive the lead-in pins securely. An example of this sealing-in pin was not produced but Kyle made a sketch of it. After this sealing-in pin was used another run was made. The use of the new pin eliminated the toeing-out of the lead-in pins, but the toeing-in still remained. The machine was running at the rate of about 200 tubes an hour. This run occurred in the last part of July in 1938. Then, Kyle said, he drilled holes in the track at positions 7 and 8 and put air jets there. Then another run was made. In this run the cullet was cut off at position 6, as previously, and air was blown at position 7 after the pull-down and also at position 8. There were cracks across the stem but no cracks at the seal region. There was no toeing-out or toeing-in of the lead-in pins. The cracks across the stems were because Horn could not regulate the air flow. Then he used air pressure gauges or manometers to control the air pressure and finally controlled the situation so that there were no cracks across the stem or at the seal region

and no toe-out or toe-in of the lead-in pins. Indeed, according to Kyle, he was producing perfect bulbs and the problem of cracks had been beaten. All this had happened by the last week of July of 1938. Later, when Kyle went on a night shift at the beginning of November in 1938 he was the senior person in charge of the production of Loktal tubes at this shift. There were no tubes with toed-out pins but toed-in pins still occurred due to improper air regulation and Kyle said that he corrected this difficulty when it occurred by adjusting the air pressure with the aid of the manometers at positions 7 or 8. On his cross-examination, he said that the tubes were taken off the sealing-in machine immediately at position 8 and that the stems were then still hot and soft.

The only corroboration of Kyle's evidence was Mr. Krim's statement that he had seen air gauges or manometers at Horn's workshop and Mr. Homer Anderson's statement that in April 1939, when he made certain tests at Raytheon, he found that air was used at stations 7 and 8.

The important portion of Kyle's evidence is, of course, his statement that Horn did the pull-down operation between positions 6 and 7 of the Eisler sealing-in machine and continued to blow air on the stem of the tube at positions 7 and 8. There are serious objections to accepting this evidence. There is no supporting evidence except the statements of Mr. Krim and Mr. Homer Anderson to which I have referred. There are no corroborating drawings, sketches, notes, instructions or memoranda such as one might expect to find. Even the drawing referred to in Horn's affidavit, if it existed, was not produced. And it is to be noted that Mr. Horn was not called as a witness nor was there any evidence on commission from him. He would have been able, better than anyone else, to tell whether he made an invention so different from that which he disclosed in his specification as Kyle said he did.

Kyle's statement that Horn made use of air-blowing after the pull-down operation is contrary to other more credible evidence. It runs counter to Horn's own statement in his specification. In my opinion, if Horn actually did what Kyle said he did it is inconceivable that he would not have mentioned the fact in his specification. Indeed, his specification flatly contradicts the evidence. It gives a

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graphic description of the steps taken by him, not at positions, it is true, but by a sequence of events, namely, the application of heat, the constriction of the skirt of the envelope, the blowing of air to assist in cutting off the cullet, the moving out of the region of the flames, the blowing of air to cool the body of the stem, the pull-down operation and the tube being ready for exhaustion. The fact that there is no reference to air blowing after the pull-down is a refutation of Kyle's evidence that there was any such air blowing. And the evidence is inconsistent with the fact that when the tube was taken off the sealing-in machine at position 8 it was still hot and soft.

Moreover, the weight of the evidence is overwhelmingly against Kyle's statement that the pull-down operation was between stations 6 and 7. Mr. Riches' letter, based on information obtained from the defendant that the pull-down operation took place between stations 7 and 8, is conclusive of that fact. Kyle was plainly in error in his statement. He may have been led into such error by reliance on the sketch, Exhibit Z18, which was shown to him two days before he gave his evidence, in which it appeared that the pull-down operation happened between positions 6 and 7. There was no evidence of who made the sketch or how it came into being. I would rather think that Kyle was mistaken in his recollection than that he told an untruth, but I must say that I do not believe his statement that Horn did the pull-down operation between positions 6 and 7. There is no justification for concluding otherwise.

That being so, and the pull-down operation having been made between positions 7 and 8 there was not much time for air blowing after pull-down, if there was any at all, in view of the fact that the operator of the Eisler sealing-in machine took the tube off the machine as quickly as possible after its arrival at position 8, and it was then still hot and soft. That amount of air blowing could not be equal to or have the effect of the artificial cooling practised by Seelen after his shaping of the bulb at the seal region.

Only a brief reference to Mr. Anderson's statement that there was cooling air after cut off, "the regular amount of air that we were using on the seventh and eighth positions on the sealing-in machine" need be made. This was a statement made in respect of an activity in April of 1939. This

cannot be considered as proof that Horn blew air at positions 7 and 8 after pull-down and made an invention different from that which he disclosed.

Having found, as I have done, that Horn did not make his pull-down operation between positions 6 and 7, as Kyle said he did, but that he made it between positions 7 and 8, as Mr. Riches' letter, based on information from the defendant, plainly stated, and as his specification indicates, notwithstanding the fact that there is no mention in it of positions, I have no hesitation in finding that the defendant has not discharged the burden of proof that rests on it in respect of the second issue. I go further, and find as a fact that Horn was not a prior inventor to Seelen of the invention defined in the claims in conflict and I, consequently, determine the second issue in this case against the defendant.

In view of this finding I need not consider whether there was any "formulation" within the meaning of the statement of Rinfret J. in the *Christiani* case (*supra*) nor the ambit of that statement. Nor need I consider the other objections to Kyle's evidence taken by counsel for the plaintiff or the reply of counsel for the defendant to them.

Before I conclude these reasons for judgment I should sound a note of caution that my findings do not put an imprimatur of validity on the claims in conflict *vis-a-vis* the Seelen application, beyond the fact that the Commissioner must now issue a patent to the plaintiff, as assignee of Seelen, containing them. But their validity is a matter for determination only in an action for infringement or for impeachment if such proceedings should be taken.

For the reasons given, the judgment of the Court in the present proceedings must be that as between the parties the plaintiff is entitled to the issue of a patent containing the claims in conflict and that it is entitled to costs to be taxed in the usual way.

Judgment accordingly.