Toronto 1965

Nov. 2-5, 8-10

Nov. 10

BETWEEN:

UNION CARBIDE CANADA LIMITED ...PLAINTIFF;

AND

TRANS-CANADIAN FEEDS LIMITED, *et al.* .....} DEFENDANTS.

Patents—Infringement—Importation and use or sale of goods in Canada—Goods made by patented process outside Canada.

Importation into Canada and use or sale in Canada of goods made outside Canada by a process subject to a Canadian patent is an infringement of that process.

Auer Incandescent Light Mfg. Co. v. O'Brien (1897) 5 Ex. C.R. 243 followed. *Elmslie v. Boursier* (1870) L.R. 9 Eq. 217; *Von Heyden v. Neustadt* (1880) 14 Ch. D. 230; *F. Hoffmann La Roche & Co. v. Commissioner of Patents* [1955] S.C.R. 414 considered.

Jurisdiction—Exchequer Court of Canada—Stare decisis—Extent of application.

While the doctrine of *stare decisis* does not have the same application in the Exchequer Court of Canada, which has jurisdiction in the province of Quebec as well as in the common law provinces, as it does in a common law Court, nevertheless where a question has been decided by the Exchequer Court after argument, it is in the interests of the orderly and seemly administration of justice that in the absence of special circumstances that decision be followed when the same question arises subsequently in the Court.

Patents—Assignment of patent—Claim for infringement not impliedly included.

A mere assignment of a patent without express reference to outstanding claims for infringement does not impliedly include an assignment of claims in respect of those infringements.

Patents—Cause of action for infringement—Assignability of—Difference between common and civil law rule.

A right of action for infringement of a patent in Ontario is not assignable (but, *semble, secus* for infringement in Quebec). It is not legally possible at common law to assign a tort and there is no provision in the *Patent Act* which changes the common law in that respect.

Burns & Russell of Canada Ltd. v. Day & Campbell Ltd. [1966] Ex. C.R. 673 followed.

Patents—Patent Act, s. 57(1)—Damages for infringement—Rights of patentee and person claiming under patentee.

Section 57(1) of the *Patent Act* confers on a patentee a right of action for damages sustained by him from infringement of the patent and confers on a person claiming under the patentee a right of action for damages sustained by such person from infringement of the patent but not for damages sustained by the patentee.

Patents—Validity of—Lack of inventive ingenuity—Combination of variables—Excessive claim—Lack of utility—Insufficient description of

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working of process—Construction of claim—Onus of proof—Necessity of experiment to obtain desired variations—Whether sufficient—Patent Act, ss. 36(1) and (2), 48.

Plaintiff sued for infringement of a patented process for making thermoplastic film of predetermined characteristics. Defendants contended that the patent was invalid (1) for lack of inventive ingenuity; (2) for claiming too much; and (3) for insufficient instructions as to the working of the process. It was established that at the time the process was devised a skilled workman would have known (*a*) that thermoplastics could be manufactured into shapes by extruding them at ordinary temperatures or after heating through different shaped dies, either wet or dry; (*b*) that the characteristics of thermoplastics can be varied by stretching them in either or both directions; (*c*) that air pressure inside a thermoplastic film in the course of extrusion was a method of stretching the tubing; and (*d*) that air cooling on the outside of the tubing accelerated setting. Plaintiff argued that the patent disclosed inventive ingenuity in the discovery (1) that cooling air directed circumferentially on the film near the point of extrusion could be used to control the rate of cooling the film, and (2) that the correlation of this cooling rate with the degree of inflation and rate of withdrawal of the film would permit the production of film of predetermined and controllable characteristics.

Held, the patent was invalid for two of the three reasons urged by defendants: (1) lack of inventive ingenuity and (2) claiming too much, and the action failed.

1. There is no inventive ingenuity in the alleged discovery as to the effect of cooling air and moreover knowledge as to the effect of cooling air was available to skilled workmen at the time the patented process was devised.

British Thomson-Houston Co. v. Duram Ltd. (1918) 35 R.P.C. 161, per Finlay L C. at p. 175; *British Celanese Ltd. v. Courtaulds Ltd.* (1935) 52 R.P.C. 171, per Lord Tomlin at p. 195; *Ernest Scragg & Sons Ltd. v. Leesona Corp.* [1964] Ex. C.R. 649; *Patent Act,* s. 48, referred to.

There is no inventive ingenuity in the alleged discovery as to the effect of the correlation of the three variables described, in the sense that one of the integers thereby did something which it could not do without one or both of the others (*British Celanese Ltd. v. Courtaulds Ltd.* (1935) 52 R.P.C. 171 at pp. 193-4 applied), and moreover the combination of the three variables was an obvious variation of what has been done before (*Longbottom v. Shaw* (1891) 8 R.P.C. 333, per Lord Herschell at p. 337).

2. Inasmuch as the patented process, though expressly claimed to be useful with *all* thermoplastics, could not as a practical matter be used with nitrous cellulose, a highly dangerous explosive, in the absence of special controls, and these were not disclosed in the patent, the patent was invalid as not being useful or, alternatively, for failing to describe the patented process.

The patent's claim could not be read so as to exclude nitro-cellulose on the ground that it was not suitable for the manufacture of tubing by dry extrusion after testing or because no one in the industry would ever think of using such a process with nitro-cellulose because of its well-known dangerous character.

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Minerals Separation North American Corp. v. Noranda Mines Ltd. (1952) 69 R.P.C. 81, per Lord Reid at p. 95; *Vidal Dyes Syndicate Ltd.* (1912) 29 R.P.C. 245, per Fletcher Moulton L.J. at pp. 271-2; *Norton and Gregory Ltd. v. Jacobs,* (1937) 54 R.P.C. 271, per Greene, M.R. at pp. 276-7; *Henriksen v. Taller Ltd.* [1965] R.P.C. 434, per Lord Reid at p. 442, applied; *B.V.D. Co. Ltd. v. Canadian Celanese Ltd.* [1937] S.C.R. 221 at p. 237. *Patent Act,* s. 36(1) and (2) referred to.

3. The patent was however not invalid for failure to describe the patented process adequately as required by s. 36(1) of the *Patent Act.* Although the patent stated that the variables in the process must be balanced by experiment to obtain various desired variations in the product, the instructions given were sufficient to enable a person skilled in the art to use the process, and there was no evidence to the contrary. The inventor was not obliged to supply a table showing various combinations in the process required to produce various typical products for each of the different thermoplastics. *Ernest Scragg & Sons Ltd. v. Leesona Corp.* [1964] Ex. C.R. 649, per Thorson P. at pp. 746 *et seq.* referred to.

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ACTION for infringement of a patent.

H. G. Fox, Q.C. and *D. F. Sim, Q.C.* for plaintiff.

D. G. Kilgour and *D. G. Friend* for defendants.

JACKETT P.:—This is an action for infringement of Canadian Letters Patent No. 460,963, in respect of a "Method of Making Flattened Thermoplastic Tubing of Predetermined Desired Characteristics".[1]

While Patent No. 460,963 is a process patent, the alleged infringement consists in the importation into Canada, and the sale and use in Canada, of polyethylene film and tubing manufactured outside Canada in accordance with the patented process.

The defendant admits the plaintiff's title to Patent No. 460,963, having abandoned, at the opening of the trial, the attack that is to be be found in the Statement of Defence on the validity of the assignment whereby the plaintiff became registered as owner of the patent.

There remain for adjudication on the pleadings certain questions relating to infringement, namely,

First, whether any film has been shown to have, at a relevant time, been imported into Canada and so used

[1] By statement of counsel at the opening of the trial, the plaintiff dropped its claim in respect of the other patents referred to in the pleadings. It was also common ground at the trial that there is only one defendant as Dominion Poly Products Company is merely the name under which Trans-Canadian Feeds Limited carries on a part of its business.

or sold in Canada as to be an infringement of the plaintiff's patent assuming the other questions are answered in the affirmative;

Second, the question as to whether the process pursuant to which any such film was manufactured falls within one or more of the first twelve claims of Patent No. 460,963[1];

Third, the question whether an importation into Canada and use or sale in Canada of wares made outside Canada pursuant to a process in respect of which there is a Canadian patent is an infringement of the patent.

In addition to the question concerning infringement, there remain for consideration:

(*a*) certain questions raised by the defence as to the validity of Patent No. 460,963,

(*b*) the amount of the damages or profits related to such infringements as may be established,

(*c*) other relief claimed by the prayer for relief in respect of the alleged infringements.

It was decided by a consent order made before trial that the action should proceed to trial at this time on the issues of infringement and title only and that, if the action is not dismissed after the trial of those issues, a date will then be set for continuation of the trial upon the issues concerning validity. As the issue of title has disappeared, the only question that has to be decided at this time is that of infringement. I say this subject to the possibility that has arisen for the first time during the hearing that, independently of the claim for infringement, this action is to be regarded also as an action for an injunction in respect of a threatened infringement.

It was further decided before trial that, upon the plaintiff establishing at trial at least one act of infringement and otherwise establishing its cause of action, the matter as to other acts of infringement and the damages or profits resulting from all acts of infringement would be the subject of a reference pursuant to section 40 of the *Exchequer Court Act*. The question that I have to decide at this time, therefore, is whether the plaintiff has established at least

[1] At the opening of the trial, the plaintiff abandoned its claim in respect of the last six claims of the patent.

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one act of infringement. A further question that is to be decided at this time, assuming that the plaintiff is successful on that question, is whether the plaintiff is entitled to claim in this action for infringements of Patent No. 460,963 alleged to have been committed by the defendant at times when that patent did not belong to the plaintiff.

I shall first dispose of the question of law as to whether importation into Canada, and use or sale in Canada, of goods that were made outside Canada in accordance with a process that is the subject of a Canadian patent is an infringement of that patent.

Under the Canadian *Patent Act*, a patent is granted for an invention and an invention is, by definition, a new and useful "art", "process", "machine", "manufacture", or "composition of matter", or a new and useful "improvement" in any such thing. In other words, a new and useful product is one invention and a new and useful process for making the same product is a different invention.

In this case, the plaintiff has no monopoly in respect of the particular product. Its monopoly is restricted to the process whereby, it is alleged, the product was made.

Inasmuch as the Canadian Act clearly contemplates a monopoly for a process and a separate monopoly for a product, and inasmuch as a monopoly under that Act operates only in Canada, it would seem to follow that a Canadian monopoly for a process would not be infringed by the sale or use in Canada of a product made by the process in a foreign country.

In at least two English decisions, however, it has been held that importation and sale of a product made in a foreign country by a process that is the subject matter of a monopoly in England is an infringement of the English process monopoly. I refer to *Elmslie v. Boursier*[1] and *Von Heyden v. Neustadt*[2].

I have been able to discover no such difference between the ambit of an English patent for an invention and the ambit of the monopoly granted under the Canadian *Patent Act* as would warrant reaching a conclusion when this question arises under the Canadian Act different from that reached in respect of an English patent. The two English

[1] (1870) L.R. 9 Eq. 217. [2] (1880) 14 Ch. D. 230.

decisions to which I have referred are not, however, decisions under our statute and I do not find them persuasive. If, therefore, they were the only authorities that had to be considered, I should not be inclined to apply them in a case arising under the Canadian statute.

However, in *The Auer Incandescent Light Manufacturing Company v. O'Brien*[1], Mr. Justice Burbidge had to consider an application for an injunction based upon a process patent where some of the infringements complained of were with respect to importation and sale, and some of them were with respect to manufacture (see pages 262-3) and, after hearing argument on the question, at page 292 he applied the two English cases to which I have referred and held that articles made in a foreign country pursuant to a process in respect of which a patent had been granted under the Canadian statute cannot be imported for use or sale in Canada without infringing the Canadian monopoly.

In *F. Hoffmann LaRoche & Co. Ltd. v. Commissioner of Patents*[2], by remarks, which do not seem to have been necessary for the decision of the case, four of the five judges referred to one of the English decisions that I have mentioned and to Mr. Justice Burbidge's decision and said: "There seems to be no reason to doubt the correctness of these decisions". Mr. Justice Rand also referred to the English decisions, but it is not clear that he expressed approval of them.

While I appreciate that the doctrine of *stare decisis* does not have the same application in this Court, which has jurisdiction in the Province of Quebec as well as the common law provinces, as it does in a common law Court, nevertheless, in my view, where a question has been decided by this Court after argument, it is in the interest of the orderly and seemly administration of justice that that decision be followed when the same question arises subsequently in this Court, in the absence of special circumstances, the nature of which I am not prepared at this time to define. I should also say that, as far as I have been able to ascertain, there is no relevant difference between the Canadian legislation that was under consideration in the *Auer Incandescent Light* case and the present legislation.

[1] (1897) 5 Ex. C.R. 243. [2] [1955] S.C.R. 414.

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While, as I see it, the question would be open for reconsideration in the Supreme Court of Canada, I propose, having regard to the views expressed above, to follow the decision rendered by Mr. Justice Burbidge in 1897 so long as its authority remains unimpaired by a decision of the Supreme Court of Canada. In adopting this position, I do not wish to be taken as expressing any opinion as to the course that should be followed when a similar problem arises in this Court at a time when this Court is differently constituted.

The plaintiff's proof as to the process whereby certain samples of polyethylene film purchased from the defendant were made consisted principally of

(*a*) evidence as to the four commercial processes that are used in manufacturing polyethylene film in the United States, and

(*b*) evidence of qualified experts that in their opinions, based upon certain characteristics of the samples, those samples were made by a particular process that they referred to as the "air bubble" process and were not made by any of the other three processes.

This evidence was given by three witnesses each of whom is an officer of the plaintiff company or of its parent company and each of whom is well trained and experienced in the art or field of knowledge in respect of which he gave evidence. While I recognize that these witnesses, by reason of their positions, were likely to be biased in favour of the plaintiff's case, I was well impressed with their manner of presenting their evidence and I have no reason to doubt that each witness expressed an honest opinion after giving the matter the conscientious study and consideration that it deserved.

According to the evidence of the plaintiff's witnesses, all four of the processes in commercial use in the United States for the manufacture of polyethylene film involve the transformation of the raw material polyethylene while in a plastic or molten state into a film of desired thickness and size and then hardening or setting it in that form.

In one process, known as "calendering", the hot melt is put through rollers to obtain the desired sheet of film and is then cooled by the use of water.

In the other three processes, it is extruded from an opening in a metal object called a die. In what is called the "slot

die" method, the die has a long narrow opening through which the hot melt is extruded so that it comes out in the form of a sheet of film somewhat narrower than the length of the opening and is then cooled by the use of water.

The other two die methods involve the use of an annular or circular die in which the opening is in the form of a ring so that when the hot melt is extruded it comes out in the form of a tube. In both of these methods, which are referred to as "tubular" methods, the molten tube is passed through a pair of contiguous rollers known as "nip" rollers some distance from the die opening.

In one of the tubular methods, a water-cooled metal form or shape known as a "mandrel" is positioned in the tube between the die opening and the nip rollers and, being cooled by water, causes the molten tube to "set" at the size dictated by its circumference. This may be called the "mandrel" method. In the other tubular method, an air bubble is positioned in the molten tube between the die opening and the nip rollers to dictate the size at which the tube sets and the tube is caused to set by external cooling, such cooling, in the form of the process to which these witnesses referred, if not always, being by the external application of air to the molten tube near the die opening. This has been called *inter alia* the "air bubble" method.

As indicated, the molten material is caused to "set" in the air bubble method by air cooling in the form of the process described by the plaintiff's witnesses. In the other three methods, it is caused to set by some form of water cooling, which operates much faster than air cooling. Rapid cooling, or "quenching" as it is called, such as is achieved by water cooling, results in a film that is more transparent and more glossy than film produced by an air cooling process. Such film has a a more pleasing appearance than film produced by air cooling and is suitable for film for food covering and other uses where appearance is important. Air cooled film is used for construction and agricultural uses and other uses where the appearance of the film is unimportant.

Another feature of the air bubble process is that the size of the air bubble is capable of being changed readily so that the size of film to be produced may be adjusted from time to time speedily and inexpensively within relatively wide limits without changing any of the equipment.

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This gives the air bubble method an element of versatility. Mandrels, especially for wide widths, are heavy and expensive and a different mandrel is required for each width of film. Slot dies are subject to a similar comment. Having regard to the nature of the process, it would also be very costly to make very wide widths of film by the calendering process. In the result, for these reasons and other reasons that I need not detail, the air bubble method as described by the plaintiff's witnesses is the only method used commercially in Canada or the United States to make seamless polyethylene film in widths of 10 feet or more.

Other differences between the products of the various processes have some significance to the experts in forming an opinion as to the process whereby a particular product was made. In the manufacture of film by the slot die method, the material is pulled longitudinally but not transversely. In the manufacture by the mandrel method, and the air bubble method as described by the plaintiff's witnesses, it is pulled both ways but the longitudinal pull is much greater than the transverse pull. (I should say parenthetically that, in theory at least, the air bubble method could be worked without any transverse pull, that is, by leaving the molten tube the same size as the die opening or causing it to shrink, but that is not the form of the process to which the plaintiff's witnesses referred.) The tensile strength of the product made by the slot die method is greater than the tensile strength of that made by the mandrel or the air bubble method as described by the plaintiff's witnesses. The "impact" strength of film made by a water cooling process is greater than that of a film made by the air bubble method when the cooling is by use of air. The product made by the mandrel method has scratches and strain lines as the result of the film being dragged over the mandrel. Such scratches and strains are not present in film produced by the other methods. Film made by extrusion from a die has marks resulting from peculiarities of the die used in its manufacture. Such marks are not to be found in film produced by calendering. Where the hot melt has been cooled rapidly by water cooling, the density of the resulting film is considerably less than that of a film produced by relatively slow air cooling. When the cooling is by a mandrel or a chill roll (i.e., a water-cooled metal roll) so that it is cooled significantly more rapidly on one side than on the

other, there is a higher degree of crystallization on one side than on the other, which gives rise to a tendency for the film to curl when a piece is laid on a flat surface.

Of the commercial production of polyethylene film in the United States, very small amounts were, during the period from 1955 to the present time, made by either the calendering process or the mandrel process. (Indeed, the witnesses all seemed to agree that the calendering process is not practical as a commercial process.) Of the balance of commercial production in the United States during that same period, the polyethylene film made by the air bubble process as described by the plaintiff's witnesses amounts to at least three times as much as the film made by the slot die process.

Much, if not all, of the polyethylene film imported and sold by the defendant was building or agricultural film, which was a heavy film in wide widths, and did not therefore have to have the decorative features of clarity and gloss which could be obtained by the water cooling feature of the process other than the air bubble process.

On the question of the process used to manufacture polyethylene film purchased from the defendant, as I have already indicated, the plaintiff adduced opinion evidence of one of its officers and of two officers of its parent company each of whom was well qualified, both by training and experience, to give such evidence. Two of them gave their evidence after doing tests on pieces of polyethylene film. Only one of them had an opportunity of doing tests on pieces of a sample of film purchased from the defendant on August 15, 1963 by one Dungan, an employee of the plaintiff. Both of them did tests on pieces of three samples of film sold during the course of discovery in this action by the defendant to the plaintiff as being samples of film imported by the defendant. Both of these gentlemen expressed the opinion that the samples of film were made by the air bubble method that had been described by the plaintiff's witnesses and they supported their opinions by detailed reasons based upon an examination of the respective samples and upon the results of various tests, all of which related in one way or another to the characteristics of the products of the respective process, most of which I have already outlined. Having observed these witnesses with care while they were giving their evidence, I am of opinion that, in

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each case, the witness expressed his opinion honestly and frankly and that he formed it after conscientiously taking steps that, in his opinion, would aid him in determining the relevant facts. I do not think it is necessary to detail their evidence. It is sufficient to say that I am satisfied that each of them had adequate material upon which to form his opinion and that neither cross examination nor the defendant's evidence weakened their evidence in any way. Neither will any good purpose be served by detailing the defendant's evidence. There is nothing in the defendant's evidence to shake the opinions given by these two witnesses that all four samples were made by the air bubble method as described by the plaintiff's witnesses[1].

The next question then is whether the air bubble method to which these witnesses referred in expressing their opinions falls within one or more of the first twelve claims of the plaintiff's patent. I have read and re-read the first of such claims and I have not been able to escape the conclusion that the air bubble method as described in the evidence of the plaintiff's witnesses falls clearly within its limits. I have also studied the differences which, according to counsel for the plaintiff, existed between each of the other claims and the first claim and, upon such a study, it would appear that the air bubble method as described by the plaintiff's witnesses falls within each of the first twelve of the claims in Patent No. 460,963.

Counsel for the defendant contended that the "air bubble method" includes

(*a*) a process where the molten tube is set when it is the same circumference as it was at the point of extrusion, and

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[1] While the witness Sachs did not himself describe the "air bubble method", he sat through the evidence given by the witness Haines and the witness Sanderson and it was clear that he was referring to the process described by them when dealing with the "air bubble method". This is confirmed by an examination of the details of his evidence.

The reasons given by the plaintiff's witnesses for expressing the opinion that the samples were made by the "air bubble method" as described by them not only support a conclusion that the samples were not made by the calendering, slot die or mandrel process but also a conclusion that they were not made by an "air bubble method" employing cooling other than by air or other gas (which is a slow cooling process), or an "air bubble method" where the molten tube is set at the circumference that it has when it emerges from the die (in which event there would be no transverse pull in the production of the film).

(*b*) a process where the molten tube is cooled by some means other than air cooling in the vicinity of the point of extrusion,

and that such processes would not fall within any of the twelve claims relied on by the plaintiff. While it may well be that the expression "air bubble method" may aptly be applied to such methods, I am satisfied that the "air bubble method" described by the plaintiff's witnesses was one where the molten tube was expanded before it was set and was one where the molten tube was cooled by air near the point of extrusion.

The final question with reference to the plaintiff's attempt to prove, by reference to the aforesaid samples, at least one act of infringement is whether any of the four samples in respect of which the plaintiff's witnesses gave evidence falls within the principle applied in the *Auer Incandescent Light* case. In other words, were any of the samples, at a relevant time, imported by the defendant into Canada and sold or used by the defendant in Canada so as to be an infringement of the plaintiff's patent within that principle?

The Dungan film was purchased by the plaintiff in Canada prior to the commencement of this action. The defendant says, however, that there is no evidence that it was imported by the defendant from the United States and indeed, he says, that, as far as the evidence goes, it might have been manufactured in Canada by the plaintiff and sold by the plaintiff to the defendant or to someone else who then sold it to the defendant. The plaintiff's answer to this is

First, having regard to the evidence that has been given as to purchases of polyethylene film similar to the Dungan film in the period prior to the Dungan purchase by the defendant from the plaintiff and from its United States supplier, respectively, the balance of probability is that the Dungan sale was made by the defendant from imported film rather than from film bought from the plaintiff; and

Second, evidence, that film of the Dungan type had been acquired from another Canadian supplier, A. & B. Plastic Co. Ltd., in a period sufficiently close to the Dungan purchase to make it not improbable that such

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purchases were the source of the Dungan film, should be disregarded because of the improbability of the witness who gave that evidence being able to remember the details in question.

If the evidence were that the purchases by the defendant from its United States supplier and those from the plaintiff that have been proved were all the purchases that the defendant had made of the Dungan type film during the period covered by those purchases, having regard to the "quick turnover" of the defendant's business, I should have had no difficulty in concluding that the balance of probability is that the film sold to Dungan had been acquired by the defendant from its United States supplier and had therefore been imported into Canada before it was sold to Dungan. However, that such were all the defendant's purchases of such film in that period has not been proved, even if I were to disregard the evidence concerning the purchases of such film from A. & B. Plastic Co. Ltd. In any event, in my view, I cannot disregard that evidence. It was given quite clearly and confidently, it was not contradicted, and it was not challenged on cross-examination or otherwise before the witness who gave it left the box. With reference to the necessity of giving a witness notice, either by cross-examination or otherwise, that his credibility is challenged, at a time when he can give any answer that he may have to such challenge, before suggesting that his evidence is untruthful, I refer to *Browne v. Dunn* of The Reports, 67, per Lord Herschell, L.C. at pages 70-1, where he said:

> Now, my Lords, I cannot help saying that it seems to me to be absolutely essential to the proper conduct of a cause, where it is intended to suggest that a witness is not speaking the truth on a particular point, to direct his attention to the fact by some questions put in cross-examination showing that that imputation is intended to be made, and not to take his evidence and pass it by as a matter altogether unchallenged, and then, when it is impossible for him to explain, as perhaps he might have been able to do if such questions had been put to him, the circumstances which it is suggested indicate that the story he tells ought not to be believed, to argue that he is a witness unworthy of credit. My Lords, I have always understood that if you intend to impeach a witness you are bound, whilst he is in the box, to give him an opportunity of making any explanation which is open to him; and, as it seems to me, that is not only a rule of professional practice in the conduct of a case, but is essential to fair play and fair dealing with witnesses. Sometimes reflections have been made upon excessive cross-examination of witnesses, and it has been complained of as undue; but it seems to me that a cross-examination of a witness which errs in the direction of excess may be far more fair to him than to leave him without cross-examination, and afterwards to

suggest that he is not a witness of truth, I mean upon a point on which it is not otherwise perfectly clear that he has had full notice beforehand that there is an intention to impeach the credibility of the story which he is telling.

and per Lord Halsbury at pages 76-8;

My Lords, with regard to the manner in which the evidence was given in this case, I cannot too heartily express my concurrence with the Lord Chancellor as to the mode in which a trial should be conducted. To my mind nothing would be more absolutely unjust than not to cross-examine witnesses, upon evidence which they have given, so as to give them notice, and to give them an opportunity of explanation, and an opportunity very often to defend their own character, and, not having given them such an opportunity, to ask the jury afterwards to disbelieve what they have said, although not one question has been directed either to their credit or to the accuracy of the facts they have deposed to.

I find, therefore, that the plaintiff has failed to establish that the Dungan film was imported into Canada and it is therefore unnecessary for me to deal with the further argument made by the defendant that a sale to the plaintiff could not be an infringement of the plaintiff's patent.

It is common ground that the three samples sold to the plaintiff by the defendant after the commencement of this action were samples of film imported by the defendant. Such sales cannot, however, be infringements upon which a judgment for infringement[1] can be based in this action because they did not take place before the action was instituted. Furthermore, there is no evidence upon which it may be determined that the importation of these samples took place before the action was instituted even if importation in the course of trade alone would be sufficient to constitute an infringement, a matter upon which I express no opinion. There is, in addition, no evidence of any use of these samples in Canada other than that involved in the sales some seven months after the commencement of this action.

[1] The finding that a sale after the commencement of the action is not a basis for a judgment or infringement does not imply that such a sale may not be relevant to the plaintiff's claim for an injunction if the claim for an injunction is based upon the anticipation that the defendant will infringe in the future. It may be also that, upon a reference as to damages, such sales will be taken into account upon the view that what is involved is a continuing tort. I express no opinion on either of these questions at this stage of the action. I also express no opinion at this stage as to whether, assuming that the action for infringement fails, this action can be regarded as a properly framed independent action for an injunction against anticipated infringements.

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My conclusion is, therefore, that, while all four samples were made by a process covered by each of the first twelve claims of Patent No. 460,963, it has not been established that any of the samples was, at a relevant time, imported into Canada by the defendant and sold or otherwise used by the defendant in Canada so as to be an infringement of that patent within the principle applied in the *Auer Incandescent Light* case.

That does not, however, dispose of the matter because counsel for the plaintiff made two additional submissions that the plaintiff has otherwise established at least one act of infringement. Both submissions are based in part on the fact that the defendant admitted by way of examination for discovery that it had acquired from Gering Plastics Company in the United States, and imported, polyethylene film and tubing from September, 1956 to 1959 and from April, 1963 to the time of the examination for discovery.

The first of those two submissions is based also on a statement made by a Mr. Herman Gering before a tribunal known as the Federal Trade Commission in the City of New York in the United States on March 19, 1958 in a proceeding described as "In the Matter of United Carbon Corporation, a corporation". This statement was placed in evidence by filing copies of four pages of a transcript of evidence, which counsel for the defendant agreed represented evidence that was given by Gering at the date and place indicated on the transcript. According to the transcript, Gering was at that time Secretary and Vice President of Gering Products Inc. and, in answer to the question "By what method does Gering manufacture polyethylene film?" he answered, in effect, "the so-called blown tubing method, blown film". I am not satisfied that this establishes that the film purchased from Gering Plastics Company by the defendant at and subsequent to that time was made by the process covered by the plaintiff's patent. While it is admitted by the defendant that it bought film at that time from Gering Plastics Company, it is not admitted and has not been established that Gering Plastic Company manufactured the film that it sold to the defendant. We know nothing of the issue that was before the Federal Trade Commission and the isolated piece of evidence taken from

that proceeding in relation to such unknown issue, in respect of which the defendant had no opportunity to cross-examine, fails to persuade me that the method referred to by Gering was the only method by which Gering Products Inc. manufactured film or indeed was the air bubble method in respect of which the plaintiff's witnesses gave evidence and which I have found to be covered by the plaintiff's patent. Finally, I am of opinion that the statements made by Gering before the Federal Trade Commission are not admissible in this case to prove the facts there stated. Counsel for the plaintiff endeavoured to support his contention that it was admissible for that purpose on a passage in the third Edition of Halsbury's Laws of England, Volume 15, at page 299, which digests cases that establish that statements made by a predecessor in title when in possession of property, and affecting his rights thereto, are evidence against but not in favour of a party claiming through him. It is clear from reading the whole of that passage in Halsbury that "Such evidence is not, however, admissible when no question of title arises". No question of title to the film purchased by the defendant from Gering Plastic Company arises here and the principle laid down in the passage from Halsbury on which the plaintiff relies has therefore no application. The plaintiff also relies upon a quotation from volume 4 of Wigmore at pages 142-3. I do not, however, read that passage as laying down a principle of the law of evidence that would be applicable in this Court to support the admissibility of the transcript in question to establish the truth of the facts stated in it.

I do not, therefore, accept the submission that Gering's statement before the Federal Trade Commission in 1958 is any support for a contention that there has been at least one act of infringement.

The plaintiff finally relies upon the fact, that has been established, that the only process by which, during the relevant period, seamless polyethylene film has been manufactured in widths of 10 feet or more is the air bubble process which is the subject of the plaintiff's patent and the fact, which has also been established, that the defendant did import prior to the commencement of these proceedings, and subsequent to the plaintiff having become the owner of Patent 460,963, polyethylene film in widths of 10 feet and more.

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Having regard to the fact that many of these importations took place some months before the institution of these proceedings, I have no hesitation in finding that most if not all of the film in question would, in the ordinary course of the defendant's trade, have been sold in Canada before these proceedings were instituted. It would follow that a necessary act of infringement has been established subject to consideration of the defendant's contention that it has not been established that the wide width film so imported was not produced by joining together narrower widths that could have been produced commercially by some method other than the air bubble as described by the plaintiff's witnesses. This point is one which is difficult to resolve.

If the evidence had been simply that polyethylene film had been imported by the defendant in 10 ft., 20 ft. and 40 ft. widths, I should have been inclined to assume that all the wide widths of film in question were seamless and were therefore made by the air bubble process. I say this having in mind all the evidence and particularly the evidence that 75 per cent or more of all commercial polyethylene film is manufactured by the "air bubble method" in question, the evidence that film so produced is of the kind that is suitable for the building trade which is serviced by the defendant and is not suitable for decorative uses which require film made by other processes, to the evidence that it is the only commercial process for making such wide widths and to the evidence that the wide widths which have been examined were seamless. The doubt that I have arises from further evidence led by the plaintiff. One of the plaintiff's experts gave evidence that he examined the samples of film "for the presence of seams that might have been put in by some heat-sealing method" and that he did this by taking the full width of the film and "examining it carefully in cross-polarized light". This suggests, if it does not establish, that such seams would not be obvious on a superficial examination. The plaintiff then put in evidence an answer given by an officer of the defendant company on examination for discovery that he believed the tubing received from Gering Plastics to be "seamless". Such an answer on discovery, by itself, might well relate only to the sort of seam that a trader would know about because it was apparent in the ordinary handling of the material in the course of trade.

I am left in the quandary that there is no evidence that there is, or is not, a practice of joining narrow widths made by other processes to make wide widths for the building trade and there is no evidence that such seams, if they do occur, would, or would not, be apparent to persons handling the film in the course of trade. In these circumstances, I find it very difficult to reach a conclusion on the matter. Giving it the most careful consideration that I can, and not overlooking the fact that the onus of proof is on the plaintiff, I have reached the conclusion, having regard to all the evidence, that the balance of probability is that the importations in question, or at least some of them, were of seamless film.

I have come to the conclusion, therefore, that the plaintiff has established at least one act of infringement.

There will therefore be no judgment at this time and I am prepared to hear, either at this time or any other convenient time, submissions as to when the trial should be continued on the validity and other outstanding questions.

Before hearing counsel on that question, there are some other matters with which I should deal.

The first is the question as to whether the plaintiff is entitled to claim in this action in respect of acts of infringement alleged to have been committed by the defendant prior to the plaintiff becoming owner of the patent.

The relevant facts are

(*a*) Patent No. 460,963 was issued on November 8, 1949 to The Visking Corporation;

(*b*) the defendant first imported polyethylene film in September, 1956.

(*c*) On December 19, 1956, The Visking Corporation assigned to Union Carbide and Carbon Corporation, which was subsequently re-named Union Carbide Corporation, "the entire right, title and interest" in Patent No. 460,963.

(*d*) On April 30, 1962, Union Carbide Corporation assigned to the plaintiff "all its right, title and interest in and to" Patent No. 460,963 "together with all rights of action and claims for damages, profits and costs arising from past infringements" thereof.

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Two questions arise with regard to these assignments, namely,

(*a*) Can a right of action for infringement of a patent in Ontario, which is where the alleged infringements took place, be validly assigned? and

(*b*) If the answer to that question is in the affirmative, does a mere assignment of a patent without express reference to outstanding claims for infringements, such as the assignment from Visking to Union Carbide Corporation, impliedly include an assignment of claims in respect of past infringements?

In my view, both of these questions must be answered in the negative.

Taking the second question first, as a matter of interpretation, in my view, an assignment of specific property is quite a different thing from an assignment of an outstanding "right of litigation" for damage to that property and the one does not impliedly include the other. No authority to the contrary was cited to me.

With reference to the general question as to the assignability of claims for past infringements of patents for inventions, I adopt the principle enunciated by my Brother Gibson in a judgment delivered by him in *Burns & Russell of Canada Ltd. v. Day & Campbell Limited* on June 17, 1965[1], where he said:

> This assignment, save and except for the clause "together with the right to claim and recover damages or profits with respect to past infringements" is clear and unequivocal and purports to confer absolute legal title on the plaintiff. I say all, except for this clause, which is meaningless, because this clause purports to assign the right to sue for past infringement which is a cause of action in tort. It is not legally possible at common law to assign a tort and there is no provision in the *Patent Act* which changes the common law in respect thereto.

If the infringement has occurred in the Province of Quebec, the result would probably have been different because, under the Civil Law system, which is in vogue in that province and in Scotland, such claims are assignable. See the Scottish case of *United Horse Nail Company v. Stewart & Co.*[2], cited by counsel for the plaintiff.

[1] [1966] Ex. C.R. 673.

[2] (1885) 2 R.P.C 122.

I have not overlooked the argument of the plaintiff based upon subsection (1) of section 57 of the *Patent Act*, which reads as follows:

> 57. (1) Any person who infringes a patent is liable to the patentee and to all persons claiming under him for all damages sustained by the patentee or by any such person, by reason of such infringement.

To me it is quite clear that the section confers a right on the "patentee" to damages sustained by the patentee and upon a person claiming under the patentee for damages sustained "by any such person". It does not confer on a person claiming under the patentee a right to damages sustained by the patentee.

Even if I am not correct in the view that I have just expressed concerning subsection (1) of section 57, the plaintiff cannot succeed in this action in respect of infringements that took place when some other person was the patentee having regard to subsection (2) of section 57, which reads:

> (2) Unless otherwise expressly provided, the patentee shall be or be made a party to any action for the recovery of such damages.

My conclusion is therefore that the plaintiff has no right to claim for infringements committed before it became owner of the patent on April 30, 1962.

I should add at this stage that, while there was some argument as to whether the terms of reference, if there should be a reference, will provide for determining infringement, as well as damages, to the time of the reference, I made it clear that this was a matter that would be left for argument and decision at the second stage of the trial.

The second matter I wish to deal with at this stage is a question as to the nature of the injunction that it would be proper to grant in this case, assuming the ultimate success of the plaintiff in its action for infringement. The question that occurs to me, and upon which I should like to have assistance, at the proper time, is what, if anything, can the defendant be enjoined from doing. I realize that it is not uncommon for an injunction to be framed so as, in terms, to enjoin against infringing the plaintiff's patent and I realize that this, while somewhat inelegant, may be adequate when there is no doubt as to what act constitutes such an infringement. Here, however, the situation is different. A person, such as a jobber like the defendant, who is not skilled in the particular art, cannot be expected to

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know whether any particular polyethylene film was made by the plaintiff's patented process. Having regard to my findings, it may be, although I have some doubt, that the defendant can properly be enjoined from importing and selling or using unseamed polyethylene film that is 10 ft. or more in width.

At the moment, I have difficulty in seeing what other acts he can conceivably be enjoined from performing without, in effect, enjoining him from importing film made by some process other than the patented process. Indeed, it does occur to me to raise the question whether, in view of the authority conferred upon the Court by section 59 of the *Patent Act* to restrain or enjoin the defendant from use, manufacture or sale "of the subject matter of the patent", which in this case is the process, the Court has any power to enjoin the use or sale of something that is not the subject matter of the patent. There is also a question in my mind as to the period for which any such injunction would run. It would presumably, not be beyond the date when the patent expires. At least in theory, however, it seems to me that it should be open to the defendant to apply to dissolve the injunction upon showing that the factual basis upon which the injunction was issued has ceased to exist. I raise these matters so that they can be the subject of argument, if the plaintiff is successful on the second stage of the trial.

I also have to refer to paragraph (*d*) of the prayer for relief in the Statement of Claim, by which the plaintiff claims

> (*d*) An order that the Defendants and each of them forthwith deliver up under oath to the Plaintiff all articles in the Defendants' possession or power made in infringement of the said Letters Patent or that the said articles be destroyed.

In the first place, I can find no authority for such relief in our statute and, in view of the express authority for damages and injunctions, I should, at the proper time, like assistance as to the authority for any such relief. Secondly, I might say that I have some doubt as to the application of that part of the paragraph which refers to "articles...made in infringement" to the facts of this case.

Finally, I wish to leave with counsel, a rough draft of a *fiat* for judgment for a possible reference so that they can be prepared to make submissions with regard thereto in the

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event that the plaintiff is ultimately successful in this infringement action. This draft *fiat*, which was not prepared with any particular action in mind, reads as follows:

Let judgment go:

1. declaring and adjudging that the patent referred to in paragraph .. of the Statement of Claim is valid;
2. declaring and adjudging that the said patent has been infringed by the defendant;
3. declaring and adjudging that the plaintiff is entitled to be paid by the defendant an amount equal to either
   (*a*) the amount of the damages sustained by the plaintiff as a result of the infringement by the defendant of the said patent, or
   (*b*) the amount of the profits derived by the defendant from infringing the said patent;
4. for the purpose of determining the amount that the plaintiff is so entitled to be paid by the defendant (if the parties cannot agree on it), referring to the Registrar (or a Deputy Registrar nominated by the Registrar or, if none such be available, an officer of the Court agreed upon by the parties or appointed by the Court) for inquiry and report, the following questions, viz:
   (*a*) what acts of infringement by the defendant of the aforesaid patent have occurred as alleged by the statement of claim; and
   (*b*) according to the election of the plaintiff, (which election must be made in writing and filed in the Court and served upon the defendant before the plaintiff may take any step in connection with the reference) what is the amount of the aforesaid damages sustained by the plaintiff or the amount of the aforesaid profits derived by the defendant; and
5. ordering the adjudging that the plaintiff recover from the defendant his costs herein to be taxed except the costs of the reference, which shall be left to be dealt with upon the motion for judgment upon the report of the referee under Rule 186 of the General Rules and Orders of this Court.

H. G. Fox, Q.C. and *D. F. Sim, Q.C.* for plaintiff.

G. F. Henderson, Q.C. and *D. G. Kilgour* for defendants.

Toronto 1966

Jan. 11-13 24-28

Mar. 11

JACKETT P.:—These reasons are to be read with the Reasons for Judgment that I delivered herein on November 10, 1965 at the conclusion of the first part of the trial of this matter.

As indicated therein, the defendant's attacks on the validity of the patent in suit had been left to be heard after the disposition of the other issues. The parties have now put in their evidence on the questions so left to be heard and have been heard in argument with regard thereto.

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At the conclusions of such argument, on January 28, 1966, I reserved judgment on the understanding that I would in due course deliver reasons for judgment indicating my findings as to the validity of the patent and that I would, at the same time,

(*a*) if I conclude that the patent is invalid, pronounce judgment dismissing the action,[1] subject to hearing the parties concerning costs before the minutes of judgment are settled, and

(*b*) if I conclude that the patent is valid, defer pronouncement of judgment until after the parties have been given a suitable opportunity to be heard as to the relief that should be awarded to the plaintiff.

On the questions relating to the validity of the patent in suit, the plaintiff relied in the first instance upon the fact, which had already been established, that the patent in suit (hereinafter referred to as the "Fuller patent") had been granted under the *Patent Act*, R.S.C. 1952, chapter 203, as amended. Its position was based, *inter alia*, upon section 48 of the *Patent Act*, which reads, in part, as follows:

> 48. Every patent granted under this Act shall be issued under the signature of the Commissioner and the seal of the Patent Office; the patent shall bear on its face the date on which it is granted and issued and it shall thereafter be *prima facie* valid...

It has been established by decisions of this Court that section 48 imposes upon a party attacking the validity of a patent granted under the *Patent Act* the onus of showing that the patent is invalid "no matter what the ground of attack may be".[2] If an attack on the validity of such a patent is to succeed, there must be evidence that satisfies[3] the Court that the patent "is invalid". In the consideration of such evidence, however, the presumption contained in section 48 has "no weight capable of being put in the balance".[4]

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[1] During the course of the trial, the defendant abandoned its counterclaim.

[2] *Ernest Scragg & Sons Ltd. v. Leesona Corporation*, [1964] Ex. C.R. 649, per Thorson P. at page 723.

[3] I employ the verb "satisfy" here to deal with "the incidence of proof, not with the standard of proof . . ." See *Blyth v. Blyth* (H.L.) London Times Law Reports, February 16, 1966, per the Master of the Rolls.

[4] *Ernest Scragg & Sons Ltd. v. Leesona Corporation*, (*supra*) at page 724, and Halsbury's Laws of England, Third Edition, Vol. 15 at page 343, as quoted by Thorson P. at the same page.

The only attacks on the validity of the Fuller patent upon which the defendant relied at trial are

(*a*) that the process that is the subject matter of the Fuller patent (hereinafter referred to as the "Fuller process") is not an "invention" for the purposes of the *Patent Act* because it does not involve any inventive step having regard to the state of the art at the date of the "invention";

(*b*) that, although the claims in the Fuller patent are that the Fuller process will work on all thermoplastics, that process as described by the disclosure will not operate on nitro-cellulose, which is a thermoplastic,[1] and

(*c*) that the Specification in the Fuller patent fails to meet the requirements of section 36 of the *Patent Act* in that the instructions for the working of the patented process leave it to further experiment to determine how to work the process in respect of all applications of the process not covered by the examples given.

Any other attack on the validity of the patent that may be found in the pleadings is to be disregarded because it was not relied upon at trial and was, in effect, abandoned. Any question as to whether the three attacks that I have outlined were properly raised by the pleadings was either waived by agreement of counsel for the plaintiff that the attack was properly raised or was met by an amendment to the pleadings that was made during the course of trial.

The first attack by the defendant on the Fuller patent was based upon the proposition, with which the plaintiff agreed, that for a process to be an invention within the concept as defined by the *Patent Act*, it must not only be novel in the sense that it must be different from any pre-existing process but it must be new from an inventive point of view,[2] which requirement has been expressed by such statements as the following:

(*a*) that it must involve an inventive step,

(*b*) that it must be the result of inventive ingenuity,

[1] This attack was raised by an amendment to the defence permitted during the trial which referred to cellulose nitrate and two other substances During argument, counsel for the defendant conceded that there was no evidence concerning the other two substances. Cellulose nitrate is another name for nitro-cellulose.

[2] *The Commissioner of Patents v. Farbwerke Hoechst Aktiengesellschaft Vormals Meister Lucius & Bruning*, [1964] S.C.R. 49.

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(*c*) that it must not have been obvious, or

(*d*) that there must be subject matter.

No matter which of these expressions is used, it is a way of describing the same requirement, which requirement is implicit in the definition of "invention" in the Canadian *Patent Act*. Whether a particular process complies with that requirement (which I shall refer to as the requirement of "inventive ingenuity") is to be judged against the background of the relevant state of affairs as it existed at the time when the alleged "invention" was "invented", that is to say, when the process was devised. I shall hereafter refer to this as the time of the alleged "invention".

The relevant state of affairs constituting the background against which the requirement of inventive ingenuity must be judged in any particular case is the information that would have been available[1] at the time of the alleged "invention" to the ordinary fully qualified and experienced person in the particular industry or activity who would, at that time, have had to deal with problems such as that in respect of which the alleged "invention" was "invented". (Such person is sometimes referred to as "the ordinary skilled workman" and I shall so refer to him in the remainder of these reasons.) Such information consists in the general knowledge that the ordinary skilled workman would have had at that time, in addition to any information available to him at that time in publications including patents of inventions. (Such publications are sometimes referred to as "prior art".)

In this case, as appears to be not unusual in recent cases of this kind in the Court, no evidence was led that tended to show *directly*

(*a*) the time that the alleged "invention" was "invented"—that is, the time when the Fuller process was devised,

(*b*) the history of the manner in which the alleged invention was invented,[2]

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[1] This includes not only what is "common knowledge", but also what is "public knowledge". Compare *Savage v D. B. Harris & Sons*, (1896) 13 R P C. 364, per Lindley L J. at page 368.

[2] Compare *Sharp & Dohme Inc. v. Boots Pure Drug Company Ld.*, (1928) 45 R.P C. 153, per Sargant L J. at page 187.

(*c*) what class of person constituted the relevant ordinary skilled workman in the industry or other activity for which the Fuller process was devised,[1] or

(*d*) what general knowledge such ordinary skilled workman would have had, what prior art would have, in fact, been available to him, or what meaning the prior art would have had for him in the light of his general knowledge.[2]

With reference to the time of the alleged "invention", since the defendant is neither the inventor nor the assignee of the inventor, it is perhaps not too surprising that there was no direct evidence available to him. Had an objection been taken to the lack of evidence on this point, I should have found it very difficult to escape the conclusion that there was no evidence.[3] However, as this point was not raised, and as the parties fought the case on the apparent assumption by both parties that, in the absence of other evidence as to the time of the alleged "invention", evidence as to when the application was made for the patent determined the date when the alleged "invention" was invented, I am relieved from reaching a conclusion on that question. I shall therefore reach a conclusion, on the balance of probabilities, on the composite question as to whether the

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[1] Compare *Osram Lamp Works Ld. v. Pope's Electric Lamp Company Ld.*, (1917) 34 R.P.C. 369, per Lord Parker, at pages 391-2.

[2] See *British Celanese Ld. v. Courtaulds, Ld.*, (1935) 52 R.P.C. 171 at page 196, where Lord Tomlin indicates that, while an expert witness may not say what a document means, he may say what, at a given time, to him as skilled in the art, a given sentence, on a given hypothesis as to its meaning, would have taught or suggested to him.

It would be of particular assistance to the Court in connection with the effect to be given to any document constituting part of the "prior art" to have evidence as to "what would this document in fact convey to those in the art?" See Blanco White's "Patents for Inventions", Third Edition, 1962, pages 134-5, and *British Thomson-Houston Company Ld. v. Charlesworth, Peebles & Co.*, (1925) 42 R.P.C. 180, per Lord Shaw at pages 204 to 206. Compare *The Lancashire Explosives Co. Ld. v. The Roburite Explosives Co. Ld.*, (1895) 12 R.P.C. 470 at pages 479 and 481, and *Allmanna Svenska Elektriska A/B v. The Burntisland Ship-building Coy Ld.* (1952) 69 R.P.C. 63, per Jenkins L.J. at pages 76 *et seq.*

[3] Offhand, it would not seem that the fact that the alleged "invention" must have been invented *before* a particular date establishes that any information available at some point of time *before* that date must have been available when the alleged "invention" was invented. All it would seem to establish in connection with the prior art is that information that was not available until after that date was clearly not available when the alleged "invention" was invented.

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relevant background information at the time of the alleged "invention" was such as to lead to the conclusion that it did not take inventive ingenuity to devise the Fuller process.

I am also relieved from deciding whether there was any evidence as to the prior art that would have been "available" to the ordinary skilled workman during the general period that was, in effect, accepted by the parties as being relevant. It was common ground that mere proof of patents published anywhere in the world containing teaching bearing on the particular branch of knowledge, without any proof as to whether they would have been available in fact to the ordinary skilled workman (and, by implication, because the point was never raised, without any proof of what meaning they would have had for him in the light of his general knowledge) was evidence that the Court must consider as tending to establish the background against which the question of inventive ingenuity must be decided.[1] I must therefore by reason of the position so taken by the parties, reach the best conclusion that I can on the background information put before the Court.

The Fuller patent is entitled "Method of Making Flattened Thermoplastic Tubing of Predetermined Desired Characteristics". Before examining the nature of the Fuller process, I propose to outline, as nearly as possible in chronological order the evidence as to background material including the evidence as to the date of the alleged "invention", and then to examine the nature of the Fuller process with a view to determining whether, having regard to the background material, it took inventive ingenuity to devise it.

Before doing so, however, it is important to note that a *thermoplastic*, according to the evidence, is a substance of a particular chemical type[2] that has the following characteristics:

(*a*) at ordinary temperatures (room temperature) it is solid;

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[1] The plaintiff, of course, reserved the right to argue as to the cogency or effect of the teaching of any particular patent and also took a special objection to a particular patent.

[2] Variously described as a high molecular weight polymer type of compound or an organic polymer.

(*b*) when heated it becomes plastic or malleable so that its shape can be changed;

(*c*) when it is brought back to ordinary temperatures after its shape has been changed while it was plastic or malleable—that is, when it has been "set"—it retains the shape it was so given;

(*d*) it retains the characteristics set out in paragraphs (*a*), (*b*) and (*c*) after it has been previously heated, moulded and cooled one or more times.

It should also be noted at this preliminary stage that, while thermoplastics have the characteristic that they become malleable when heated, some of them, at least, can be "conditioned" for "working" by being put in certain types of solution or "colloidal dispersion".

The evidence to show the background of information available to the ordinary skilled workman at the time of the alleged "invention" falls into two classes: general evidence concerning earlier manufactures from thermoplastics and "prior art" patents.

The most important points in the general evidence may be summarized as follows:

1. In "the early days", there was a method for "dry" [1] extruding nitro-cellulose for propellants for artillery shells—no evidence was led as to the process but it presumably had safeguards against premature explosion. Early in this century, a better "wet" extrusion method was devised and the "dry" extrusion of nitro-cellulose for this purpose was abandoned.

2. Since *1905* or earlier, *celluloid*, which is a thermoplastic consisting of a mixture of nitro-cellulose and camphor, has been extruded in solution commercially. It has also been stretched and moulded. It has been produced in the form of more or less solid tubes, plates, sheets, rods, etc.

3. Since *1905*, rayon filaments or fibres[2] have been produced commercially by extruding the thermoplastic known as cellulose xanthate, and more commonly known

[1] "Dry" extrusion, for purposes of this judgment, may be defined as extrusion of a substance that has *not* been put in solution and "wet" extrusion is extrusion of a substance in solution.

[2] The original rayon was produced from nitro-cellulose, apparently by a process of wet extrusion that was commercialized in 1891.

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as "viscose", through a "spinnerette" die (consisting of a nozzle with many very small holes) and regenerating the resultant filaments or fibres into cellulose.[1]

4. Since *1927*, or *1928*, cellophane, which is a transparent film of regenerated cellulose, has been produced in the same way as rayon filaments or fibres, with the exception that a slot die is substituted for the spinnerette.

5. Since *1931* or *1932*, viscose has been extruded through a circular die to produce continuous cellulose tubing—this is the same general process as that for producing cellophane except that the product is in tubular form.

6. Since the early *1930's*, the thermoplastics polyvinochloride and polystyrene have been manufactured into various types of articles either by putting them "dry" into moulds or by dry extruding them from a die, in the "molten" state created by heat, and then setting them in the shapes so created.

7. In *1933* a process for making cellulose tubing from nitro-cellulose was brought to the United States from Germany. (This process was the predecessor of the Reichel and Craver patent referred to later. A series of such processes, of which the one brought to the United States in 1933 was the first, was employed in the United States commercially to make sausage casings from 1934 to 1962.)

8. About *1940*, commercial production of *nylon*, which is a thermoplastic, commenced—it consisted in dry extruding a melted nylon material through a spinnerette type of nozzle.

As already indicated, the balance of the evidence concerning the background material consists of certain foreign patents, which may be summarized as follows:

1. *July 14, 1936*—United States Patent 2,047,554, Ernst Fischer—inventor (hereinafter called the "Fischer patent").

[1] Cellulose—wood fibre—is not a thermoplastic. It is made into a thermoplastic—cellulose xanthate or viscose—by reacting it with xanthic acid. Viscose is an extremely viscous yellow-brownish liquid, which is extruded through a die into a coagulating bath that converts it into regenerated cellulose—that is cellulose in a different form from that with which the process started.

This is a process patent and relates to the manufacture of "hollow-shaped bodies" from a thermoplastic substance known as "polystyrene" and "like substances".

The disclosure tells us that the manufacture of shaped bodies from polystyrene (one of the polyvinol compounds) presented great difficulties in spite of its "thermoplasticity". It says that it was well known, at that time, that polystyrene could be "pressed", in a heated state, into desired shapes and that experiments had been carried out to work polystyrene in a manner similar to a well-known metal spraying method but that the shaped bodies so produced were brittle and inflexible at normal temperatures, which fact considerably restricted their "possibility of use".

It further tells us that it had already been proposed to render shaped bodies of polystyrene less brittle and more pliable by subjecting them during formation to a mechanical stress—particularly by causing them to elongate during formation. In this manner, it says, it was actually possible to manufacture "ribbons, filaments, section wires and the like" of less brittleness and sufficient pliability so that they could be utilized for a variety of purposes.

However, it says, no method had been known, before that time, "to continuously produce particularly thin-walled tubular bodies" from polystyrene, since the methods employed before that time in connection with the manufacture of shaped bodies of polystyrene only ensured production of "solid bodies".

The object of the Fischer invention, according to the disclosure, was to provide a method whereby hollow shaped bodies might be made "without losing the greater pliability aforementioned". The method, it says, is preferably carried out so that in forming a body of polystyrene its walls are also stretched "which reduces the brittleness and increases the pliability of the material".

By way of explanation, the disclosure tells us that the "stretching" of polystyrene does not merely change mechanically the cross-section of the material, but changes its internal structure.

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The process disclosed need not be described in detail. It is sufficient to say that it involves continuously extruding a molten thermoplastic in the form of a seamless tubing and continuously withdrawing the tubing from the point of extrusion. It also involves stretching the thermoplastic laterally by filling the tubing as it leaves the mouth of the die with compressed air. It also suggests, as a possiblity, cooling the thermoplastic tubing to room temperature by "a cooling tube".

2. *January 13, 1938*—German Patent 654,757 (hereinafter called the "first German patent").

This is a patent for the manufacture of pliable ribbons, sheets or tubes from polystyrene, etc. It is described as an addition to supplementary patent 654,299 patented in Germany as of November 26, 1933. The principal patent 653,250 became effective October 25, 1932.

The Specification of patent 654,757 discloses that the principal patent was for a method for the manufacture of ribbons and sheets from certain man made substances which are brittle by nature, as, for instance, polystyrene, "but are made flexible and pliable in every direction". "The method", according to the principal patent, consists in "stretching the substance lengthwise and crosswise after it has been pressed through a nozzle at an increased temperature". The method of the principal patent consisted in pressing the substance through a "rectangular nozzle" at a temperature of 150°C. and stretching the resulting ribbon in both directions by a special device.

Patent 654,757 discloses that pliable ribbons, sheets and tubes can be produced in a simpler and more effective manner by pressing the substance through a "circular nozzle" and by "pulling" the "resulting tube" over a stretching device. It tells us that the speed with which the tube is pulled over the stretching device must, according to the principal patent, be such that the tube can "be stretched simultaneously in both directions by the stretching device" and that the method, according to the invention in the first

German patent, consists of stretching polystyrene, etc., simultaneously in two directions "to increase the pliability of the substance".

3. *January 13, 1938*—German Patent 655,014 (hereinafter called the "second German patent").

This patent is referred to as an addition to the first German patent and the invention is said to consist in the improvement of the method and device in that patent, which it describes as a method and device for the manufacture of pliable ribbons from certain products and in particular polystyrene "by pressing the substance through a circular nozzle and then pulling it over a stretching device".

The Specification in the second German patent says that, with constant "pressure", the thickness of the wall of the tube or the thickness of the ribbon depends on

(*a*) the temperature,

(*b*) the friction and the diameter of the nozzle, and

(*c*) the degree of the stretch.

It explains that for various reasons the thickness will be different in different parts of the ribbon. (An important reason seems to have been that the stretching device over which the tubing was pulled was rectangular in shape.) It teaches that to produce ribbons of uniform thickness and pliability, a further improvement of the invention according to the first German patent consists in "the cooling of certain parts of the ribbons after they have left the circular nozzle", preferably by compressed air or other compressed gases blown upon the ribbon through adjustable nozzles, some of which should be movable so that they can be directed during the process towards the spots which require cooling. According to the disclosure, the nozzles may be affixed in great numbers around the ribbon and the force of the compressed gas can be adjusted in such a way as to produce a ribbon of uniform thickness and pliability.

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4. *October 24, 1939*—United States Patent 2,176,925—Frank H. Reichel and Augustus E. Craver inventors (hereinafter referred to as the "Reichel and Craver patent").

This invention related to flexible tubing and more particularly to flexible tubing of a type capable of use as artificial sausage casings.

The problem in the sausage making field was to get casings that were uniform as to size, expansibility, tensile strength, shape, appearance, etc. Reichel and Craver worked out their process to produce casings of such predetermined characteristics by taking advantage of the fact that certain materials when stretched (after they have been conditioned so as to adapt to stretching) and set in the stretched condition, became stronger than they were before being stretched in a way and to an extent that is related to the direction and the amount of the stretching. Their process consisted in

(*a*) dissolving or otherwise dispersing a cellulose derivation (preferably nitro-cellulose) in a liquid;

(*b*) shaping the solution in the form of a seamless tubing preferably by extruding it through an orifice into a bath;

(*c*) coagulating (i.e., converting into a soft solid) the tubing by having appropriate coagulating substances in the bath;

(*d*) conditioning the tubing for stretching either by having appropriate conditioning substances in the bath or otherwise;

(*e*) stretching the tubing longitudinally and transversely; and

(*f*) fixing the micellar structure of the tubing material in the condition caused by the stretching.

The disclosure says that, when employing thermoplastic tube-forming materials, it had been found that the stretching operations might be facilitated by the application of heat which renders the material more plastic and that the degree of stretch under a constant

force will be dependent upon the plasticity of the tubing which, in turn, is dependent upon its temperature. It also teaches that "Where heat has been employed the condition and/or for stretching the tubing, the stretched structure may be fixed by chilling the tubing, for example, by passing it through a bath of cold water or *through a stream of cold air or the like*". (The italics are mine.)

This disclosure also contemplates the predetermining of desired characteristics of the ultimate tubing by varying certain of the variables in the process. For example, it says, ". . . a finished tubing having substantially any desired strength and shrinkage characteristics within the limits of the material can be produced by suitably proportioning the ratio of the amount of longitudinal stretch to the amount of transverse stretch imparted to the tubing at the proper point in its manufacture".

When the operation of the Reichel and Craver process is described by reference to the preferred form of apparatus illustrated in the drawing accompanying the Specification, a clear picture is obtained of the production of a continuous tubing by extrusion of a plastic substance through an annular (circular) die and of the use of an air bubble and draw or nip rolls to stretch that continuous tubing in both directions.

5. *March 20, 1942*—Italian Patent 393,119 (hereinafter referred to as the "Italian Patent").

This patent states that it was known that thin-walled flexible tubes could be produced from organic thermoplastic substances by inflating thicker tubes in the plastic hot state with air or other gases and that a prerequisite for executing the process was that the substance be sufficiently tenacious in the heated state since "otherwise holes or cracks form in the flexible tube and the gas escapes". It also says that superpolyamides are generally of a low viscosity in the fused state and are therefore not suitable for the method but that it has been found that, contrary to all expectations, superpolyamides made in a particular way can be used to produce "technically unexceptional thin-walled flexible thicker tubes or flexible tubes in the

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plastic, hot state". It says that such superpolyamides are distinguished by their high viscosity in the fused state and gradually become plastic with increase in temperature.

The process as disclosed by this patent is described in part as follows:

> "the hot superpolyamide is plasticized . . . and extruded through a nozzle for tubes. In the centre of the nozzle there is a passage through which air, nitrogen or another gas is blown. The flexible tube is placed under high pressure at the start and is then expanded, and by varying the pressure of the gas and/or the size of the nozzle, flexible tubes of any diameter and thickness are obtained . . . The process may with advantage be made continuous by passing the flexible tube into a pair of rollers located far enough away from the nozzle to permit cooling of the layer of material. By means of this pair of rollers, the air is completely expelled . . ."

The disclosure says that the temperatures to be used in the extruding machine depends upon the "superpolyamide softening area" used and that, in producing specially thin foils, the temperatures used will be higher than for thick foils.

The evidence shows that the Reichel and Craver process was used commercially from 1938 until 1962. There is no information in the evidence as to whether any of the processes disclosed by the other patents was ever used commercially or at all.

In the early 1940's, the thermoplastic polyethylene came into use on a commercial scale. There is no clear evidence as to the process used in its manufacture when it first came into commercial use. It seems probable that a slot die process was employed.

On October 20, 1945, an application was filed for a United States patent for the Fuller process, which, it is apparent, was devised primarily for polyethylene. The application for the Canadian patent was not filed until September 11, 1948.

With some hesitation, I have come to the conclusion that the balance of probability is that the Fuller process was not

devised until after the grant of the Italian patent on March 20, 1942. The only evidence that bears on the point is that the first application for a patent of the Fuller process, as far as the evidence discloses, was made in October 1945. It was devised primarily for polyethylene which was just coming into commercial use in the early 1940's, and the plaintiff, who was interested in establishing an earlier date for the invention and was presumably in a better position to obtain information concerning the actual facts, brought forward no evidence whatsoever as to when the process was in fact devised.

In any event, the Italian patent is the only part of the background evidence adduced by the defendant that the plaintiff contended could not be considered and its contention was based on the very special reason that, while that patent would otherwise be information that, in accordance with the plaintiff's submission, the Court should deem to have been available to the ordinary skilled workman, the existence of a state of war between Canada and Italy changed the situation. As I indicated during argument, in the absence of any help from counsel as to what legal principle required the Court to deem both foreign and Canadian patents to have been available to the ordinary skilled workman when there is no evidence as to what information was in fact available to him, I have great difficulty in deciding whether a state of war creates an exception to the principle. However, as I understand the argument, it was based on the assumption that information concerning patents could not have reached Canada from Italy while there was a war on. This is a matter that should have been established by evidence. As far as appears from the evidence, information taught by an Italian patent could have passed by ordinary means of communication in technical circles from Italy to a neutral country and from the neutral country to Canada. I find that I must treat the Italian patent as falling in the same class as the other evidence of "prior art".

In any event, the Italian patent does not substantially alter the background picture and I should not have reached a conclusion different from that that I am about to express if I had accepted the submission that I cannot look at the Italian patent.

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The background against which I must judge whether the Fuller process has inventive ingenuity is, as I find it, that a skilled workman would have known, at the time when the Fuller process was devised,

(a) that thermoplastics had been manufactured into shapes by extruding them, at ordinary temperatures or after heating, through different shaped dies (slot, spinerette and circular) either in solution (wet) or not in solution (dry) depending upon the characteristics of the particular thermoplastic,

(b) that thermoplastics could be given determinable useful characteristics by varying amounts of stretching in either or both directions during the manufacturing process,

(c) that where a thermoplastic was formed by extrusion in a plastic state from a circular die in the shape of continuous tubing, air trapped in the tubing while still in a plastic state so as to form an air bubble ahead of rolls through which the tubing was being pulled at varying speeds, was a convenient and versatile method of attaining the amount of stretch required in either direction and of varying the diameter of the tubing and the thickness of the film, and

(d) that air cooling could be used on the outside of such tubing to accelerate the setting of the film.

In Appendix A to these reasons, I have set out the disclosure and the first claim (from the point of view of the problem of inventive ingenuity there is no material difference between the first claim and any of the other claims) and I have analyzed them in detail. As there indicated, the first claim may be broken down as follows:

The claim is, in a method of producing flattened tubing of predetermined desired characteristics, the steps which comprise

(1) continuously dry-extruding a molten thermoplastic in the form of a seamless tubing,

(2) continuously withdrawing the tubing from the point of extrusion,

(3) flattening the tubing at a point spaced from the point of extrusion,

(4) maintaining a substantially constant continuous isolated bubble of a gaseous medium in the section of the tubing extending between the point of extrusion and the point of flattening, the quantity of the gaseous medium constituting the bubble being such as to inflate the tubing while in the plastic formative state to a predetermined desired diameter at a point beyond the point of extrusion, and

(5) passing the tubing while in the plastic formative state through streams of a cooling gaseous medium in the vicinity of the point of extrusion and impinging circumferentially on the tubing in the plastic formative state to chill the tubing "to an extent that when the tubing has been inflated by said bubble to the said predetermined diameter it will be in a set condition",

"the rate of withdrawing the tubing, the degree of inflation of the tubing and the degree of chilling the tubing all being correlated in accordance with predetermined desired physical characteristics of the tubing."

Counsel for the plaintiff submitted that the "inventive step" in the Fuller patent over the prior art "lay in the discovery that cooling air directed circumferentially on the film near the point of extrusion could be used to control the rate of the cooling of the film, and that the correlation of this cooling rate with the degree of inflation . . . and the rate of withdrawal would permit the production of film of predetermined and controllable characteristics, from a wide variety of thermoplastics."

If this submission is taken literally, the "inventive step" is said to consist in the discovery of two things, namely, first, that "cooling air directed circumferentially on the film near the point of extrusion" could be used to control the rate of cooling of the film, and second, that the "correlation" of this cooling rate with the degree of inflation and the rate of withdrawal would permit the production of film of predetermined and controllable characteristics from a wide variety of thermoplastics.

So far as the first of these two discoveries is concerned, even if there was no help in the evidence, I should have been inclined to take judicial knowledge that there is no inventive step in discovering that "cooling air" can be used

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to control the rate of cooling of the film,[1] no matter where it is employed, and I fail to see any discovery of an inventive character in finding that air cooling can be used either at the point of extrusion (which is the first place where it can be applied) or circumferentially (the object at which it is directed being circular). In any event, air cooling to control the rate of cooling is taught by the second German patent, for a different purpose it is true, and the Reichel and Craver patent teaches that thermoplastic tubing may be "fixed" after it has been stretched by passing it through "a stream of cold air". Certainly, it requires no inventive genius to discover that the more air or the cooler the air that is applied the faster the thermoplastic will be cooled to a temperature at which it will be "set".

Turning to the second branch of counsel's "inventive step", namely, the discovery that the "correlation" of the cooling rate achieved by the cooling air with the degree of inflation and the rate of withdrawal would permit the production of film of predetermined characteristics, my first observation is that it does not appear to have been as clear to Fuller or the draftsman of his specification that this was his discovery. When he first described his invention in general terms, he referred to "setting" the expanding tubing with no indication of the means—which does not seem to attribute too much importance to air cooling. Indeed, as far as I have been able to find, there is no place in the disclosure where first importance is attached to air cooling, when the idea of varying the variables of the process to obtain desired characteristics in the product is being disclosed. In one place, it is expressed by reference to the "peripheral speed of the squeeze rolls" in combination with the other controlled variables. (That is certainly taught by the "prior

[1] The disclosure does not treat either "cooling" or "air cooling" as something new. It says that, in place of the "air cooling" coil, some of the other "known" cooling systems may be utilized. Compare *British Thomson-Houston Company Ld. v Duram Ld.*, (1918) 35 R.P.C. 161, per Lord Finlay L.C. at page 175: "There can be no subject-matter in the application to tungsten of the old process of working under heat, as this does not require any invention". See also *British Celanese Ld. v. Courtaulds Ld.*, (1935) 52 R.P.C. 171, per Lord Tomlin at page 195: "The employment of warm air as an evaporative medium was not novel and its employment in combination with the integers found in Clark was clearly obvious." The use of air cooling to cool a thermoplastic so as to set it is comparable to the use of heat to condition a metal for working it or the use of warm air as an evaporative medium.

art".) In another place, it is expressed by reference to correlating the other variables with the expansion of the tubing. In still another place, the reference is simply to the "variables in the process". In three other places, internal air pressure, the volume of "cooling air" or "cooling medium" and the diameter of the die are mentioned in that order.

Reading the disclosure as a whole as carefully as I can, it does not seem to me that the idea of correlation of variables in the process is limited to any particular variables. The basic idea is that there are a number of variables in the process each of which has its effect on the ultimate product and that they can be varied in many ways so as to get a desired result. Some suggestions are made as to what variables might be chosen for the purpose and the claims are stated in terms of specified variables. Nowhere, as far as I can find, however, does the disclosure suggest the "correlation" in quite the way put by counsel for the plaintiff. The claims do, it is true, refer to the rate of withdrawing the tubing, the degree of inflation of the tubing and the degree of chilling the tubing all being correlated but they neither place special emphasis on the degree of chilling nor express it as a correlation of the degree of cooling with the other two factors.

In any event, I cannot find any inventive ingenuity in the idea, upon which the Fuller process is based, that you achieve a particular width of product and a product that has been stretched laterally and longitudinally to the extent required to produce the thickness and the characteristics of film desired by appropriately varying the size of the air bubble, the speed of withdrawal of the tube and the rate of cooling or chilling.

In the first place, I find an almost direct application of that part of Lord Tomlin's judgment in *British Celanese Ld. v. Courtaulds, Ld.*[1], which reads as follows:

> It is accepted as sound law that a mere placing side by side of old integers so that each performs its own proper function independently of any of the others is not a patentable combination, but that where the old integers when placed together have some working interrelation producing a new or improved result then there is patentable subject-matter in the idea of the working inter-relation brought about by the collocation of the integers.
>
> . . .

[1] (1935) 52 R.P.C. 171 at pages 193-4.

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In the truth and in fact there is no interrelated working between the integers in the sense that any one of the integers is doing something which it could not do without the presence of one or more or of the others. Each integer is in fact performing its own part and is not functionally dependent upon the presence of any other integer at all. I think therefore that the invention lacks subject-matter.

A variation of any one of the three integers claimed by the Fuller patent (namely, the degree of inflation of the tubing, the rate of withdrawal of the tubing or the rate of cooling of the tubing) has certain obvious effects on the ultimate product of the process whether it occurs alone or at the same time as a variation in one or both of the other "integers". If more than one is to be varied the effect of all the variations on the ultimate product must, of course, be taken into account. However, the variation of all three at the same time does not, as far as I can tell from the evidence, have a "working interrelation" producing "a new or improved result" in the sense that "one of the integers is doing something which it could not do without the presence of one or more of the others". Each variation in the process performs its own part and is not "functionally" dependent upon any other variation. It follows that "the invention lacks subject-matter".

Furthermore, if there would otherwise be inventive ingenuity in the combination idea in the Fuller patent, it was so little different from what has been done before as to be a mere obvious variation. The disclosure itself says that "Obviously" if one or more of the conditions which were maintained constant in the examples were varied one of the other variables would have to be "balanced" to compensate.[1]

[1] An alternative submission was made by counsel for the plaintiff that was, in effect, that, whereas the Italian patent taught that, as of that time, only some of the thermoplastics were suitable for the air bubble method because others were not sufficiently viscous in the fused state, the Fuller patent claims that the Fuller process is an air bubble method suitable for *all* thermoplastics and that (assuming that the attacks other than that for lack of inventive ingenuity fail) it must therefore be assumed that there is something in the Fuller process that overcomes the difficulty that had been previously encountered with thermoplastics that were of a low viscosity in the fused state. This something, counsel suggested, is the air cooling at the point of extrusion, which, he suggests, will have the result of making low viscosity thermoplastics sufficiently viscous so that the tubing will remain intact and contain the air bubble. What the Fuller patent claims, however, is not sufficient air cooling to make the particular thermoplastic viscous enough to withstand the air pressure but air cooling

Quite apart from the bases upon which counsel for the plaintiff asked the Court to find that the Fuller process involved inventive ingenuity, in my opinion, the balance of probability is that the Fuller process would have been the obvious answer to the ordinary skilled workman who, shortly after the inception of the commercial manufacture of polyethylene in the early 1940's by, for example, the slot die method, had been asked to find a better method of processing this new thermoplastic that could be used for making film of different widths, different thicknesses, and different characteristics, without the limitations of the slot die or other earlier method. (Compare the discussion of the relative advantages of the different methods in the reasons that I delivered at the end of the first part of the trial of this case.) The Fuller process for a thermoplastic such as polyethylene was in the path that was already being followed by persons charged with the task of devising processes for thermoplastics.[1] The ordinary skilled workman to whom the problem was put, if he had looked only at the process in the Reichel and Craver patent as exemplified by reference to the drawing attached to the disclosure, knowing (because it was already being used in the slot die process) that polyethylene could be conditioned for processing by heating alone, would only have had to make obvious adjustments to reach the Fuller process. He would

to chill the tubing "to an extent that when the tubing has been inflated by said bubble to the said predetermined diameter it will be in a set condition." Obviously this is air cooling for an entirely different purpose from that suggested by counsel and in many cases the two results—that contemplated by the claim and that suggested by counsel—could not be achieved by the same degree of air cooling. For the purpose of finding inventive ingenuity, I am not prepared to assume, merely by reason of a claim of a universal nature, that a process can be applied to achieve a result that, on the evidence, it is most improbable that it will achieve If there is a thermoplastic of such a low viscosity that it will not resist the pressure of an air bubble, I see nothing in the Fuller process that will, as a matter of course, overcome that defect in such material for use in the air bubble process.

[1] Compare *Penn v. Bibby,* (1866) L.R. 2 Ch. A. 127, per Lord Chelmsford L C. at page 136. See *Savage v. D. B. Harris & Sons,* (1896) 13 R P.C. 364, per Lopes L.J., at page 370: "The material question . . . is, whether the alleged discovery lies so much out of the track of what was known before as not naturally to suggest itself to a person thinking on the subject; it must not be the obvious or natural suggestion of what was previously known." This was applied in *Sharp & Dohme Inc. v. Boots Pure Drug Company, Ld.,* (1928) 45 R P.C. 153, by Sargant L J. at page 191

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heat the resin instead of putting it in solution before extrusion in the form of tubing. He would eliminate the stage of passing the tubing through the bath because the coagulating and conditioning necessary for the nitrocellulose in solution would obviously be unnecessary for the polyethylene heated so as to be in a viscous state. That would bring him to the air bubble stage of the Reichel and Craver process to follow immediately upon the extrusion from the annular die. (The plaintiff did not suggest any inventive ingenuity in this.) He then has in front of him the teaching of the Reichel and Graver disclosure that "where heat has been employed to condition and for stretching the tubing, the stretched structure may be fixed by chilling the tubing, for example, by passing it through a bath of cold water or through a stream of cold air or the like." I can detect no substantial difference between this and the teaching of the Fuller patent that the tubing is set by an air cooling system or other "known" cooling system. Finally the correlation of the variables in the process to obtain the desired characteristics in the product is a prominent feature of the Reichel and Craver process although it may be somewhat more fully developed by the Fuller patent. This hypothetical reconstruction of what an ordinary skilled workman could have taken from the Reichel and Craver patent could be developed at length by reference to the other "prior art". What I have said is sufficient to indicate why, in my view, on the evidence, there was no inventive ingenuity involved in the Fuller process.

At this point, it may be well to comment upon the somewhat unrealistic situation in respect of which the Court is being required to make a finding on the question of inventive ingenuity. The patent is, "*prima facie* valid" by virtue of section 48 of the *Patent Act*. The defendant must therefore bring evidence to show lack of inventive ingenuity. (In the ordinary course of events, the defendant is unlikely to have access to evidence concerning the actual situation that gave rise to the Fuller process being devised or to evidence of how it was actually devised.) He brought evidence (the admissibility of which was not challenged by the plaintiff) that is sufficient, considered by itself, for the Court to draw certain inferences although these inferences, if the whole truth were known, may or may not have any relation to reality. The plaintiff, who is more likely to have

access to evidence of the history of events leading up to the Fuller patent, has left the Court in the dark as to what actually happened. In these circumstances the Court must come to the best conclusion that it can, recognizing that its conclusions may be completely divorced from reality.

I am, therefore, having regard to my findings as to the background of information available to the ordinary skilled workman, of opinion that there was no inventive ingenuity involved in the devising of the Fuller process and I therefore conclude that it was not an "invention" within the meaning of the *Patent Act* and that the Fuller patent is for that reason invalid.[1]

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[1] I find here none of the circumstances that constrained the Court in other cases to find inventive ingenuity even where there were relatively simple adaptations from earlier processes or the prior art. There is no indication here of any problem that had remained unsolved although there was an obvious demand or need. "We have no history of the manner in which this invention came about." See *Longbottom v. Shaw*, (1891) 8 R.P.C. 333, per Lord Herschell at page 337. We do know that there was a thermoplastic, polyethylene, newly come on the market, that, very shortly thereafter, this process was devised for it and that commercial success followed. There is no evidence that the process is associated with notable commercial success in connection with thermoplastics generally. (In addition to polyethylene, it was used for "saran" and polyvinylchloride.) I find myself in substantially the same position in which Lord Herschell was when he said, in *Longbottom v. Shaw, supra,* at page 37

> My Lords, no doubt it is perfectly true, as the learned counsel for the Appellant has said, that an invention which comes to a man by a happy flash of inspiration or without any prolonged experiment or thought may be as good a subject-matter of a patent as one which has only been arrived at after long and difficult experiments. That I entirely agree with. But when we are coming to enquire into the question whether there really is an invention in any case, or whether it is merely such an adaptation as would be obvious to any one whose mind addressed itself to the subject, then the absence of any such evidence as I have indicated of either experiment or investigation or thought on the part of the patentee, or evidence that the mind of anybody else had been addressed to the subject, or that there had been attempts to remedy the defects by other methods,—I say the absence of such evidence appears to me to justify one in resting upon the opinion which one has formed that there is in this case no invention at all I quite agree that it is always easy to say a thing is obvious when it has been pointed out. I fully feel the force of that argument and the danger of hastily arriving at such a conclusion; and, as I have said, if I saw that although the minds of mechanicians had been directed to meeting a certain want, and various methods of doing so had been devised, those mechanicians had not arrived at the simple and the efficient one at which the patentee had arrived, I should be disposed to put aside my own view of the obviousness of the so-called invention

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A second ground of attack, as indicated above, was that, although the claims in the patent are that the process will work with all thermoplastics, it cannot, as a practical matter, be applied to nitro-cellulose, which is a thermoplastic.

Witnesses for both sides were in agreement that nitro-cellulose (otherwise known as "cellulose nitrate") is a thermoplastic (and the plaintiff did not controvert that fact), although it is not quite so clear that any witness knew, otherwise than by hearsay, that it had the characteristic, essential to its being a thermoplastic, of becoming malleable when heated. The reason for the absence of personal knowledge on this point is, as the witnesses agree, that nitro-cellulose is a very dangerous explosive and that no sensible person who knows its character would contemplate heating it in its ordinary state for the purpose of converting it into film or tubing.

The defendant on these facts contends, in effect,

(*a*) that the claims of the Fuller patent are for a process whereby tubing may be made from any thermoplastic,

(*b*) that tubing cannot, as a practical matter, be made by the Fuller process from nitro-cellulose,

(*c*) that a process to be a valid invention must be useful, and

(*d*) that, if it is not practically possible to use the Fuller process, as described in the disclosure, for processing all thermoplastics as claimed, the Fuller patent is invalid either because it claims too much or because the disclosure does not sufficiently describe the patented process.

In support of this submission, the defendant refers to the statement in the disclosure that "In general, the invention can be utilized with any thermoplastic material...", to the first step of the process as claimed by the claims, which, in

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and to come to the conclusion, notwithstanding my own impression on the subject, that those facts indicated that it was not so obvious as I myself should have thought. But in this case nothing of that sort is really to be found in the evidence, and therefore it appears to me that no more is shown than an adaptation of the well-known idea of utilizing a row of hooks attached to or forming part of a band of metal by applying them as they are required, the adaptation in the particular case being in a well-known manner, for a well-known purpose, and not involving, as it appears to me, any invention which can support a patent.

each case, consists of "dry-extruding a molten thermoplastic", and to the uncontroverted facts that nitro-cellulose is a thermoplastic and that it would be highly dangerous to utilize the Fuller process as described in the disclosure, and as claimed, with nitro-cellulose.

The plaintiff adduced evidence to show that, at least in theory, the Fuller process could be utilized with dry nitro-cellulose under very strict temperature controls and with special safeguards or by mixing it with a substance which would reduce its tendency to explode when heated—i.e., "a heat decomposition inhibitor". In connection with the latter possibility, reference is made to the statement in the disclosure that "The properties of the thermoplastic substance or composition can be modified as by the incorporation therein of suitable modifying agents such as... heat decomposition inhibitor..."[1] The plaintiff also submits, in effect, that the Specification should not be interpreted as disclosing or claiming a process to be utilized with all thermoplastics but only as disclosing and claiming a process to be utilized with those thermoplastics that are suitable for the manufacture of tubing by dry extrusion after heating and that, in any event, it should not be interpreted as claiming the process for use with a thermoplastic that no one in the industry would ever think of employing with such a process because of its well-known dangerous character.

Nitro-cellulose is a thermoplastic material from which tubing was, at the appropriate time, being manufactured by another process and there is no doubt that the claims in this patent extend to the use of the patented process with any thermoplastic substance.

If the disclosure and claims had been in terms for a process for dry-extruding nitro-cellulose, the patent would, having regard to the necessity of using special controls and safeguards or a heat decomposition inhibitor, have been clearly bad because either

(*a*) the patented process is regarded as being the process as described without the implied addition of such essen-

[1] I do not read this sentence as containing a direction as to how to use the process. It is merely an indication as to an optional variation in the process. The same statement is made about such things as "fillers" and "colouring agents".

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tial steps, in which event, it would not then be a useful process, or

(*b*) the patented process is regarded as consisting of the described steps plus the implied addition of such essential steps, in which event, the disclosure would not contain a correct and full description of the process nor would it clearly set forth the various steps in the process in such full terms as to enable any person skilled in the art to use it.

If, therefore, the Specification were so written as to describe the process as one exclusively for use with nitro-cellulose, the complete process would either be that actually described, in which event it would not be a useful process because it would be too dangerous to use as a practical matter[1] or the process would be regarded as involving certain essential steps that are not described, in which event there would have been a substantial failure to comply with section 36(1).[2] I cannot read the reference to the possibility of modifying the properties of the thermoplastics as an adequate indication that this is an essential part of the process in the case of nitro-cellulose.

As the Fuller patent would have been bad if it had been restricted to utilizing the process for nitro-cellulose, it cannot, in my view, be valid if, properly construed, it is to be regarded as claiming the process for use with all thermoplastics.[3]

[1] Counsel for the plaintiff said during argument that "if this patent were directed only to nitro-cellulose, I would have great difficulty in supporting it on the argument and the evidence I am now putting..."

[2] Compare *Baldry v. McBain,* [1936] S.C.R. 120, per Duff C.J. at pages 123-4. There may be lack of compliance with section 36(1) even though the steps omitted are not such as to call for inventive ingenuity. See *King, Brown & Co. v. The Anglo-American Brush Corporation,* (1892) 9 R.P.C. 313, per Lord Watson at page 320, and *Savage v. D. B. Harris & Sons* (1896) 13 R.P.C. 364, per Lindley L.J. at pages 368-9.

[3] "It is well settled that, where the scope of a claim includes some method which is useless, the claim cannot be saved by showing that no skilled person would ever try to use that method." *Minerals Separation North American Corporation v. Noranda Mines Ld.,* (1952) 69 R.P.C. 81, per Lord Reid at page 95. See also *Vidal Dyes Syndicate Ld. v. Levinstein Ld.,* (1912) 29 R.P.C. 245 at pages 271-2, per Fletcher Moulton L.J., where he said:

> The law applicable to such a case forms the subject of a very celebrated decision of Lord Westbury when sitting as Lord Chancellor on appeal from the Vice-Chancellor in the case of *Simpson v. Holliday.* The point of law raised in that case was, to my mind, identical with the contention of the Defendants in the present case.

The Patent in issue in that case was held to describe two processes for obtaining the result, the one with, and the other without, the action of heat. It was admitted that one of them, namely, the cold process, was ineffective, but it was contended that any workman of ordinary knowledge and observation would reject the cold process and adopt the hot. In his judgment the Lord Chancellor said: "When it is said that an error in Specification, which any workman of ordinary skill and experience would perceive and correct, will not vitiate a Patent, it must be understood of errors which appear on the face of the Specification, or the Drawings it refers to, or which would be at once discovered and corrected in following out the instructions given for any process or manufacture; and the reason is, because such errors cannot possibly mislead. But that proposition is not a correct statement of the law, if applied to errors which are discoverable only by experiment and further inquiry. Neither is the proposition true of any erroneous statement in a Specification amounting to a false suggestion, even though the error would be at once observed by a workman possessed of ordinary knowledge of the subject. For example, if a Specification describes several processes, or several combinations of machinery, and affirms that each will produce a certain result, which is the object of the Patent, and some one of the processes or combinations is wholly ineffectual and useless, the Patent will be bad, although the mistake committed by the Patentee may be such as would be at once observed by an ordinary workman. I am of course speaking of cases where that process or machine which is inefficient is the invention or part of the invention that is claimed." An appeal was brought from the Lord Chancellor's judgment to the House of Lords, and the judgment was supported on all points relating to the Patent. Lord Chelmsford, who was Lord Chancellor when the appeal was heard, said:—"It was also said that there was a considerable body of evidence to show that skilled persons, to whom the Specification must be taken to be addressed, found no difficulty in working it out, and applied heat in the process as a matter of course. This, however, cannot have any effect upon the construction of the Specification. It merely proves that the description, though erroneous, is not likely to mislead skilled workmen. That the description may induce the necessity of experiments appears from the evidence of an experienced chemist, who says:—'If I found there was no action without heat, I should heat it immediately.' The construction of the Specification remaining untouched by the evidence, and the Court being informed that the invention which is claimed is incapable of producing the result intended, it had no other course to pursue than to pronounce the Patent to be void." Lord Cranworth, who was the other member of the Court, said as follows:—"There is no doubt in this case as to the construction of the Specification. It specifies two modes of obtaining the mixture which produces the dyes—one with, and the other without, the agency of heat. It was admitted, on the motion before Lord Westbury, and it was also admitted on the hearing of the appeal before your Lordships, that no practical result can be obtained without the heat. This clearly makes the Specification bad. It specifies two processes, whereas only one is practicable. It is no answer to say, as was said at the bar, that any practical workman would know that the cool process was bad, and

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Is the patent then to be regarded as claiming the process for use with all thermoplastics? On the one hand, there is the suggestion from the plaintiff that the Specification should be interpreted as referring only to thermosplastics that are suitable for the manufacture of tubing by dry extrusion after heating or, in any event, should not be interpreted as claiming the process for use with a thermoplastic, such as nitro-cellulose, that no one in the industry would ever think of employing with such a process because of its well known dangerous character. On the other hand, there is the problem of construing the language used in the claims.

The suggestion that the claim must be read so as to exclude nitro-cellulose because it is not suitable for the manufacture of tubing by dry extrusion after heating or because no one in the industry would ever think of employing nitro-cellulose with such a process because of its well known dangerous character, must, upon the authorities, be rejected. See *Vidal Dyes Syndicate Ld.*, (1912) 29 R.P.C. 245, per Fletcher Moulton, at pages 271-2, and *Norton and Gregory Ld. v. Jacobs,* (1937) 54 R.P.C. 271, at pages 276-7, where Greene, M.R., delivering the judgment of the Court of Appeal, said:

> Now if Claim I be read by itself and construed in accordance with the ordinary meaning of the language used, it is apparent that the use of any reducing agent falls within it. The character of the reducing agent to be used is not defined by reference to any particular quality or any particular result. If the matter stood there, the Claim would be unquestionably bad.

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so would adopt the other. It may be that in construing a Specification the Court may sometimes feel justified in understanding the language, not according to its ordinary meaning, but in the mode in which it would be understood by skilled workmen called upon to act according to its direction. But this does not warrant us in giving effect to a Specification claiming two things, one practicable, and the other impracticable, because a skilful workman would know that one of them could not be acted upon, and so would confine himself to the other. This would not be to construe a Specification according to the language of workmen, instead of according to our ordinary language, but to reject something claimed by the Patentee, because a workman would know that it was an impracticable claim." To my mind, this is decisive authority in the present case. Whether or not a skilled chemist would reject the suggestion to use sulphur alone with dinitronaphthols, it is, on the proper construction of the Specification, a part of the invention that is claimed and if, as is admitted, it will not succeed, the Patent is invalid.

But it is said (and this is the substantial part of the Appellants' argument) that the language of the Claim must be construed so as to exclude any reducing agent which a chemist of ordinary skill would know, with or without experiment, to be unsuitable in view of the result to be achieved. We are unable to accept this argument. The fact that a skilled chemist desiring to use the invention would reject certain reducing agents as being unsuitable is one thing; it is quite a different thing to say that a claim must in point of construction be cut down so as to exclude those reducing agents because a skilled chemist would not use them. To adopt the latter proposition would not be to construe the Specification but to amend it, and it would, in our opinion, be mere self-deception to hold otherwise. The duty of a patentee is to formulate his claim in such a way as to define with clarity the area of his monopoly; the claim is the solemn operative part of the Specification in which the patentee sets himself to achieve that purpose, and in construing it, it is of great importance not to lose sight of that fact. It is illegitimate to whittle away clear words in a claim by reading into them glosses and limitations extracted from the body of the Specification whose function is in its essence different from that of the claim. Each part of the document must be construed in the light of the function which is peculiarly its own. In the same way it is in our opinion illegitimate to whittle away the clear words of the claim—selected, as they must be taken to be, with the peculiar function of the claim in mind—by writing into them glosses and limitations based on the fact that a skilled chemist would avoid working in part of the area which the words in their ordinary meaning are wide enough to include. This does not mean that regard is not to be paid to the fact that the claim as well as the body of the specification is addressed to persons skilled in the art and must be construed accordingly. But the argument here goes far beyond this and, under the pretence of construing the claim, in reality seeks to reform it.

In *Henriksen v. Taller Ltd.*[1], Lord Reid, at page 442, summarized the decision in the *Norton & Gregory* case by saying: "The decision was that if a claim represents that any reducing agent can be used, and it turns out that some cannot, the claim cannot be saved because the addressee would know which could and which could not be used and would avoid using those which are ineffective."

I therefore turn to the question whether the claims in the Fuller patent must be taken, upon a fair reading of the words used, as referring to any thermoplastic. The use of the words "in general" in the statement in the disclosure that the invention can be used with any thermoplastic might be taken as qualifying the absoluteness of that statement. However, in the claims, where the things in respect of which "an exclusive property" is being claimed are to be stated "in explicit terms" (section 36(2)), there is no limitation on the thermoplastics with which the process is to be

[1] [1965] R.P.C. 434.

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used.[1] It is fundamental to the statutory scheme that the claims be clearly limited to the inventor's invention. If the claims in fact go beyond the invention the patent is invalid. See *B.V.D. Company Ltd. v. Canadian Celanese Ltd.*[2] Otherwise the patent could be used as a weapon to exclude others from a field in which the patentee has no property. I conclude that the Fuller patent is bad because the Specification claims what is not useful in a patentable sense. Alternatively, it is bad because it has failed to describe the patented process.

Having come to a conclusion that the Fuller patent is invalid on two separate grounds, it is unnecessary for me to deal with the third ground of attack. As, however, I have reached a conclusion on that question, and as my reasons for that conclusion may be of some aid in the event that I am in error in both the conclusions that I have already expressed I shall now set out my reasons for concluding that the third ground of attack is bad.

The third attack made on the validity of the patent is that the disclosure does not meet the requirements of section 36(1) of the *Patent Act* in that the instructions for the working of the patented process leave it to further experiment to determine how to work the process in respect of all applications of the process not covered by the examples

[1] As nearly as I can determine, on the evidence, the history of the matter is that, early in this century, there was a method for dry extruding nitro-cellulose for such things as propellants for artillery shells and, at a later time, it became apparent that by "wet" extrusion (i.e., by extruding it after putting it in solution) nitro-cellulose was more adaptable, "more easy to extrude", so the dry extrusion of nitro-cellulose was abandoned early in this century. On the other hand, methods for dry extruding specific thermoplastics or classes of thermoplastics had been developed or discovered at various times reaching back into the nineteenth century. Nevertheless, the wet extrusion of nitro-cellulose tubing continued as a very important branch of the thermoplastic industry at least until 1962. It is against this background that the Fuller patent comes along and claims the discovery of a method for *dry* extruding *all* thermoplastics. Presumably, other things being equal, there is a utility in "dry" extrusion over "wet" extrusion as there is an elimination of the step of putting the starting substance in solution, and, possibly, of other steps necessary to remove it from solution. Compare the relatively simple Fuller process with the much more complicated Reichel and Craver process. I cannot escape the conclusion that the Fuller patent must be read as claiming the discovery of a relatively simple process for the "dry" extrusion of all thermoplastics, in which the only conditioning required is heating.

[2] [1937] S.C.R. 221 at page 237.

given. This attack is based upon that part of section 36(1) that reads as follows:

> 36. (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 ... 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 ... use it; ..."

In appraising the validity of this attack, it is necessary to assume that both the other attacks have failed and to have in mind the essential nature of the patented process. It is a process involving many possible variables and is for the production of a product the characteristics of which will obviously vary as the different elements of the process are varied. Such things as

(*a*) the thermoplastic substance with which the process is used,

(*b*) the temperature of the "molten" thermoplastic when extruded,

(*c*) the size (diameter and width of opening) of the die from which it is extruded,

(*d*) the amount of air in the air bubble,

(*e*) the volume, temperature, etc., of the cooling air,

(*f*) the speed of nip rolls,

may be varied, each in relation to all others, and each variation will have a possible effect on the ultimate tubing in, for example, one or more of the following respects, viz.,

(*a*) the width of the flattened tubing,

(*b*) the thickness of the film constituting the tubing, and

(*c*) the tear strength or tensile strength in either direction of the film constituting the tubing.

This is made clear by such parts of the disclosure as the following:

> 1. "The squeeze rolls may be driven at a speed that stretches the tubing while in the plastic formative stage, thus affecting the physical properties of the tubing. Hence, the *peripheral speed* at the squeeze rolls is selected so that, *in combination with other controlled variables of the process,* tubing of predetermined characteristics is obtained."
>
> (The emphasis is mine.)

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2. "The quantity of the gaseous medium . . . is selected so that the extruded tubing, while still in the formative plastic stage, will be expanded to the diameter necessary to produce the predetermined desired flat width when the tubing is flattened by the squeeze rolls. The *expansion of the tubing* also affects the physical properties of the film constituting the tubing and therefore the *other variables in the process are correlated therewith* so as to produce a tubing of predetermined flat width and other predetermined characteristics."

(The emphasis is mine.)

3. "As will hereinafter become more apparent, the desired dimensions and physical properties of the tubing are predetermined and *the variables* in the process are adjusted to produce the desired results."

(The emphasis is mine.)

4. "It is to be noted that in the process hereinbefore generally described, *the internal air pressure, the volume of external air, and the diameter of the die,* are balanced against each other (all the other variables being maintained constant) as is necessary to produce tubing of predetermined characteristics."

(The emphasis is mine.)

5. "The invention provides a method whereby tubing of predetermined desired size and physical characteristics can be obtained by appropriately controlling and regulating the *variables in the process.* Since in most apparatus certain conditions may be maintained constant, the desired results can be obtained if all conditions are maintained constant except *the internal pressure, the volume of the cooling medium and the diameter of the die,* and such variables are balanced against each other while the conditions are maintained constant as is necessary to produce the predetermined desired results."

(The emphasis is mine.)

The defendant says, however, that such directions are not a sufficient compliance with section 36(1); he refers to judicial decisions where it has been said that it is not a sufficient description of an invention if the person who wants to use it must resort to experiment in order to fill in gaps in the description or instructions contained in the

disclosure and he refers to the following passages in the disclosure of the patent in suit:

> 1. "Each thermoplastic substance . . . possess certain properties which may make it necessary to determine, *by experiment,* the extent the variables have to be balanced in order to produce tubing of the desired result."
>
> (The emphasis is mine.)
>
> 2. "Such determination of the necessary conditions can in accordance with the teachings of the instant invention, be determined *by simple experiment.* In general, however, since in any apparatus certain features thereof can be maintained constant, the three variables (internal air pressure, volume of cooling air and diameter of the die) are the most easily varied and controlled."
>
> (The emphasis is mine.)

The answer to the question as to whether this attack succeeds must depend upon whether the defendant has discharged the onus of showing, as a matter of fact, that the instructions contained in the disclosure are *not* sufficient "to enable any person skilled in the art...to use" the patented process. It is improbable that there could ever be instructions as to the use of a new process which would completely eliminate the necessity of all trial and error and, in that sense, all experiment. The question is—Are the instructions sufficient to enable a person skilled in the particular art to use the process or must he refer some aspects back for further work in the laboratory or even for the exercise of inventive ingenuity? In my view, this is a matter upon which the Court requires evidence before it can conclude (unless the instructions are obviously adequate) that the instructions in the disclosure are not sufficient to enable a person skilled in the art to use the process and here there is no evidence upon which any such finding can be made. On the other hand, the principal expert witness for the defendant, upon cross-examination, gave evidence that he had no difficulty in understanding the operation of the procedure in the Fuller process after reading the United States patent which was for all practical purposes identical with the Fuller patent. In any event, if I had to decide the matter on the basis of my own view, unaided by evidence of any person skilled in the art, I

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should have concluded that the instructions are adequate. I should have thought that once a skilled machine operator had been taught as the disclosure teaches the idea that the various variables in the process can be varied in reasonably obvious ways to achieve different characteristics in the product it would become a part of the skill of the operator, which he would develop by experience, to know how to achieve such results. I cannot accept the defendant's submission, which was, in effect, that the inventor must supply the public with a table showing various combinations of variables in the process ("parameters") required to produce various typical products for each of the different thermoplastics. A similar argument was dealt with in a similar manner in *Ernest Scragg & Sons Ltd. v. Leesona Corpn.*[1] per Thorson P., at pages 746 *et seq.*

As, however, I have, on other grounds, reached the conclusion that the Fuller patent is invalid, there will be judgment dismissing the action. Having regard to the request made by counsel for the plaintiff for an opportunity to make submissions concerning costs, I shall not pronounce judgment until counsel for both parties have had such an opportunity. In the light of these reasons, the defendant may bring the matter before me at some time convenient to all concerned by way of a motion for judgment.

APPENDIX A

Each of the attacks on the validity of the Fuller patent involves some consideration and interpretation of the Specification in the patent. I therefore propose, in this Appendix, to examine that document in a general way. I do this for two reasons. First, it is necessary to examine the Specification in a general way so that, when considering a submission that relates to or is based upon a particular portion or portions of the document, such submission may be considered in the light of the part that the particular portion or portions play in the overall scheme of the Specification. Second, I must reach some conclusion as to the meaning of certain of the words and expressions used. For this purpose, I set out hereunder a copy of the Specification excluding all claims except the first.

[1] [1964] Ex. C.R. 649.

SPECIFICATION

BE IT KNOWN that EDWARD D. FULLER, a citizen of the United States of America, whose post office address is 6528 South Whipple Street, Chicago, State of Illinois, United States of America, having made an invention entitled

A METHOD OF MAKING FLATTENED THERMOPLASTIC TUBING OF PREDETERMINED DESIRED CHARACTERISTICS

the following is a full, clear and exact disclosure of the nature of said invention and of the best mode of realizing the advantages thereof.

B This invention relates to tubing and more particularly to a new and improved dry process for producing thin-walled continuous seamless tubing of predetermined characteristics from thermoplastic organic materials.

An object of this invention is to provide a new and improved dry method of preparing thin-walled continuous seamless tubing from a melt of a thermoplastic organic material.

C Another object of this invention is to provide a dry method of preparing thin-walled continuous seamless tubing of predetermined characteristics from a melt of a thermoplastic organic material.

Other and additional objects will become apparent hereinafter.

The objects of this invention are accomplished, in general, by dry extruding a thermoplastic organic material from a melt thereof through an annular die to form a seamless tubing, and, as the tubing is being drawn from the die and while it is in the formative plastic state, inflating the tubing to a predetermined diameter and setting the expanding tubing at approximately the point where said tubing has reached the desired final diameter.

The term "formative plastic state" is used herein to define that state of the plastic wherein the plastic is in the unset or partly set condition and can be permanently enlarged as by stretching.

The drawing of the tubing from the die is obtained by a pair of squeeze rolls which also serve to collapse the inflated tubing into the form of a ribbon, in which condition it is wound up on a wind-up reel. The squeeze rolls may be driven at a speed that stretches the tubing while in the plastic formative stage, thus affecting the physical properties of the tubing. Hence, the peripheral speed of the squeeze rolls is selected so that, in combination with the other controlled variables of the process, tubing of predetermined characteristics is obtained.

D The inflation of the tubing is obtained by a gaseous medium introduced into the interior of the tubing. The inflating medium is entrapped or confined between the nip of the draw rolls and the die through which the molten thermoplastic is extruded. As a result, the inflating medium comprises an isolated gaseous bubble which advances bodily, while remaining substantially constant in quantity, through the successive portions of the tubing withdrawn from the die by the draw rolls. The quantity of the gaseous medium constituting the entrapped or confined inflating medium (isolated bubble) is selected so that the extruded tubing, while still in the formative plastic stage, will be expanded to that diameter necessary to produce the predetermined desired flat width when the tubing is flattened by squeeze rolls. The expansion of the tubing also affects the physical properties of the film constituting the tubing and, therefore, the other variables in the process are correlated therewith so as to produce a tubing of predetermined flat width and other predetermined characteristics.

As will hereinafter be more fully explained, the final diameter of the tubing can be obtained in the vicinity of the die or in the vicinity of the draw rolls. In either embodiment, when the tubing in the formative plastic state has

been expanded to the desired diameter, the thermoplastic is set, i.e. converted to that state which resists and is not further expanded by the isolated gaseous bubble. It is to be noted that the amount of internal air pressure, produced by the isolated gaseous medium and required to stretch the tubing in the formative plastic state, is less than the amount of pressure required to stretch a set tubing. When the tubing is expanded by internal air pressure while in the formative plastic state, the tubing will permanently acquire that diameter to which it has been inflated.

D
Conc.

In the preferred form of this invention, the tubing is converted from the formative plastic state to the set condition by directing and applying a controlled volume of an external air flow on and around the tubing while in the formative plastic state. The cooling by air of the tubing in the formative plastic state is regulated in accordance with volume and temperature of the air so that the inflation of the tubing while in the formative plastic state can be effected either near the lips of the die or near the draw rolls as desired. The control of the point of inflation of the tubing aids in controlling, within narrow tolerances, the flat width and wall thickness of the finished tubing. It also permits control of the structural characteristics of the tubing (orientation).

E

In the manufacture of thermoplastic tubing by the process of this invention, the following dimensions and properties of the finished tubing are capable of variation and can be controlled:

1. Flat width of the tubing;
2. Thickness of the tubing;
3. Machine—direction properties; structural characteristics of the tubing (i.e., tear resistance, tensile strength, etc);
4. Transverse—direction properties; structural characteristics of the tubing (i e , tear resistance, tensile strength, etc).

F

As will hereinafter become more apparent, the desired dimensions and physical properties of the tubing are predetermined and the variables in the process are adjusted to produce the desired results.

The process is not restricted to any particular apparatus. It, for example, can be carried out in an apparatus such as that shown in the accompanying drawings, wherein

Figure 1 is a diagrammatic side elevation (with the extruder in partial section) of an apparatus wherein the inflation of the tubing to the desired diameter is obtained in the vicinity of the die; and

Figure 2 is a diagrammatic side elevation of an apparatus similar to that shown in Figure 1, but wherein the inflation of the tubing to the desired diameter is obtained in the vicinity of the squeeze rolls.

Referring now to the drawings wherein like reference numerals disclose like parts, the reference numeral 10 designates an extruder provided at one end thereof with a feed hopper 12 which feeds the selected thermoplastic into the screw chamber 14 of the extruder. An electric vibrator 16 of known construction cooperates with the hopper 12 to accelerate the feed of the thermoplastic material into the extruder. In the screw chamber 14 there is positioned a single-threaded pitch screw 18 which, upon rotation, advances the thermoplastic through the extruder. The screw 18 is rotated in the known manner by means not shown. The extruder is provided with a jacketed chamber 20 through which a heating medium is circulated. The extruder thus far described is one known type of National Thermoplastic Extruders manufactured and sold by the National Rubber Machinery Corporation of Akron, Ohio.

G

As the thermoplastic material is fed by the screw 18 through the extruder previously explained, it is molten and in such condition is fed into a 90°

elbow 22 bolted to the head 24 of the extruder. A die 26 is secured in any appropriate manner to the outlet end of the elbow 22 and the molten thermoplastic passes thereinto.

The die 26 is provided with an annular orifice 28 from which the molten mass emerges in the air as a hot gummy-like viscous thermoplastic tubing 30. The die 26 is provided with a central orifice 32 which is connected to an air supply 34 whereby air is introduced interiorly of the tubing to inflate the same. The air supply 34 is provided with a valve, not shown, so that when the desired quantity of air has been introduced within the tubing further supply thereof can be prevented. In the event the quantity of the air decreases, as for example by leakage or otherwise, the requisite quantity of air can be added by proper manipulation of the valve.

The inflated tubing 30 is drawn upwardly and passes interiorly of a helical hollow coil 36, each spiral of which has a multiplicity of predetermined spaced perforations 38 of appropriate size. Cooling air is supplied to the coil 36 from both ends 37 thereof and it passes therefrom through the perforations 38 on to the exterior surface of the tubing. The stream of cooling air serves to chill or set the expanding plastic tube at approximately the point in its upward travel where it has reached the desired final diameter. In general, the tubing reaches its final diameter an inch or so above the final cooling orifice. Thereafter, the tubing which passes through the atmosphere of the room in which the apparatus is located is not subjected to any further expansion during the rest of its travel.

The inflated tubing is drawn from the die 26 in a substantially vertical direction through the cooling coil 36 and thence through the circumambient atmosphere by a pair of rotating squeeze rolls 42 and 44 which also serve to collapse the tubing passing therebetween into a flattened ribbon-like material. The flattened tubing, designated by the reference numeral 46, passes over the roll 44 and is wound up on a wind-up reel 48 driven by a torque motor (not shown). Intermediate the squeeze roll 44 and the wind-up reel 48, guide rolls 50 and 52 serve to direct the flattened tubing 46 from the squeeze roll 44 to the wind-up reel 48.

G
Cont.

The inflating air is introduced in an amount such as is necessary to expand or inflate the tubing while in the formative plastic state to a predetermined desired final diameter. After such a quantity of air has been introduced into the system, the valve controlling further supply is cut off and the air is sealed within the section of the tubing extending between the nip of the squeeze rolls 42 and 44 and the molten thermoplastic in the annular orifice 28. As the molten thermoplastic is extruded from the die orifice in the form of a seamless tubing, it is drawn vertically upwardly by the squeeze rolls 42 and 44. As soon as the molten thermoplastic leaves the die orifice, it is subjected to the inflating medium which expands the tubing to the desired predetermined diameter. While the tubing is being expanded, it is passed interiorly of the spirals of the coil 36 and the cooling medium supplied thereby impinges on substantially the entire exterior surface of the tubing in the formative plastic state exposed thereto. The quantity of the cooling air, the temperature thereof, and the pressure thereof, are such that the thermoplastic material will be converted from the formative plastic state to a set condition at the time when the tubing has been inflated to the predetermined desired diameter and which, in Figure 1, is in the neighborhood of approximately 1 inch above the uppermost spiral of the coil 36.

In Figure 1, the cooling coil 36 is positioned close to the die 26 and the expansion of the tubing while in the formative plastic state to the pre-determined desired diameter is secured quickly. After the final diameter has been obtained, the thermoplastic constituting the tubing being in a set condition, the tubing is not subjected to any further expansion or drawing.

Though it is preferred to secure the expansion of the tubing to the pre-determined desired diameter in the vicinity of the die as previously explained, the invention is not restricted thereto. Alternatively, the expansion of the tubing to the desired final diameter can be obtained anywhere between the face of the die and the nip of the draw rolls, and Figure 2 illustrates an embodiment wherein the tubing is expanded to the predetermined desired final diameter in the vicinity of the squeeze rolls 42 and 44. This is obtained by utilizing such a quantity of air and of such pressure and temperature as will
G partially (surface only) but not wholly cool (set) the extruded tubing. The
Conc. tubing will thus be capable of further expansion even though some cooling has been done. The formative plastic tubing will, all things being equal, tend to expand most easily at its thinnest point. Since the tubing is being drawn by the squeeze rolls 42 and 44, it is also acquiring a machine direction, linear expansion as it is being pulled upwardly, the film becoming thinner and thinner as it is drawn toward the squeeze rolls. The film thus reaches its least (and final) thickness just before contact with the draw rolls. The result is that the air pressure within the formative plastic tube expands the tubing at a point in the vicinity of the squeeze rolls since at that point it is the thinnest.

In carrying out the process of this invention, the selected thermoplastic is introduced into the extruder and the feed screw rotated at a certain speed whereby the thermoplastic in the molten state is extruded through the annular orifice of an appropriately selected die The extruded material which is in the form of seamless tubing is then passed between the nip of the squeeze rolls. Air is introduced into the portion of the tubing extending between the die and nip of the draw rolls in the amount required to inflate the tubing to the desired diameter. This is determined by increasing or decreasing the amount of air as is indicated upon measurement of the flat width of the collapsed tubing. The quantity of the cooling air, depending on the place in the upward path of
H travel of the tubing where the tubing is to be set, is next determined. The amount of cooling air, while it is fairly constant for a particular set of conditions, is subject to change in accordance with changes in the following variables:

1. Speed of upward travel of the extruded tubing;
2. Air temperature of (external) cooling air;
3. Humidity of external cooling air;
4. Room temperature;
5. Temperature of the extruded material;
6. Specific heat of the thermoplastic.

It is to be noted that in the process hereinbefore generally described, the internal air pressure, the volume of external air, and the diameter of the die, are balanced against each other (all the other variables being maintained constant) as is necessary to produce tubing of predetermined characteristics.

The details and manner of practicing the invention will be apparent from the following specific examples, it being understood that these examples, it being understood that these examples are merely illustrative embodiments of the invention and that the scope of the invention is not restricted thereto.

J *EXAMPLE I*

To produce a tubing 8" in flat width and 0.003" in (wall) thickness, whose tensile strength in the machine direction is approximately equal to its tensile strength in the transverse direction, and whose tear resistance in the machine direction is approximately equal to its tear resistance in the transverse direction.

Molten polyethylene was extruded in an apparatus of the type shown in Figure 1 at the rate of 17.5 pounds per hour through a die having an annular orifice of .018" and 2-½" in diameter (between the inner lip thereof), the temperature of the polyethylene at the lips being 270°-290°F. The extruded tubing was withdrawn upwardly in a vertical direction from the die at the rate of 15' per minute by the draw rolls positioned 20" above the die. Sufficient air necessary to inflate the tubing while in the plastic formative state to a final diameter of 5.1" which, upon flattening, will produce a flat width of 8", was introduced interiorly of the tubing through the air inlet 34. When this quantity of air had been introduced, the supply thereof was cut off and the air within the tubing comprised an isolated bubble which was sealed in the tubing between the top of the die and the nip of the squeeze rolls. As soon as the tubing was withdrawn from the die, the gaseous bubble began to inflate the tubing. The tubing was drawn through the zone of action of the cooling coil 36 which was positioned in close proximity to the die so that the air in the lowermost spiral thereof impinged on the tubing when the latter was approximately 1" from the die. A large amount of air at room temperature (26°C), such as at least 122,000 cubic inches per minute, was applied by the coil 36 to the outer circumference of the upwardly advancing tubing at the approximate point in its upward travel where it was desired to set the tubing and thus prevent further expansion. The tubing, which started to expand by reason of the internally applied air as soon as it left the lips of the die, was expanded to its final desired diameter within 9 or 10", or so, of its upward travel, and the stream of external cooling air set the expanding tube at approximately the point in its upward travel where it reached its final diameter.

J *Cont.*

In general, the tubing reached its final diameter an inch or so above the final cooling holes.

After the tubing had passed out of the zone of action of the cooling air, it passed through an unconfined circumambient atmosphere which, in this example, was the atmosphere of a room.

EXAMPLE II

To produce a tubing 8" in flat width and 0.003" in (wall) thickness whose tensile strength in the machine direction is higher than its tensile strength in the transverse direction and whose tear resistance in the transverse direction is greater than its tear resistance in the machine direction.

The procedure and conditions are the same as those described in Example I, except that a smaller amount of room temperature (26°C.) air, such as less than 40,000 cubic inches per minute, was applied by the coil 36 to the outer circumference of the upwardly advancing tubing.

This quantity of air did not wholly set the extruded tubing but only a part (surface only) thereof. Thus, the tubing was still in the formative plastic state and capable of further easy expansion even though some cooling had taken place.

All things being equal, a tubing in the formative plastic state tends to expand at its thinnest point. As the tubing was being drawn by the squeeze rolls, it was acquiring a machine direction linear expansion, the film becoming thinner and thinner as it was drawn upwardly. The film reached its least (and final) thickness just before contact with the draw rolls, at which point the air pressure of the confined bubble expanded the tube to the predetermined desired diameter.

EXAMPLE III

To produce a tubing 8" in flat width and 0.003" in (wall) thickness whose tensile strength in the transverse direction is higher than its tensile strength in the machine direction and whose tear resistance in the machine direction is greater than its tear resistance in the transverse direction.

The procedure and conditions are the same as those described in Example I, except that a die having an annular orifice 0.018" wide and being 1" in diameter (between the inner lips) was utilized.

It is apparent that this procedure is substantially the method of Example I in all particulars except that, due to the utilization of a smaller die, the tubing is expanded to a greater degree whereby the desired properties are obtained.

J *Conc.*

In the examples, the relative humidity of the cooling air was 71% and the air volumes were of free air, i.e. air at atmospheric pressure.

The pressure of the air at the cooling coil affects the volume of air emerging therefrom, and this is used to obtain the volume of cooling air desired. In general, the pressure at the cooling coil is within the range of from 1 to 10 pounds per square inch, gauge pressure. If additional cooling air is desired, the pressure is increased and vice versa. Conventional pressure regulators are used for this purpose. In practice, compressed air is supplied to the cooling coil from a suitable source of supply where it is maintained under a pressure higher than that required at the cooling coil, such as 80 pounds per square inch, gauge pressure, which pressure is reduced and regulated by conventional pressure regulators to supply the air at the cooling coil at the desired pressure.

Though the specific examples describe the invention in connection with the production of seamless tubing of predetermined desired characteristics from polyethylene, it is to be understood that the invention is not restricted thereto. In general, the invention can be utilized with any thermoplastic material and mixture of synthetic rubbers with thermoplastic materials. Each thermoplastic substance or composition possesses certain properties which may make it necessary to determine, by experiment, the extent the variables have to be balanced in order to produce tubing of the desired results. This may be especially so with regard to the quantity of cooling air, since the temperature at the lips of the die may be different with different thermoplastic substances or compositions. Hereinafter, is set forth a list of illustrative thermoplastic materials which can be used in this invention, the temperatures of the melt at the lips of the die being also given:

K

Material	Temperature of melt at lips of die (°F.)
Cellulose acetate	360 – 380
Cellulose acetate butyrate	350 – 360
Ethyl cellulose	400 – 420
Methyl methacrylate polymer	470 – 490
Nylon (extrusion or molding grade)	475 – 525
Polystyrene	470 – 490
Polyvinyl formal—acetate butyral	300 – 340
Copolymers of vinyl chloride and vinyl acetate (Vinylite)	330 – 340
Polyvinyl chloride (Geon)	350 – 370
Copolymers of vinyl chloride and vinylidene chloride (Saran)	360 – 370

Though the results can be obtained when the temperature of the thermoplastic at the lips of the die is as above given, the temperature of the lips can be 85° higher than the melting point of the plastic used but not greater than 525°F.

K

Conc.

The properties of the thermoplastic substance or composition can be modified as by the incorporation therein of suitable modifying agents, such as plasticizers, fillers, coloring agents, heat decomposition inhibitor, anti-oxidant, etc.

In the examples, the cooling coil was positioned about 1" from the face of the die and extended upward for approximately 6" to 7". However, the cooling coil can be positioned as close as possible to the die or spaced therefrom even as much as 3". The total height of the cooling coil or spirals is not restricted to any dimension. The total height is determined by the quantity of cooling air to be supplied, and the quantity of cooling air in turn depends on the specific thermoplastic being extruded.

L

In the examples, the internal air pressure, the volume of the cooling air of any appropriate temperature, and the diameter of the die, were balanced against each other to produce tubing of the predetermined desired characteristics while all the other conditions, such as, for example, screw speed, temperature of extrusion, speed of squeeze rolls, room temperature, width of die orifice, humidity of cooling air, etc, were maintained constant. Obviously, if one or more of the conditions which were maintained constant in the examples were varied, the internal air pressure, the volume of the cooling air and the diameter of the die, would have to be further balanced to compensate for such variations. Such determination of the necessary conditions can, in accordance with the teachings of the instant invention, be determined by simple experiment. In general, however, since in any apparatus certain features thereof can be maintained constant, the three variables (internal air pressure, volume of cooling air and diameter of the die) are the most easily varied and controlled.

M

The invention has been described in connection with an inflating medium consisting of air. Since air is relatively cheap and available, it is preferred. However, any other gaseous medium which does not exert any deleterious effect on the tubing being produced can be used.

N

In the invention as hereinbefore specifically described, air at room temperature constituted the cooling medium. However, the invention is not restricted to such specific room temperature air, since the air can be previously chilled to a temperature lower than room temperature. Likewise, in place of air, either at room temperature or at a temperature lower than room temperature, other gaseous media which do not exert any deleterious effect on the tubing can be utilized. Furthermore, in place of the air cooling coil, some of the other known cooling systems may be utilized.

O

The invention herein described is particularly suitable for the production of thin-walled continuous tubing. Through, as shown by the examples, tubing having a wall thickness of 0.003" can be produced, tubing having a wall thickness as low as 0.0005" and as high as 0.020" or higher has also been produced.

P

Q

In general, the width of the die orifice is not material. It should be of a width to provide the molten material in sufficient amount to produce the predetermined sized tubing.

The diameter of the die between the lips thereof is such that the tubing in the plastic formative stage can be expanded to a diameter of from 2 to 5 time the diameter of the die.

R

Though the method has been herein described in connection with expanding the extruded tubing while in the formative plastic state to a diameter greater than the diameter of the die, the invention is not restricted thereto. The method can be utilized in the production of tubing of predetermined characteristics and of a diameter less than the diameter of the die. This is obtained by increasing the speed of the squeeze rolls and utilizing only sufficient internal air pressure to hold the tubing in the inflated condition at the desired diameter, it being understood, of course, that the tubing in the formative plastic state is subjected to cooling as herein described.

S

In the preferred embodiment of the invention, the tubing is extruded in an upward direction. Though this is the preferred embodiment, the principles of the invention can also be utilized for extruding horizontally or downwardly.

T

The invention provides a method whereby tubing of predetermined desired size and physical characteristics can be obtained by appropriately controlling and regulating the variables in the process. Since in most apparatus certain conditions may be maintained constant, the desired results can be obtained if all conditions are maintained constant except the internal pressure, the volume of the cooling medium and the diameter of the die, and such variables are balanced against each other while the conditions are maintained constant as is necessary to produce the predetermined desired results.

U

Since it is obvious that various changes and modifications may be made in the above description without departing from the nature or spirit thereof, this invention is not restricted thereto except as set forth in the appended claims.

I claim:

1. In a method of producing flattened tubing of predetermined desired characteristics, the steps which comprise continuously dry-extruding a molten thermoplastic in the form of a seamless tubing, continuously withdrawing the tubing from the point of extrusion, flattening the tubing at a point spaced from the point of extrusion, maintaining a substantially constant continuous isolated bubble of a gaseous medium in the section of the tubing extending between the point of extrusion and the point of flattening, the quantity of the gaseous medium constituting said bubble being such as to inflate the tubing while in the formative plastic state to a predetermined desired diameter at a point beyond the point of extrusion, said predetermined diameter being different from that of the tubing at the point of extrusion, and passing the tubing while in the plastic formative state through streams of a cooling gaseous medium in the vicinity of the point of extrusion and impinging circumferentially on said tubing in the plastic formative state to chill the tubing to an extent that when the tubing has been inflated by said bubble to the said predetermined diameter it will be in a set condition, the rate of withdrawing the tubing, the degree of inflation of the tubing and the degree of chilling the tubing all being correlated in accordance with predetermined desired physical characteristics of the tubing.

I have divided the part of the Specification preceding the claims, which part I shall hereafter refer to as "the disclosure", into portions which I have lettered for convenience of reference in my preliminary analysis.

Before attempting to analyze the Specification, it is well to get in mind the provisions of the *Patent Act* that have most to do with determining the contents of that document. For the purposes of the *Patent Act* an "invention" is *inter alia* a new and useful "process". By virtue of section 28(1) an "inventor" of an "invention" that meets certain conditions, on presentation to the Commissioner of Patents of a petition (called "the application"), and on compliance with the other requirements of the Act, may obtain a patent granting to him "an exclusive property in such invention". Section 35 requires that the application contain "the title or name of the invention" and that it be accompanied by "a specification...of the invention". Section 36 contains the statutory directions concerning the Specification. It reads in part:

> 36. (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,...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...use it;...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 that the applicant regards as new and in which he claims an exclusive property or privilege.

Section 46 requires that a patent, when granted, shall contain "the title or name of the invention" with "a reference to the specification" and shall grant to the patentee the exclusive right "of...using..." the said "invention".

The following is my analysis of the Specification from a general point of view.

The invention is entitled (A) "Method of Making Flattened Thermoplastic Tubing of Predetermined Desired Characteristics". The invention, being a method of making something, is within the word "process" in the statutory definition of "invention".

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The first paragraph of the disclosure (B) discloses what the "invention" to be described "relates to"—i.e., the subject matter of the "invention". It shows that the subject matter of this patented process is "tubing" and more particularly a new and improved "dry process" for producing "thin-walled continuous seamless tubing of predetermined characteristics from thermoplastic organic materials".

The second, third and fourth paragraphs of the disclosure (C) discuss the "objects" of the "invention", which, as I have already indicated, is a "process". In the first place it is said that it is an object of the invention to provide a new and improved "dry method" of preparing thin-walled continuous seamless tubing "from a 'melt' of a thermoplastic organic material". What is said to be "Another object" is to provide such a method of preparing tubing of that description "of predetermined characteristics" from a "melt". The Specification then tells that "other and additional objects will become apparent hereinafter". What it seems to come to, at least at this stage of the reading of the disclosure, is that the object of the invention is to provide a method of preparing a certain type of continuous tubing from a "melt" of a thermoplastic organic material in such a way as to cause the tubing to have such characteristics as may from time to time be desired.

The next portion of the disclosure (D) consists of five paragraphs that tell how "in general" the objects of the invention are accomplished. The first paragraph of this portion (D) contains an almost cryptic description of the patented process. Each of the remaining four paragraphs of portion (D) expands on different aspects of the information contained in the first paragraph. The five paragraphs taken together, however, constitute no more than a description of the patented process in "general" terms.

The first paragraph of this portion (D) tells that the objects of the invention are achieved "in general"

(*a*) by dry extruding a thermoplastic organic material from a melt thereof through an annular die to form a seamless tubing,

(*b*) as the tubing is being drawn from the die and while it is in the "formative plastic state", inflating the tubing to a predetermined diameter, and

(c) setting the expanding tubing at approximately the point where said tubing has reached the desired final diameter.

The second paragraph defines "formative plastic state", for the purpose of this description, to mean "that state of the plastic wherein the plastic is in the unset or partly set condition and can be permanently enlarged as by stretching."

The third paragraph of this portion (D) explains that the drawing of the tubing from the die is obtained by a pair of "squeeze rolls" which also serve to collapse the inflated tubing into the form of a ribbon so that it can be wound on a reel. It tells that the squeeze rolls may be driven at a speed that stretches the tubing while in "the formative plastic stage", thus affecting the physical properties of the tubing. Hence, it explains, "the peripheral speed of the squeeze rolls" is selected so that "in combination with other controlled variables of the process, tubing of predetermined characteristics is obtained".

The fourth paragraph of this portion (D) discusses the "inflation of the tubing", which, so it says, is obtained by a "gaseous medium introduced into the interior of the tubing". Just how this works is explained by the following part of the paragraph:

> The inflating medium is entrapped or confined between the nip of the draw rolls and the die through which the molten thermo-plastic is extruded. As a result, the inflating medium comprises an isolated gaseous bubble which advances bodily, while remaining substantially constant in quantity, through the successive portions of the tubing withdrawn from the die by the draw rolls.

The paragraph goes on to explain that the quantity of the gas constituting this "isolated bubble" is selected so that the extruded tubing, while still in the formative plastic stage, will be expanded to the diameter necessary to produce "the predetermined desired flat width when the tubing is flattened by the squeeze rolls". In other words, having decided to produce tubing having a certain width when flattened, sufficient gas is inserted in the continuous tubing to produce a bubble of the required diameter. This paragraph ends by explaining that the expansion of the tubing also affects the "physical properties of the film constituting the tubing" and says that, therefore, "the other variables in

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the process are correlated therewith" so as to produce a tubing "of predetermined flat width and other predetermined characteristics".

The fifth and final paragraph of this portion (D) gives some information concerning the "setting" of the tubing. Noting that later in the Specification there will be a fuller explanation, it says that the final diameter of the tubing can be obtained in the vicinity of the die or in the vicinity of the draw rolls. ("Draw rolls" is obviously another name for "squeeze rolls".) Whichever of these alternatives is chosen, when the tubing in the formative state has been expanded to the "desired diameter", it is "set". (That means that it is solidified, that is to say, "converted to that state which resists and is not further expanded by the isolated gaseous bubble".) This paragraph also explains that, "When the tubing is expanded by internal air pressure while in the formative plastic state, the tubing will permanently acquire that diameter to which it has been inflated".

The next portion (E) tells us something about "the preferred form of this invention", which, to me, signifies that what this paragraph talks about is only one possible form of the patented process, but it is the one recommended by the inventor above all other possible forms of it. What it says is that, in "the preferred form" of the process, the tubing is converted from the formative plastic state to the set condition by applying a controlled volume of "an external air flow" on and around the tubing while in the formative plastic state. It tells us further that this "cooling" by air of the tubing in the plastic state is regulated (i.e., as to volume and temperature) so that "the inflation of the tubing while in the formative plastic state can be effected either near the lips of the die or near the draw rolls as desired". It says that controlling the point of inflation aids in controlling the flat width, wall thickness and structural characteristics of the finished tubing.

The next portion (F) details the dimensions and properties of the finished tubing made by the patented process that can be varied and controlled (e.g., flat width, thickness, tear resistance, tensile strength) and tells us that, in the process, having determined what particular dimensions and characteristics are desired in the tubing to be produced, "the variables in the process are adjusted to determine the desired results".

The Specification then tells us (G) that the patented process is not restricted to any particular apparatus and describes a way in which it can be carried out by reference to the drawings that are attached to the Specification.

The next portion of the disclosure (H) indicates some of the variables in the process (e.g., the thermoplastic, the speed of the feed screw in the extruder, the die, the amount of air inside the tube and the quantity of the cooling air) and explains in general terms how to determine the amount of air to put inside the tube and the quantity of cooling air to be applied to the outside of the tube. Having done that, it says that it is to be noted that, "in the process hereinbefore generally described, the internal air pressure, the volume of external air, and the diameter of the die, are balanced against each other (all the other variables being maintained constant) as is necessary to produce tubing of predetermined characteristics".

The next portion of the disclosure (J) describes specific "examples" as being "illustrative embodiments" of the process to indicate the "details and manner of practising" it. All three examples are examples of making tubing from polyethylene. In each of the three examples the tubing made was 8″ in flat width and 0.003″ in thickness. In the first example, the tensile strength in each direction is approximately equal. In the second, the tensile strength in the machine direction is higher than the tensile strength in the transverse direction and in the third the tensile strength in the transverse direction is higher than the tensile strength in the machine direction.

The next portion (K) tells that, while all the examples were related to the production of tubing from polyethylene, the invention is not restricted to that material. It says that, "In general, the invention can be utilized with any thermoplastic material and mixture of synthetic rubbers with thermoplastic materials". It then warns that "Each thermoplastic substance...possesses certain properties which may make it necessary to determine, by experiment, the extent the variables have to be balanced in order to produce tubing of the desired results". It says that this may be especially so with regard to the quantity of cooling air, since the temperature at the lips of the die may be different with different thermoplastic substances and it gives a list of "illustrative thermoplastic materials" which "can be used

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in this invention" with information as to appropriate temperatures of the melt at the lips of the die for each of them. While still on the subject of the use of thermoplastic materials other than polyethylene, this portion (K) tells us that "The properties of the thermoplastic substance...can be modified as by the incorporation therein of suitable modifying agents such as plasticizers, fillers, colouring agents, heat decomposition inhibitor, antioxidant, etc."

The next nine portions of the disclosure each consists of one paragraph and each contains statements describing some aspect of the patented invention. For example,

(1) Portion L deals with the position and size of the cooling coil.

(2) Portion M discusses the way in which the variables in the process may be most easily varied and controlled to obtain the desired results.

(3) Portion N says, in effect, that any gaseous medium that does not adversely affect the tubing may be used in place of air to create the air bubble.

(4) Portion O says that either room temperature or cooled air can be used as the cooling medium and that, in place of the air cooling coil, "some of the other known cooling systems" may be utilized.

(5) Portion T again deals with the controlling and regulating of the variables in the process to get tubing of the desired size and physical characteristics.

(6) The final portion U says that "Since it is obvious that various changes and modifications may be made in the above description without departing from the nature or spirit thereof, this invention is not restricted thereto except as set forth in the appended claims".

That completes my analysis of the disclosure part of the Specification.

As I read the first claim (it has not been seriously contended that, from the point of view of the attacks on validity, there is any relevant difference between the first claim and the other claims upon which the plaintiff relies), it may be set up as follows:

The claim is, in a method of producing flattened tubing of predetermined desired characteristics, the steps which comprise

(1) continuously dry-extruding a molten thermoplastic in the form of a seamless tubing,

(2) continuously withdrawing the tubing from the point of extrusion,

(3) flattening the tubing at a point spaced from the point of extrusion,

(4) maintaining a substantially constant continuous isolated bubble of a gaseous medium in the section of the tubing extending between the point of extrusion and the point of flattening, the quantity of the gaseous medium constituting the bubble being such as to inflate the tubing while in the plastic formative state to a predetermined desired diameter at a point beyond the point of extrusion, and

(5) passing the tubing while in the plastic formative state through streams of a cooling gaseous medium in the vicinity of the point of extrusion and impinging circumferentially on the tubing in the plastic formative state to chill the tubing "to an extent that when the tubing has been inflated by said bubble to the said predetermined diameter it will be in a set condition",

"the rate of withdrawing the tubing, the degree of inflation of the tubing and the degree of chilling the tubing all being correlated in accordance with predetermined desired physical characteristics of the tubing."

That completes my preliminary analysis of the structure of the Specification. The other subject for this Appendix is to consider the sense in which certain words and phrases are used in the Specification. These are

(1) "thermoplastic",

(2) "dry",

(3) "Melt" and "molten",

(4) "squeeze rolls" and "draw rolls",

(5) "set" and "setting".

Much evidence was given as to the meaning of the word "thermoplastic" but there was no controversy as to its meaning. It was common ground that it refers to a certain class of substances each of which has the characteristic that a piece of it is solid at normal temperatures, when heated becomes plastic or malleable so that its shape can be

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changed, and when then cooled becomes solid again, retaining the shape given to it when it was plastic and the further characteristic that such a series of steps may be repeated in respect of the same piece over and over again.

The word "dry", according to the evidence, is used in relation to a substance in this Specification, and other documentary evidence, to indicate that it has not been dissolved in a solvent.

Submissions were made that the words "melt" and "molten" are so used in the Specification as to cause ambiguity and uncertainty. In their dictionary sense, both words refer to a substance that has been converted from a solid to a liquid state. If that is the meaning in which the words are used in the Specification, the instructions in the Specification are nonsensical. In my view, however, when the Specification is read as a whole, it is quite clear that the words are used to indicate a plastic or viscous state of the thermoplastic substance referred to when it has been heated sufficiently to be moulded but before it has been heated sufficiently to be actually liquified. If one first looks at the portion of the disclosure that I have marked "D", it will be seen that the process is described as extruding a thermoplastic material from a "melt" thereof through an annular die to form a tube. Stopping there, if one extruded a liquid through a circular opening, one would not get a "tube" because a liquid does not retain a shape when not in a container. (Consider what happens to water "extruded" from an ordinary lawn hose.) Certainly one does not get a "tube" of the kind contemplated. The description then refers to the "tube" being "drawn" from the die while it is in the "formative plastic state". (The expression "formative plastic state", it will be remembered, is defined by the document to mean that state of the "plastic" wherein the plastic is in the unset or partly set condition and "can be permanently enlarged as by stretching".) Clearly, the description makes no sense unless the word "melt" refers to the material in a plastic and not in a liquid state. Confirmation of this is to be found in portion G of the disclosure where the document, in the course of describing the working of the process by reference to the drawings, says that "The die 26 is provided with an annular orifice 28 from which the molten mass emerges in the air as a hot gummy-like viscous thermoplastic tubing". Confirmation is also to

be found in the evidence of the plaintiff's witness Haines on cross-examination where, speaking of the word "melt", he said, "the term is usually used in the trade" and "it is in a state that it can be formed. It is softer than it was when you put it in the extruder."

"Squeeze rolls" and "draw rolls" are two different expressions meaning the same thing, namely, the pair of contiguous rolls (operating on the same principle as the old-fashioned clothes wringer) into which the tube passes after it is set.

"Set", or "setting", refers to the cooling of the thermoplastic substance from the plastic state to the solid state.