BETWEEN:

ERNEST SCRAGG & SONS LIMITED .....PLAINTIFF;

AND

LEESONA CORPORATION, formerly known as UNIVERSAL WINDING COMPANY, ... DEFENDANT.

1961
Nov 7-10, 13-17, 20-22, 27-30
Dec. 4-8, 11-15

1962
Jan. 9-12, 15-19, 23-25
Mar. 8-9, 12-15.

1964
Feb 26

Patents—Patent Act, R S C. 1952, c. 203, ss. 36(1), 36(2), 45, 48, 62, 63(1) —Invention defined only in claims—Claims to be construed in light of common knowledge of person skilled in relevant art at date of invention—Proof of date of invention not confined to proof of formulation of description—Evidence of commercial success of invention outside of Canada admissible—Specification assumed to be addressed to workman of ordinary skill in relevant art—Patent to be construed fairly—Specification to be read as a whole—Specification may be made dictionary for meaning of terms in claims if intention made plain—Meaning of term "thermo-plastic yarns"—Meaning of expression "such as"—Meaning of term "prescribed temperature"—Meaning of expression "to preclude substantially any ductility"—Extent of statu-

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tory provision for prima facie validity of Canadian patent—Evidence to rebut presumption of validity must be credible evidence—Onus of showing invalidity not easy to discharge—Tests for determining whether prior publication anticipatory of invention—Statements of experts relating to prior art subject to careful scrutiny—Commercial success of invention proof of usefulness—Exercise of inventive ingenuity essential attribute of patentability—Question of obviousness exclusively matter for Court—Trial judge no right to express own opinion on whether invention obvious—Mere scintilla of invention sufficient—Invention not to be considered obvious because of simplicity—Combination not to be held obvious because of obvious inclusion of certain integers—Unobvious nature of one integer may make combination unobvious—Commercial success evidence of inventive step—Specification not insufficient or ambiguous—Claims not invalid by reason of width if limits clearly defined—No independent development of invention—Patent protection not to be impaired by inept expressions or misuse of words if addressee not misled—Inferiority of alleged offending device or process not a defence to charge of infringement—Meaning of term "correlated"—Essence of process invention—Meaning of expression "control means operable automatically to regulate supply of heat energy to heated zone"—Gillette defence not available to plaintiff.

The plaintiff brought an action under section 62 of the *Patent Act* for impeachment of the defendant's patents No. 552,104 for "Thermoplastic Yarns and Methods of Processing Them" and No. 552,105 for "Apparatus for Processing Textile Yarns" seeking a declaration that certain claims in them are invalid and that its "Crimp Spin" machine and its use in the processing of textile yarns do not infringe any of the defendant's rights under them. The defendant denied the plaintiff's claims and counterclaimed for a declaration that the claims are valid and have been infringed by the plaintiff and for an injunction and damages or an account of profits.

Held: That it is the duty of the Court in a patent infringement action to construe the claims in suit according to the recognized canons of construction, for it is in the claims and only in the claims that the monopoly for which the patent was granted is defined, and that this basic principle applies with equal force in the case of an impeachment action, for what is sought to be impeached is the monopoly granted by the patent as defined in the claims.

2. That it is a cardinal principle that the claims in a patent should be construed in the light of the common knowledge which a person skilled in the art to which the invention defined in the claims relates is assumed to have had as at the date of the invention for which the patent was granted.

3. That the state of the relevant art immediately prior to the date of the invention is part of the common knowledge which the addressee of the patent is assumed to have had.

4 That the date of the conception of the idea of an invention does not determine its date and that its determination does not depend on the date of the reduction to practice in the sense of the United States decisions on the subject.

5. That if an inventor can prove that he formulated a description of his invention, either in writing or verbally, at a certain date then he must have made the invention at least as early as that date.

6. That the requirement that there must be proof of the formulation of a description of the invention, either in writing or verbally, is neither apt nor necessary in the case of an invention of an apparatus where the inventor can prove that at the asserted date he had actually made the apparatus itself.

7 That, even although the test of proof of the formulation of a description of the invention, either in writing or verbally, at a particular date might be appropriate in determining the date of an invention of a process, it cannot have been intended to exclude proof that the process was actually used at the asserted date.

8 That proof that an invention was made at an asserted date is not confined to evidence that a written or oral description of it had been formulated at such date. It may also be proved, in the case of an invention of an apparatus, that the apparatus was made at such date and, in the case of an invention of a process, that the process was used at such date. The essential fact to be proved is that at the asserted date the invention was no longer merely an idea that floated through the inventor's brain but had been reduced to a definite and practical shape

9. That, while the Court will carefully scrutinize the evidence in support of an inventor's assertion that he made his invention at a date long prior to the date of his application for a patent for it the law does not impose a heavier onus of proof on him than that which is usual in civil cases. All that is required is that the evidence should be "fairly read" and that the Court should be satisfied on the evidence so read that the invention, in the true sense of the word, was made at the asserted date. *Canadian General Electric Co. Ld. v. Fada Radio Ld.* (1930) 47 R P C. 69 at 93 applied.

10 That Mr. Seem and Mr. Stoddard made the invention of the apparatus defined in claim 3 of patent No. 552,105 at the asserted date, namely, in July, 1947, or, at the latest, early in August, 1947

11. That the fact that Mr Seem and Mr Stoddard continued to work on the first embodiment of their invention of the apparatus and make further experiments does not affect the fact that they made it at the asserted date.

12. That Mr Seem and Mr. Stoddard invented the method defined in the claims in issue of patent No 552,104 as early as November 13, 1950

13. That the inventions in issue have met with remarkable commercial success.

14. That an invention is not limited to any particular locale, that the licenses referred to in the evidence were licenses to use the inventions in issue before any patents were issued for them and that evidence of their commercial success outside of Canada was admissible.

15. That the Court must determine the state of the relevant art at the date of the invention.

16 That patent No 552,104 was addressed to throwsters with a good deal of knowledge of the arts of their customers for the yarns produced by them, namely, weavers, knitters and dyers, for they had to produce yarns that met the needs of such customers and patent No. 552,105 was addressed to manufacturers of false-twist process machines with knowledge of the needs of throwsters like the plaintiff or the defendant who would be the users of them

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17. That the nylon yarn produced by the defendant's false twist process was more uniform in appearance than that produced by the step by step or conventional method and superior to it in quality.
18. That the defendant's continuous false twist process was superior to the step by step method from an economic point of view.
19. That the superiority of the continuous false twist process over the step by step method, both as to the quality of the yarn produced and as to the cost of production, was the cause of the commercial success of the inventions in issue.
20. That there is no support in any of the prior art references for any of the attacks made on the validity of the claims in issue.
21. That a specification is addressed to the man who must use it, not to expert scientists, not to amateurs, but to those who will be responsible for putting it into practice and have the necessary skill for doing so
22. That the skilled person to whom a patent is assumed to be addressed is a workman of ordinary skill in the relevant art.
23. That, while the Golden Rule of construction of a document, namely, that its words should be given their plain and ordinary meaning applies to the claims of a patent, it is a fundamental principle of patent law that a patent should be construed fairly.
24. That the Court must not allow lack of precision in the use of the words in a patent specification or in a patent claim to defeat the claim if its meaning, notwithstanding the misuse of some of its words, would be plain to the workman of ordinary skill in the art to which the invention covered by the patent relates.
25. That the specification should not be construed astutely but should be approached with a judicial anxiety to support a really useful invention if it can be supported on a reasonable construction of the patent, that the claims should be interpreted by a mind willing to understand, not by a mind desirous of misunderstanding and that where the Court has been satisfied that there was a meritorious invention and the language of the specification, upon a reasonable view of it, can be read so as to afford the inventor protection for that which he has actually in good faith invented, the Court, as a rule, will endeavour to give effect to that construction
26 That it is essential to the fair construction of a patent claim that the specification be read as a whole.
27. That the principle of fair construction of a patent claim must be applied in such a way as to give effect to the expressed intent of the inventor as it would be understood by a workman of ordinary skill in the relevant art.
28 That the words of a patent claim may bear a "special or unusual meaning by reason of a dictionary found elsewhere in the specification or of technical knowledge possessed by persons skilled in the art".
29 That experts in the relevant art may give evidence of the meaning of technical terms and expressions in a patent claim as they would be understood by the addressee of the patent.
30. That the applicant for a patent may in the specification define the meaning of terms or expressions in the claims and thereby make the specification a dictionary for the purpose of interpreting them and that, if he has made his intention plain to the addressee of the patent that the terms or expressions are to be read with the meaning

defined in the specification, the Court, in pursuance of its duty of fair construction of the claims, must construe the said terms or expressions as having such meaning.

31. That the inventors have in the specification plainly defined the meaning of the term "thermoplastic yarns" as being thermoplastic yarns "such as nylon, vinyon, orlon, velon, dacron, saran and the like" and have made it plain to any person of ordinary skill in the relevant art who reads the patent with a mind willing to understand it that when he comes to the claims he must read the term "thermoplastic yarns" as having the meaning defined in the specification and that since cellulose acetate yarn is not one of the specified thermoplastic yarns it is not within the ambit of the term "thermoplastic yarns" as the inventors have defined it and the patents in issue do not relate to it.

32. That the expression "such as" in the specification must not be construed as meaning simply "for example". It is clearly restrictive and definitive of the term "thermoplastic yarns" and limits its meaning to the thermoplastic yarns of the kind or type specified.

33. That the inventors made it plain in the specification that the term "yarn-set", as it appears in the claims in issue means that the molecules of the yarn are to be stabilized in the helical deformation into which they were reoriented by the twisting while the yarn was in its plastic state followed by the cooling of the yarn before it was untwisted so that a spiralled helical formation is set in it.

34. That the use of the word "prescribed" in the term "prescribed temperature", as it appears in the claims in issue, is inept, but it is clear to any addressee of the patent who is willing to understand it that the term "prescribed temperature" means the temperature that is required in order to enable the yarn to be "yarn-set".

35. That the specification regards "ductile" and "plastic" as synonymous terms and thereby equates ductility with plasticity, that the specification is concerned with the commercial production of substantially permanently crimped thermoplastic yarns of the kind specified in it, that the specification is addressed to practical throwsters who would know the purposes for which the yarns are to be used and that it would be clear to them that what is meant by the use of the expression "to preclude substantially any ductility in the cooled yarn" in the requirement of the claims in issue that the tension on the heated yarn should be correlated to its prescribed temperature, or its prescribed temperature and its linear speed of travel, to maintain it under tension adequate "to preclude substantially any ductility in the cooled yarn" is that the tension on the yarn should be so related with its temperature, or its temperature and its linear speed of travel, that it will be adequate to effect a substantial offset against the tendency of the yarn to become plastic by reason of the application of the heat to it, in order that the spiralled formation of the yarn should remain in it after it has been untwisted, so that the crimp in it will be permanent in the sense that it will withstand the stresses and temperatures to which it will be subjected in the course of production and the conditions of actual commercial use to which it will be put and still retain its crimp.

36. That the statutory provision for the *prima facie* validity of a Canadian patent enacted by section 48 of the *Patent Act* extends, not only to the attributes of patentability of novelty, utility and inventive ingenuity or lack of obviousness, all of which are persumed to be present

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until the contrary is shown, but also to the obligations imposed by law on a patentee and the requirements specified in the Act and that compliance with them is presumed until the contrary is shown.

37. That the onus of showing that a patent is invalid lies on the party attacking it, no matter what the ground of attack may be.

38. That the presumption of validity enacted by section 48 cannot be rebutted merely by the introduction of some evidence tending to establish invalidity.

39. That the evidence required to rebut the presumption of validity must be "credible" evidence and substantial enough to satisfy the Court that the patent is invalid. Halsbury's Laws of England, Third Edition, Vol. 15, at 343, applied.

40. That the onus of showing that a patent is invalid is not an easy one to discharge.

41. That the provision for the validity of a Canadian patent enacted by section 48 enures to the benefit of the owner of the patent until the party attacking it shows to the satisfaction of the Court that it is invalid.

42. That a prior publication must not be held to be anticipatory of an invention unless the information as to the invention given by it is, for the purposes of practical utility, equal to that given by the patent for the invention and shows everything that is essential to it so that a workman of ordinary skill in the relevant art would at once have perceived, understood and been able practically to apply the invention without the necessity of further experiment. It is not enough to prove that the information could have been used to produce the result of the invention in issue; there must have been a clear and unmistakeable direction to use it for such purpose. Nor is it sufficient that the prior publication contained suggestions which, taken with other suggestions, might be shown to have foreshadowed the invention or important steps in it, or that it contained the nucleus of the idea of the invention which could have been regarded as the beginning of its development. If the prior publication is to be regarded as a prior publication of the invention it must be shown that it published to the world the whole invention with all the material necessary to instruct the public how to put it into practice and that it so disclosed the invention to the public that no person could subsequently claim it as his own. A prior publication is not to be regarded as an anticipation of the invention unless it can be shown that a person grappling with the problem solved by the patent and having no knowledge of it but having the prior publication in his hand would have said, "That gives me what I wish."

43. That anticipation of an invention cannot be proved by resort to alleged inventions that were not put into practice or were inoperable.

44. That the statements of expert witnesses relating to the prior art, being made with the knowledge possessed at the date of the statements, should be carefully scrutinized.

45. That there was no information, for the purposes of practical utility, in either the Finlayson United Kingdom patent No. 424,880 or the Finlayson United States patent No. 2,111,211 or the alleged use of the Finlayson machine at Spondon as to the invention defined in the claims in issue of patent No. 552,104 equal to that given by the patent.

46. That the mere statement in the specification of United Kingdom patent No 424,880 that heat may be used to bring about the setting of the filaments which are thermoplastic or in the specification of United States patent No. 2,111,211 that hot air may be used as a setting agent, in the absence of a direction to use it, is not enough to make the patent an anticipation of the invention in issue
47. That, since the invention defined in the claims in issue of patent No. 552,104 was made as early as November 13, 1950, the Chavanoz patents cannot be regarded as anticipatory of it.
48. That the invention defined in the claims in issue of patent No 552,104 was not anticipated.
49. That the remarkable commercial success of the inventions in issue, even before any patents for them were granted, is conclusive proof that they were useful.
50. That the exercise of inventive ingenuity is an essential attribute of patentability.
51. That the question whether an alleged invention was obvious or not is exclusively a matter for the Court and it is not within the competence of a witness, whether an expert or not, to express his opinion on the subject.
52. That the trial judge has no right to determine the question whether an invention was obvious according to his own opinion on whether it was obvious or not. The issue is not whether the alleged invention would have been obvious to him but whether it would have been obvious to a person of ordinary skill in the relevant art. The judge must, as far as possible, put himself or be put in the position of such a person and determine the question accordingly.
53 That the plea that the invention was obvious is frequently the last resort of an infringer and the Court should look askance at the effort to defeat a new and useful invention by such a plea.
54 That, since it has never been possible to define with precision, apart from the statutory definition, what constitutes an invention, the provision of *prima facie* validity enacted by section 48 is of particular importance so far as the attribute of patentability of inventive ingenuity is concerned.
55. That the statement that the onus of showing that a patent is invalid is not an easy one to discharge is particularly applicable in cases where a party seeks to destroy a new and useful invention by the plea that it was obvious.
56 That a mere scintilla, meaning thereby "the slightest trace" of invention is sufficient to support a patent.
57 That an invention is not to be considered obvious because of its simplicity
58 That the fact that the inclusion of certain parts in an apparatus or certain steps in a process was obvious does not warrant the conclusion that the invention of the apparatus or process was obvious.
59. That in considering whether an invention was obvious the whole of the relevant art may be looked at. *Allmanna Svenska Electriska A/B v. The Burntisland Shipbuilding Coy. Ld.* (1952) 69 R P.C. 63 at 69 followed.
60 That a combination should not be found invalid for obviousness of the invention for which it was granted unless it is shown to the satisfaction of the Court that it was obvious that the integers of the

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combination should be combined as specified in the claim defining the invention. The issue is not whether the integers in a combination invention were obvious but whether the invention of the combination was obvious.

61. That the unobvious nature of one integer of a combination may be such as to establish the unobviousness of the combination. *Martin and Biro Swan Ld. v. H. Millwood Ltd.* (1956) R.P.C. 125 at 136 followed.

62. That when it is found that there has been a problem calling for solution and that the new device has solved it then its practical utility and commercial success in displacing alternative devices should be considered strong evidence that its production required the taking of an inventive step and that the applicant for the patent was the first to take it. *Samuel Parkes & Co. Ltd. v. Cocker Brothers Ltd.* (1929) 46 R P C. 241 at 248 followed.

63. That the plaintiff has failed to discharge the onus imposed by section 48 of showing that the inventions in issue were obvious.

64. That the great commercial success of the inventions in issue is evidence that they were not obvious.

65. That a patent specification is not insufficient by reason of the fact that a competent workman of ordinary skill in the relevant art may have to make trials or experiments in order to accomplish the result of the invention, if such trials or experiments are not themselves inventions and the competent workman can accomplish the desired result by following the teaching of the specification. It is sufficient if it enables him to put the invention into practice and sufficient directions are given to him to enable him to know what trials or experiments he may have to make and how to make them. *No-Fume Ld. v. Frank Pitchford & Co. Ld.* (1935) 52 R P.C. 231 applied.

66. That the specification, when read as a whole and fairly, teaches any competent workman of ordinary skill in the art who is willing to understand it what is necessary to the production of yarns of the superior uniformity and quality promised by the patent and how it should be accomplished.

67 That it is not necessary in a patent specification to give directions of a more minute nature than a person of ordinary skill and knowledge of the relevant art might fairly be expected to need and that by following the teachings of the specification the addressee of the patent can put the invention into practice as easily and effectively as the inventors could do themselves.

68 That, in view of the wide limits within which the invention may be operated, the general directions in the specification give more effective information on how the result of the invention is to be accomplished than if the specific examples and directions referred to in the argument of counsel for the plaintiff had been given.

69. That the specification was not insufficient.

70. That the expression "prescribed temperature" in the claims in issue is not ambiguous.

71. That the specification of patent No 552,104 does not contain any contradictory statements and is not ambiguous.

72. That a claim must be stated with such precision as to leave no doubt of the scope of the monopoly defined in it, so that an addressee of the patent will, on a fair reading of the claim, be able to determine whether what he proposes to do will infringe it or not.

73. That any addressee of the patents in issue would know, without doubt, that if what he proposes to do is tantamount to following the teaching of the specification he will produce a uniform and permanently crimped yarn and his action will be within the scope of the monopoly defined in the claims in issue and constitute an infringement by him.

74. That the fact that the claims in issue cover a wide range of inventions does not invalidate them since the limits of the claims are clearly defined.

75. That the claims in issue are not indefinite or flexible

76. That the attacks on the validity of the patents in issue on the ground that the invention defined in the claims in issue is inoperable fail.

77. That there was no independent development of the inventions in issue at the respective dates of their invention.

78. That when a meritorious invention, such as that defined in the claims in issue, has been made the owner's rights in respect of it should be protected unless it has been clearly shown that the patent granting the monopoly is invalid.

79. That the fact that there are instances in the patents in issue of inept expressions and the misuse of words, none of which would mislead any addressee of the patents who would read them fairly with a willingness to understand them, should not "impair the protection due to an inventor who has made an honest and careful disclosure of the invention and given as clear a definition of the monopoly claimed as the subject admits of". An inventor's rights are not to be measured by his capacity for precision of speech if he has fairly complied with the requirements of the law, as the inventors in the present case have done.

80. That as between the parties all the claims in issue are valid.

81. That it is not a defence to a charge of infringement that the alleged offending device or process is inferior to the patented one.

82. That all that is meant by the requirement in the claims in issue that the tension upon the heated yarn should be "correlated" to its prescribed temperature to maintain it under tension adequate to preclude substantially any ductility in the cooled yarn is that the tension on the heated yarn should be "put in relation" with its temperature so that it will be adequate for the accomplishment of the purpose specified in the claims and that this was done in the process used on the C83 machines, that the plaintiff sold to Galtex Company Limited.

83. That it is not correct to describe compliance with each requirement of the process claims in issue as a step in the process in the sense that it must be made in any particular order. The process is a unitary one calling for compliance with several of the specified requirements in combination with one another at the same time.

84. That it would be obvious to every throwster or other workman of ordinary skill in the art that the requirement that the tension on the heated yarn should be correlated to its prescribed temperature to maintain the yarn under tension adequate to preclude substantially any ductility in the cooled yarn must have been intended to be related to the purpose of producing a permanently crimped yarn and it should be construed accordingly.

85 That the validity of the process claims in issue does not depend on whether the idea of preclusion of substantially any ductility in the

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cooled yarn is novel or not. The essence of the process invention in issue is that the combination of the requirements set out in the claims results in the production of permanently crimped thermoplastic yarns of the kind specified in the patents by its continuous false twist process that are not only more uniform in character than any yarns produced by any other process but are also superior in quality and are producible at greatly less cost.

86. That the process used on the CS3 machines which the plaintiff sold to Galtex Company Limited came within the ambit of the invention defined in each of the claims in issue of patent No. 552,104 and that the plaintiff has infringed the defendant's rights under them.

87. That the temperature control system and its monitoring system in the CS3 machines which the plaintiff sold to Galtex Company Limited cooperate with one another and constitute control means operable automatically to regulate the supply of heat energy to the heated zone within the meaning of claim 3 of patent No. 552,105.

88. That the said CS3 machines came within the ambit of the invention defined in the said Claim 3 and that the plaintiff has infringed the defendant's rights under it.

89. That, since the invention defined in the claims in issue was not anticipated and the plaintiff has infringed the rights of the defendant under them, the so-called Gillette defence is not open to the plaintiff.

90. That the plaintiff's action must be dismissed and the defendant's counterclaim allowed.

ACTION for impeachment of defendant's patents and declaration of invalidity of claims and non-infringement.

The action was tried before the President of the Court at Ottawa.

Harold G. Fox, Q.C. and *Donald F. Sim* for plaintiff.

E. G. Gowling, Q.C. and *Gordon F. Henderson, Q.C.*, for defendant.

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

THE PRESIDENT now (February 28, 1964) delivered the following judgment:

The plaintiff is a corporation under the laws of Great Britain having its principal office and chief place of business at Macclesfield in England and the defendant is a United States corporation having its chief place of business at Cranston in Rhode Island. The defendant is the owner of three Canadian Letters Patent as assignee of Nicholas J. Stoddard and Warren A. Seem, the inventors of the inventions covered by them, the said patents being No. 552,103

for "Textile Yarns and Methods of Processing Them", No. 552,104 for "Thermoplastic Yarns and Methods of Processing Them" and No. 552,105 for "Apparatus for Processing Textile Yarns", all issued on January 21, 1958. The plaintiff manufactures and sells textile machinery in England, Canada and elsewhere throughout the world, including a textile processing machine known as the "Crimp Spin" machine and referred to in the evidence as its CS3 machine. In the action, which is brought under the authority of section 62 of the *Patent Act,* R.S.C. 1952, Chapter 203, the plaintiff impeaches the defendant's patents and seeks a declaration that they are invalid and also a declaration that its "Crimp Spin" machine and its use in the processing of textile yarns do not infringe any of the defendant's rights under the patents. The defendant denies the plaintiff's claims and counterclaims for a declaration that the patents are valid and have been infringed by the plaintiff, an injunction restraining such infringement and damages or an account of profits as it may elect.

By an agreement, dated August 28, 1961, and filed as Exhibit 9, the parties agreed, *inter alia,* that both the action and the counterclaim with respect to patent No. 552,103 be discontinued on the defendant's undertaking set out in the agreement, that both the action and the counterclaim with respect to patent No. 552,104 be discontinued, except as to claims 1, 2, 3, 5 and 8, on the defendant's undertaking set out in the agreement and that both the action and the counterclaim with respect to patent No. 552,105 be discontinued, except as to claim 3, on the defendant's undertaking set out in the agreement.

Thus the claims in issue are claims 1, 2, 3, 5 and 8 of patent No. 552,104, which are process claims, and claim 3 of patent No. 552,105, which is an apparatus claim.

The invention for which patent No. 552,104 was granted relates to thermoplastic yarns such as nylon, vinyon, orlon, velon, dacron, saran, and the like (as distinguished from silk, rayon, cotton, linen or wool, etc.) and to methods of processing them and is especially concerned with the production of substantially permanently crimped, wavy or fluffed thermoplastic yarns. The claims in issue of this patent read as follows:

1. A method of producing evenly and permanently crimped, wavy or fluffed multi-filament thermoplastic yarn having improved and uniform

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physical characteristics which comprises, continually drawing the yarn from a source of supply, continually twisting the yarn drawn from said supply, continually passing the yarn at a selected linear speed under uniform tension through a restricted thermally isolated and uniformly heated zone to uniformly heat the yarn to a prescribed temperature to reorient the molecules of the yarn to the twisted formation of the yarn and yarn-set the same, controlling the supply of heat energy to said zone to thereby maintain said heated zone uniformly at the temperature required to uniformly heat said yarn to said prescribed temperature, continually cooling the yarn to stabilize the same after passage under tension through said heated zone, continually untwisting the yarn after cooling the same, and finally continually collecting the processed yarn, the tension upon the heated yarn being correlated to said prescribed temperature of the heated yarn to maintain the yarn under tension adequate to preclude substantially any ductility in the cooled yarn.

2. A method of producing evenly and permanently crimped, wavy or fluffed multi-filament thermoplastic yarn having improved and uniform physical characteristics which comprises, continually drawing the yarn from a source of supply, continually twisting the yarn drawn from said supply, continually passing the yarn at a selected linear speed under uniform tension through a restricted thermally isolated and uniformly heated zone to uniformly heat the yarn to a prescribed temperature to reorient the molecules of the yarn to the twisted formation of the yarn and yarn-set the same, controlling the supply of heat energy to said zone to thereby maintain said heated zone uniformly at the temperature required to uniformly heat said yarn to said prescribed temperature, correlating the tension in said yarn to said prescribed temperature and linear speed of travel of the yarn to maintain the yarn at a selected uniform tension relative to the contractile force of the yarn resulting from heating and twisting the same to preclude substantially any ductility in the yarn after cooling, continually cooling the yarn to stabilize the same after passage thereof under tension through said heated zone, continually untwisting the yarn after cooling the same, and finally continually collecting the processed yarn.

3. A method of producing evenly and permanently crimped, wavy or fluffed multi-filament thermoplastic yarn having improved and uniform physical characteristics which comprises, continually drawing the yarn from a source of supply, continually twisting the yarn drawn from said supply, continually passing the yarn at a selected linear speed under uniform tension through a restricted thermally isolated and uniformly heated zone to uniformly heat the yarn to a prescribed temperature to reorient the molecules of the yarn to the twisted formation of the yarn and yarn-set the same, controlling the supply of heat energy to said zone compensatively according to the ambient temperature and rate of transfer of heat to the yarn to thereby maintain said heated zone uniformly at the temperature required to uniformly heat said yarn to said prescribed temperature, correlating the tension in said yarn to said prescribed temperature and linear speed of travel of the yarn to maintain the yarn at a selected uniform tension less than the contractile force of the yarn resulting from heating and twisting the same to preclude substantially any ductility in the yarn after cooling, continually cooling the yarn to stabilize the same after passage thereof under tension through said heated zone, continually untwisting the yarn after cooling the same, and finally continually collecting the processed yarn.

5. A method of producing evenly and permanently crimped, wavy or fluffed multi-filament thermoplastic yarn having improved and uniform

physical characteristics which comprises, continually drawing the yarn from a source of supply, continually twisting the yarn drawn from said source, continually passing the yarn at a selected linear speed under uniform tension through a restricted thermally isolated and uniformly heated zone to uniformly heat the yarn to a prescribed temperature to reorient the molecules of the yarn to the twisted formation of the yarn and yarn-set the same, controlling the supply of heat energy to said zone to thereby maintain said heated zone uniformly at the temperature required to uniformly heat said yarn to said prescribed temperature, continually cooling the yarn to stabilize the same after passage thereof under tension through said heated zone, continually untwisting the yarn after cooling the same, continually collecting the processed yarn, and controlling the tension upon the heated yarn relative to the contractile force and thermal characteristics of the yarn at said prescribed temperature to maintain the same under uniform tension adequate to preclude substantially any ductility in the cooled yarn.

8. A method of producing evenly and permanently crimped, wavy or fluffed multi-filament thermoplastic yarn having improved and uniform physical characteristics which comprises, continually drawing the yarn from a source of supply, continually twisting the yarn drawn from said supply, continually passing the yarn at a selected linear speed under uniform tension through a restricted thermally isolated and uniformly heated zone to uniformly heat the yarn to a prescribed temperature to reorient the molecules of the yarn to the twisted formation of the yarn and yarn-set the same, controlling the supply of heat energy to said zone compensatively according to the ambient temperature and rate of transfer of heat to the yarn to thereby maintain said heated zone uniformly at the temperature required to uniformly heat said yarn to said prescribed temperature, correlating the tension in said yarn to said prescribed temperature and linear speed of travel of the yarn to maintain the yarn at a uniform tension substantially in excess of the contractile force of the yarn resulting from heating and twisting the same to preclude substantially any ductility in the yarn after cooling, continually cooling the yarn to stabilize the same after passage under tension through said heated zone, continually untwisting the yarn to the exact extent to which twisted, and finally continually collecting the processed yarn.

The invention for which patent No. 552,105 was granted relates to apparatus for processing thermoplastic textile yarns and is concerned more particularly with apparatus useful in processing polyamide and other thermoplastic yarns such as nylon, vinyon, orlon, velon, dacron, saran and the like (as distinguished from yarns of cotton, linen, rayon, silk or wool and the like). Claim 3 of this patent reads as follows:

3. Apparatus for thermally processing thermoplastic yarn comprising a support for a supply of yarn, wind-up means for the processed yarn spaced from said support and operable to draw the yarn continuously at a selected linear speed from the supply to said wind-up means, an electrically energized heating device defining a restricted thermally isolated heated zone for passage of the yarn therethrough to heat the yarn to a prescribed temperature, a false-twist device operable to twist the yarn before passage

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thereof through said heated zone and to untwist the yarn after said passage through the heated zone, control means operable automatically to regulate the supply of heat energy to said zone compensatively according to the rate of transfer of heat to the yarn to maintain said zone uniformly at the temperature required to heat the yarn to said prescribed temperature, tension means operable to maintain the yarn at a uniform tension during passage thereof through said heating device and to the wind-up means, and means to regulate the tension means to control the tension of the yarn in correlation to the prescribed temperature and linear speed of travel of the yarn to maintain the latter at a selected uniform tension relative to the contractile force and thermal characteristics of the yarn.

It is the duty of the Court in a patent infringement action to construe the claims in suit according to the recognized canons of construction, for it is in the claims and only in the claims that the monopoly for which the patent was granted is defined. This basic principle applies with equal force in the case of an impeachment action, for what is sought to be impeached is the monopoly granted by the patent as defined in the claims. It is for that reason that I have set out the claims in issue at this early stage in these reasons for judgment, for it is the function of the claims to define the monopoly sought to be impeached and it is only in the claims that it is defined. This fundamental principle, which is part of the foundation on which our patent law is established, was clearly stated in the House of Lords by Lord Russell of Killowen in the leading case of *Electric and Musical Industries, Ld. et al v. Lissen, Ld. et al*[1] where he said, at page 39:

> The function of the claims is to define clearly and with precision the monopoly claimed, so that others may know the exact boundaries of the area within which they will be trespassers . . . . the forbidden field must be found in the claims and not elsewhere.

and later:

> A claim is a portion of the specification which fulfils a separate and distinct function. It and it alone defines the monopoly.

The case raises several questions of interest and importance. The actual hearing took up 44 days and voluminous written arguments have been filed. It became manifest early in the proceedings that there is fierce commercial competition between the parties and that the present litigation is only one phase of it. There has been litigation in the United States involving the defendant's United States patents cor-

[1] (1939) 56 R.P.C. 23.

responding to the ones in issue in which the plaintiff sought to intervene and in England applications for patents covering the inventions made by the English owner of them have been held up pending the disposition of opposition proceedings taken by the plaintiff.

Evidence for the plaintiff was given by Dr. Donald Finlayson, formerly the chief physicist at the works of British Celanese Limited at Spondon in England and since 1957 an industrial consultant to several industrial companies including the plaintiff, Professor John B. Speakman, the professor of textile industries at the university of Leeds in England, Mr. Timothy Nesbitt-Dufort, who came to the plaintiff in 1956 as the personal assistant to Mr. Philip Scragg, one of the plaintiff's joint managing directors, and since the middle of 1960 has been the plaintiff's commercial director, Dr. George P. Hoff, formerly the manager of the technical division and the acetate division of the E. I. Dupont de Nemours Company and now a director of the Ohio Research Foundation, Miss Jeanette Rea, an intermediate research associate with Fabric Research Laboratories Incorporated at Dedham in Massachusetts and Dr. Leslie Turl, a textile expert with the Defence Research Medical Laboratories at Toronto of the Department of National Defence. Evidence for the defendant was given by Mr. Warren A. Seem, one of the inventors of the inventions in issue, Mr. Roger Tomlin, the plant superintendent of Galtex Company Limited at Galt in Ontario, Mr. Harold P. Berger, a part owner of Marionette Mills Incorporated at Coatesville in Pennsylvania and one of the partners in the Permatwist Company of which Mr. Seem and his co-inventor Mr. Stoddard were also partners, Mr. William S. Berky, the defendant's comptroller and Dr. Chester J. Dudzik, the project engineer in charge of the development and design of the defendant's yarn processing equipment. In addition, evidence on behalf of the plaintiff was given on comimssion in England by Mr. Ernest Philip R. Scragg, the plaintiff's deputy chairman.

It is a cardinal principle that the claims in a patent should be construed in the light of the common knowledge which a person skilled in the art to which the invention defined in the claims relates is assumed to have had as at the date of the invention for which the patent was granted,

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for the specification of the patent, including the claims with which it ends, is deemed to be addressed to such a person.

The state of the relevant art immediately prior to the date of the invention is part of the common knowledge which the addressee of the patent is assumed to have had. It is important, therefore, that the date of the invention should be determined.

In the present case there is a dispute between the parties regarding the date of the inventions defined in the claims in issue of patents No. 552,104 and No. 552,105 respectively. While the said patents, which were issued on January 21, 1958, were based on applications dated September 27, 1954, and the corresponding United States patents were based on applications dated January 4, 1954, it is asserted on behalf of the defendant that the inventions in issue were in fact made in July, 1947. On the other hand, it is contended for the plaintiff that the defendant is not entitled to an invention date prior to January 4, 1954.

Evidence in support of the defendant's assertion was given by Mr. Seem. He set out the steps that he and Mr. Stoddard had taken relating to the inventions which he and Mr. Stoddard had made. A detailed review of his evidence on the subject is essential.

Mr. Seem's qualifications are of a high order. He has been in the throwing business for over 40 years ever since he was 16 years of age. Throwing is the business of processing yarns consisting of continuous filament fibres and those who are engaged in it are known as throwsters. Mr. Seem worked first under his father who was the throwing superintendent of the Julius Kaiser Company which was engaged in twisting silk fibres. In 1927 he entered the employ of the Georgetown Silk Company at Wilkes-Barre in Pennsylvania and in 1929 became its vice-president and the general manager of its throwing plant.

In 1935 he hired Mr. Stoddard as a machinist. They were both experimentally minded and worked on the twisting of silk and rayon fibres. Between 1938 and 1941 they had developed a false twist spindle and were experimenting with it. In that period they had some nylon yarn to work with. They had received such yarn for the first time in the fall of 1938. They experimented with heaters of various types. They found that the use of steam for the purpose

of setting twist in the yarn was not satisfactory and they also tried other means for the purpose, including the use of certain chemicals, wetting the yarn and running it through the heater, and adding high boiling point materials to it. In the course of their experiments they found that when the nylon yarn was heated to a high temperature they were getting a very good set with the use of dry heat alone. This surprised them for the teaching in the industry had been that moisture was always used for setting the fabric or the twist in the yarn.

In 1941 their experiments came to a temporary halt. The production of silk was stopped and the Georgetown Silk Company was forced into liquidation. Mr. Stoddard then went to Durham in North Carolina to work with a government agency and Mr. Seem went to the Sauquoit Silk Company at Scranton in Pennsylvania. In 1943 he left that company and went to the Atlantic Rayon Corporation of Providence in Rhode Island which later changed its name to Textron Inc. These companies were rayon and nylon throwsters.

In 1944 Mr. Seem and Mr. Stoddard came together again. Mr. Seem was in Philadelphia with Synthetic Yarns Inc., of which he was a part owner, and Mr. Stoddard moved there in July and took a position with the Radio Corporation of America. The two men resumed their experiments, each having a laboratory in the basement of his own home. They reviewed their work on rayon fibres and then resumed their experiments with nylon fibres. Between them they made a rough bench model of a false twisting apparatus on which they conducted their experiments. In the same year they formed a partnership under the name of the Permatwist Company with Mr. Harold P. Berger and Mr. Tecce, who had agreed to finance their work.

In 1946, after further experiments, Mr. Seem and Mr. Stoddard had come to the conclusion that they could build a full scale commercial machine for false twisting yarns and decided to build a portable bench model incorporating the entire apparatus that was necessary for the purpose. In the spring of 1946 Mr. Stoddard approached the Baugher and Hirst Machine Shop Company with a view to having them make the model and on April 18, 1946, Mr. Seem wrote to the Company authorizing the work according to

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the instructions that Mr. Stoddard had given. On February 11, 1937, he wrote to the Company complaining of the slow progress that had been made. Mr. Stoddard then helped in the completion of the model himself, working in the Company's shop in the evenings and at week ends, and, finally, in July, 1947, Mr. Seem and Mr. Stoddard received the portable bench model which they had devised.

After it had been received the rough model was dismantled. Mr. Seem and Mr. Stoddard then used some additional pieces of equipment with the model, comprising a voltage regulator, a step-down transformer, a rheostat, a voltmeter calibrated to revolutions of the motor per minute and a voltmeter to test the voltage fed to the heater. The portable bench model with the rheostat and the calibrated voltmeter was filed as Exhibit Z-151 and pictures of it were filed as Exhibits Z-152 and Z-153. These show the parts, as listed on Exhibit Z-154. Mr. Seem also showed on a photograph of Exhibit Z-151, filed as Exhibit Z-174, the path taken by the yarn as it passed from the supply package through the machine to the take-up package. The yarn travelled upward from the supply package and through what was called a pigtail guide, then through the tension device and downwardly through the heating device, then through a space and another pigtail guide and around the twist trapper on top of the hollow false twist spindle, then through the spindle and the hollow motor shaft, then around a guide pulley and upward through another pigtail guide and into the take-up package.

Mr. Seem explained how the controls of temperature, tension and linear speed of the yarns operated. The voltage regulator was used to make corrections for variations in the voltage coming from the outside power source and it was able to do so within plus or minus one per cent. The step-down transformer was used to step the incoming voltage being fed to the heater down from 120 volts to safe voltages of from 24 volts downward. The output of the step-down transformer went through the rheostat and this enabled Mr. Seem to make a fine adjustment of the voltage going to the heater. This was changed as required in order to correlate changes in the temperature of the heater with tensions in the yarn. If there were changes in the temperature of the ambient atmosphere, referred to in the evi-

dence as the ambient temperature, Mr. Seem observed the temperature as indicated on the thermometer shown as one of the parts of Exhibit Z-151 listed on Exhibit Z-154 and then made a hand adjustment of the rheostat in whatever direction was necessary in order to maintain a uniform temperature in the heater. Within a week or two after receiving the portable bench model in July, 1947, Mr. Seem used equipment with it in addition to that which I have listed. This was for the purpose of making automatic changes in the voltage fed to the heater to meet changes in the ambient temperature. He explained that Exhibit Z-151 was built as a first step in a planned commercialization of the invention and he wished to be certain that equipment that would correct the voltage in order to ensure a uniform temperature in the heater was commercially available. Mr. Stoddard assured him that it was and brought the equipment to his home. This was a small induction voltage regulator with a temperature sensitive resistor which was adjustable to the heater. The equipment referred to was commercially available but the actual temperature sensitive resistor that was used was made by Mr. Stoddard himself. The thermometer in the heater was taken out and the temperature sensitive resistor inserted in its place. Effective insulation was used and the equipment worked satisfactorily. It compensated automatically for changes in the ambient temperature. Mr. Seem and Mr. Stoddard found that with the use of this equipment they were able to control the temperature in the heater and keep it uniform within plus or minus one per cent in spite of changes in the ambient temperature. The second voltage meter to which I referred was used merely for the purpose of determining what voltage was required to produce a given temperature in the heater.

On his cross-examination Mr. Seem explained that he used tensions on the yarn extending from very low tensions down to 1 or 2 grams up to the breaking point of the yarn. He measured these tensions with a tensiometer at various points on the pathway of the yarn. He and Mr. Stoddard were experimenting with various yarns and in respect of nylon were using all the tension devices that were commercially available. The tension device appearing on Exhibit Z-151 was made by Mr. Stoddard. Mr. Seem stated that it gave a uniform tension to the yarn passing through it.

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Mr. Seem also said that the false twisting device appearing on Exhibit Z-151 was made by Mr. Stoddard and Baugher and Hirst especially for their purpose.

The rate of through-put of the yarn varied from a few thousand revolutions of the false twist spindle per minute to 10,000. The knob of the rheostat was turned to control the voltage and, consequently, the speed of the motor of which the false twist spindle was the shaft, the higher the voltage the greater the speed of the motor and the larger the number of revolutions of the spindle per minute. The linear speed of travel of the yarn was controlled by changing the relation of the sprockets on Exhibit Z-151. The lower sprocket drove the higher one attached to the take-up package. There was a series of sprockets of various sizes that could easily be changed. Thus, for example, if the spindle was run at 7,500 revolutions per minute and a sprocket of the size that would result in a linear speed of the yarn at 100 inches per minute was used there would be 75 turns of twist per inch in the yarn. Conversely, if it was desired to get 75 turns of twist per inch in the yarn a sprocket of the size that would enable a linear speed of 100 inches per minute to be run was used and the knob of the rheostat was turned so that there would be 7,500 revolutions of the spindle per minute.

Mr. Seem explained that through the control mechanism step-down transformer and the rheostat he was able to bring about changes in the temperature of the heater up to the melting point of the yarn, that the tension device was adjustable by the use of an adjusting nut and that by changing the springs in it he could obtain tensions in the yarn up to its breaking point, that by changing the lower sprocket and occasionally the upper one he could obtain various linear speeds of the yarn that, consequently, he was able to operate Exhibit Z-151 in such a way as to correlate the temperature, tension and linear speed of the yarn.

Mr. Seem disclosed Exhibit Z-151 to Mr. Berger and Mr. Tecce soon after it was received in July, 1947. Between that date and December 1, 1950, Mr. Seem and Mr. Stoddard experimented with various fibres including nylon and produced very satisfactory stretch nylon yarn that was permanently crimped. This was experimentally knit at the

Mar-Ed Hosiery Mills and the Wallbridge Mills, both owned by Mr. Berger and Mr. Tecce. The knitted fabric was uniform and could stand washing and boiling and still maintain its crimp. The yarn produced was more uniform than yarns produced by the step-by-step process, to which further reference will be made. This was proved by making the yarn into fabrics or skeins and then dyeing them. There was greater uniformity in the appearance of the yarn. The step-by-step yarn with which the comparison was made was obtained from Synthetic Yarns Inc. This company was an off-shoot of the Atlantic Rayon Corporation, later Textrons Inc., to which I have referred.

I turn now to Mr. Seem's evidence of developments subsequent to 1947 and up to the end of 1950. In 1949 he sold his interest in Synthetic Yarns Inc. and decided to put his full time on the experimental work in which he and Mr. Stoddard had been engaged. In the same year Mr. Berger and Mr. Tecce sold their two hosiery mills and other mills and went into the throwing business which they operated under the name Marionette Mills Inc. They located a plant for their business at Coatesville in Pennsylvania and started their operation early in the spring of 1950. Mr. Seem and Mr. Stoddard then moved all their equipment, including Exhibit Z-151, to a space in this plant. They then decided to build a short section of a full scale false twisting machine, primarily to demonstrate to Mr. Berger and Mr. Tecce that it was practical to convert the equipment shown in Exhibit Z-151 into full scale commercial operation. With this purpose in mind they visited a textile machinery show in Atlantic City in April, 1950, and inspected various up-twisters and selected for their proposed conversion an up-twister manufactured by Fletcher Works, Philadelphia. This was a short section, about 10 feet long and having 40 spindles. The machine was sent on loan to Marionette Mills Inc. I should mention that an up-twister is a machine used by throwsters for putting a large amount of twist in a yarn. Mr. Seem and Mr. Stoddard converted ten of the 40 spindles to false twisting, that is to say, ten set-ups each having a spindle. Each of the conventional spindles was replaced with a false twist spindle of the same kind as in Exhibit Z-151. A creel was put on top of the machine and the yarn went from this creel to the tension device and through the heating device to the take up package. The

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path taken by the yarn was shown on a drawing made by Mr. Seem and filed as Exhibit 134B. It showed the several parts of a spindle after it had been converted.

On his cross-examination Mr. Seem explained that he and Mr. Stoddard had used tension devices of various types in the course of their experiments before they made their final decision. Indeed, they used tension devices of all the kinds that were commercially available, tested them and made modifications of them in their attempt to find a tension device that would suit their purpose. They were trying to design an apparatus that could be applied to conventional up-twisters of various kinds in order to convert them from a true twisting process to a false twisting one. What they needed was a multipoint tensioner and they finally decided on a tension device that was substantially the same as the one on Exhibit Z-151. With this tensioner they were able to provide uniform tension to the yarn within one or two grams at any point in its pathway. The heating device was electrically energized and was practically the same as that shown on Exhibit Z-151.

The conversion of the 10 spindles of the 40 spindle up-twister was completed in the latter part of July, 1950. Mr. Seem kept a notebook in which he recorded experiments in the production of nylon yarn on the converted 10 spindles which ran from July 27, 1950, to November 13, 1950. Samples of the yarn so produced were filed as exhibits. These showed that when the yarn had left the heater it had been yarn-set and that when it was taken off the take-up package it had a satisfactory crimp.

The 10-spindle converted machine was kept in a blocked-off part of a room in the Marionette Mills plant. After Mr. Seem had run off the tests which he recorded in his note-book he and Mr. Stoddard were satisfied that they could accomplish their intended purpose and decided to build eight full scale false twisting machines of 220 spindles each. Having come to that conclusion, they removed all the false twist process conversion parts from the machine, restored it to its original position and returned it to the Fletcher Works from whom it had been borrowed.

When it was decided to construct eight full length false-twisting machines of 220 spindles each, Marionette Mills Inc. also decided to excavate under their building in order

to provide space where the machines could be constructed and operated secretly. The plan to build the eight machines ran into difficulty by reason of the fact that in 1950 nylon yarn was not freely available to throwsters. The Dupont Company, which was the manufacturer of the yarn, sold it only to knitters and weavers and other customers and would not allocate it to throwsters. In the hope that the nylon yarn might be made available for their purpose Mr. Seem and Mr. Stoddard and their Permatwist Company partners, Mr. Berger and Mr. Tecce, arranged a meeting on December 19, 1950, at Wilmington in Delaware with representatives of the Dupont Company and showed them yarn which had been produced on their false-twisting apparatus and fabric made from it. But their efforts failed. At a later meeting held at the Dupont Company's sales office in Philadelphia they were told that the Company had established a firm policy that no new allocation of nylon yarn should be made and that they would not be able to obtain the desired yarn for two or three years. This forced a change of plan. The partners decided to build only one full length 220-spindle false twisting machine instead of the eight machines that had been planned. The Marionette Mills Company went ahead with the excavation and Mr. Seem and Mr. Stoddard built the machine in the newly built basement. It is still there. Its construction was started early in 1951 and completed early in 1952. It was built by Mr. Seem and Mr. Stoddard and certain employees of Marionette Mills Inc.

The machine was located in the basement of the Marionette Mills plant with a partition built around it and was operated with great secrecy. Prior to its conversion to false-twisting it was a full length 220-spindle Utility Up-twister. After its conversion had been completed in 1952 the arrangement of its parts was the same as that shown in Figure 2 of patent No. 552,104 and Figure 8 of patent No. 552,105. And it was substantially similar to the defendant's Fluflon False Twisting Machine of which an exemplification was set up in the basement of the Supreme and Exchequer Court Building and filed as Exhibit Z-161. There were some differences due to changes that were made after 1952, to which further reference will be made, but there was no functional difference. A photograph of Exhibit Z-161 was

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filed as Exhibit Z-162 and photographs of the 220-spindle machine were filed as Exhibits Z-182 to Z-186.

Nylon yarn was processed on the machine in the spring of 1952 and knitted into fabrics which were dyed and washed and put to other tests. Swatches of fabrics knitted from low and high twist stretch yarns produced on the machine were filed as Exhibits Z-163 to Z-165. All of these fabrics had been worked, boiled and thoroughly tested and had retained a permanent crimp. The machine was a production machine and nylon yarn processed on it was sold as a commercial product in March or April of 1953. On his cross-examination, Mr. Seem explained that in the course of their work on the machine their range of throughput ran from 8,000 to 20,000 revolutions of the spindle per minute, with twists in the yarn ranging from 20 times up to about 140 per inch, that the tension used in the twist zone between the heater and the twist trapper of the false twist spindle ran from 3 grams up to the breaking point and that the temperature used was from 10° to 20° above the ambient up to the melting point. He freely admitted that the machine was used for experimental purposes as well as for commercial production.

A secret disclosure of the machine and of the processing method used was made on May 20, 1952, to four persons representing Synthetic Yarns Inc. It had been offered a license under certain French patents and Mr. Seem had told one of its representatives that he and Mr. Stoddard had developed a machine and a method for producing stretch thermoplastic yarns by a continuous process and that they might work out an arrangement whereby representatives of Synthetic Yarns Inc. could inspect the machine with a view to working out a business arrangement. The representative came to the Marionette Mills plant and signed a secret disclosure statement which was filed as Exhibit Z-166. Mr. Seem showed them yarns of various types that had been produced on the machine and fabrics made from them and also, for comparison purposes, yarns that had been produced by the conventional step-by-step process. He also showed them the machine in operation and described the parts, including the overhead creel, the tension device such as that shown in Exhibit Z-151 and the electrically energized heater as already described. In order to demonstrate how the machine would eventually

run, Mr. Seem used equipment in connection with the heater which had been borrowed from the Radio Corporation of America. This consisted of an induction voltage regulator with a temperature sensitive resistor for insertion in one of the heaters which had the effect of automatic control of changes in the voltage fed to the heater and necessary compensation for changes in the ambient temperature as already described in the case of the additional equipment used with Exhibit Z-151. Mr. Seem also stated that the false twist spindle was such as that shown on a drawing made by the Hartford Machine Screw Co., dated December 5, 1951, and filed as Exhibit Z-157. Mr. Seem admitted that in respect of some of the features referred to in the secret disclosure statement the representative of Synthetic Yarns Inc. had accepted his own statements of them.

I come now to Mr. Seem's evidence relating to the events subsequent to the secret disclosure of May 20, 1952, and the issue of the United States patents corresponding to the patents in issue. After the secret disclosure arrangements were made to build six false-twisting machines for Synthetic Yarns Inc. and the Permatwist Company partners decided to build seven machines in addition to the one already described in order to make up the eight machines that had been planned. An adequate supply of nylon yarn was now available and there was space in the basement of the Marionette Mills plant for them. Mr. Seem and Mr. Stoddard were urged to get patent protection for what they had devised and documents and drawings were sent to Synnestved and Lehner, their patent attorneys, in July, 1952.

The machines were all built during 1953 and were completed in that year or very early in 1954 and they all went into production on their completion and have been in production since then.

There were some differences between the machines that were finally built and the single 220-spindle machine that was completed early in 1952. There was a change in the tension device from the interlocking coil gate tension device such as that in Exhibit Z-151 to a gate tension device. The change was made for the purpose of making the device more easily threadable and capable of more variations of

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adjustment without changing springs. Mr. Seem and Mr. Stoddard worked out the new device, which provided uniform tension, and the Hartford Machine Screw Co. made the devices for them. There was an alteration in the heating device involving wear resistant bushings and there was also a change in the location of the temperature sensitive resistor. When the single machine was built the temperature sensitive resistor was in one of the heaters but when the eight machines were installed it was put in a central position relative to them so that it could control them all. There was a slight difference in the false twist spindles in the location of the bearings and the machines were better balanced. But there was no difference in the functioning of the machines. The differences to which I have referred were made in the latter part of 1953.

One other fact remains. Mr. Seem and Mr. Stoddard applied for United States patents for their inventions on January 4, 1954. Later, in the same year, namely, on December 14, 1954, The Permatwist Company, which really owned the inventions, sold them, except as later stated, to the defendant, then Universal Winding Company and now Leesona Corporation. Mr. Seem explained that the inventions had been sold to the defendant because it was the biggest manufacturer of textile machines in the United States. On August 17, 1957, United States patents for the inventions issued to Universal Winding Company. United States patent No. 2,803,109 corresponds to Canadian patent No. 552,104 and its claims 1, 2, 3, 5 and 8 are identical with the claims in issue of patent No. 552,104. United States patent No. 2,803,105 corresponds with Canadian patent No. 552,105 and its claim 3 is identical with claim 3 of patent No. 552,105.

Mr. Seem also stated that applications for patents for the inventions had been made in England but were under opposition by the plaintiff and others.

The dispute between the parties as to the date of the inventions defined in the claims in issue is one of fact. It is settled that the date of the conception of the idea of an invention does not determine its date, for, as Viscount

Cave L.C. said in *The Permutit Company v. Borrowman*[1], at page 359:

> It is not enough for a man to say that an idea floated through his brain; he must at least have reduced it to a definite and practical shape before he can be said to have invented a process.

This was a case where there were conflicting applications for a patent for the invention of a particular process and it was held on the evidence that the respondent Borrowman, whose application was made in 1919, had completed the invention in 1916 and was a prior inventor as against one Spencer, the assignor of the plaintiff, notwithstanding the fact that he had conceived the idea of the invention in 1912 and had made his application in 1917, on the ground that it was not proved that he had made any invention in the true sense of the word in 1912 or before the completion of the invention by Borrowman in 1916.

The Court is frequently called upon, as it was in the *Permutit v. Borrowman* case (*supra*), to determine the date of an invention prior to the date of the application for a patent for it. It does so, for example, in conflict proceedings. It is settled that in Canada the determination does not depend on the date of the reduction of the invention to practice in the sense of the United States decisions on the subject and they must, therefore, be read with caution,

Since the determination of the date depends on the facts of the case it is not surprising that there is a dearth of Canadian decisions on the subject. The matter was considered by the Supreme Court of Canada in *Christiani & Nielsen* v. *Rice*[2] where Rinfret, J., as he then was, made the following statement, at page 456:

> The holding here, therefore, is that by the date of discovery of the invention is meant the date at which the inventor can prove he has first formulated, either in writing or verbally, a description which affords the means of making that which is invented. There is no necessity of a disclosure to the public

and he went on to say:

> If the inventor wishes to get a patent, he will have to give the consideration to the public; but, if he does not and if he makes no application for the patent, while he will none the less, if he has communicated his invention to "others" be the first and true inventor in the eyes of the Canadian patent law as it now stands, so as to prevent any other person from securing a Canadian patent for the same invention.

[1] (1926) 43 R P C 356. [2] [1930] S C R. 444

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The judgment in the *Christiani* v. *Rice* case was affirmed by the Judicial Committee of the Privy Council[1] but it did not mention the statement referred to. But it was adopted by this Court in *Bohn Aluminum & Brass Corpn.* v. *Berry*[2] as a statement of the test to be applied in determining the date of an invention.

It was not intended, in my opinion, that the test laid down in the statement should be all-inclusive. It is clear, of course, that if an inventor can prove that he formulated a description of his invention, either in writing or verbally, at a certain date then he must have made the invention at least as early as that date. It is also clear that the requirement that there must be proof of the formulation of a description of the invention, either in writing or verbally, is neither apt nor necessary in the case of an invention of an apparatus where the inventor can prove that at the asserted date he had actually made the apparatus itself, although there was no formulation of a written or oral description of it. Nor was it intended that the test laid down in the statement should replace the general statement in the *Permutit v. Borrowman* case (*supra*) that before a man can be said to have invented a process he must have reduced the idea of it to a definite and practical shape. Consequently, even although the test of proof of the formulation of a description of the invention, either in writing or verbally, at a particular date might be appropriate in determining the date of an invention of a process, it cannot have been intended to exclude proof that the process was actually used at the asserted date, even although there was no formulation of a written or oral description of it at such date. Thus the statement in the *Christiani* v. *Rice* case (*supra*) to which I have referred should not be interpreted as laying down a rule that proof that an invention was made at an asserted date must be confined to evidence that a written or oral description of it had been formulated at such date. It may also be proved, in the case of an invention of an apparatus, that the apparatus was made at such date or, in the case of an invention of a process, that the process was used at such date. The essential fact to be proved is that at the asserted date the invention was no longer merely an idea that floated through the inventor's

[1] [1931] A C. 770; (1931) 48 R.P.C. 511.

[2] [1937] Ex. C R. 114 at 116.

brain but had been reduced to a definite and practical shape. The statement to which I have referred should be construed accordingly.

Counsel for the plaintiff contended that a special onus rested on the defendant by reason of its assertion that the invention defined in the claims in issue was made in July, 1947, and the fact that it did not apply for its patents until January 4, 1954. I do not agree. While the Court will, of course, carefully scrutinize the evidence in support of an inventor's assertion that he made his invention at a date long prior to the date of his application for a patent for it the law does not impose a heavier onus of proof on the inventor than that which is usual in civil cases. There is support for this opinion in the judgment of the Judicial Committee of the Privy Council in *Canadian General Electric Co., Ld.* v. *Fada Radio Ld.*[1] In that case the evidence showed that one Alexanderson had made his invention in the middle of January, 1913, and was therefore not hit by the assumed fact that Schloemilch and Von Bronk also discovered it in February, 1913. The fact that Alexanderson's application for a patent for his invention was not made until September 17, 1920, did not impose any special onus on him. This appears from the brief statement of Lord Warrington of Clyffe, at page 93:

> Their Lordships are therefore of opinion that, fairly read, the evidence shows that *Alexanderson* had discovered his "invention" in January, 1913, and therefore he is not hit by the fact which is assumed that *Schloemilch* and *Von Bronk* also discovered it in February, 1913, although they did not proceed to make practical use of that discovery.

All that is required is that the evidence should be "fairly read" and that the Court should be satisfied on the evidence so read that the invention, in the true sense of the word, was made at the asserted date.

Two inventions are involved in the present case, one being the invention of the method of processing the thermoplastic yarns defined in the claims in issue of patent No. 552,104 and the other that of the apparatus for processing them defined in claim 3 of patent No. 552,105.

I shall deal with the invention of the apparatus first. In my opinion, the evidence satisfactorily establishes that the apparatus filed as Exhibit Z-151, and the additional

[1] (1930) 47 R.P.C. 69.

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equipment used with it, together with the small induction voltage regulator with the temperature sensitive resistor that Mr. Stoddard made that was used with Exhibit Z-151 a week or two after the portable bench model had been received constituted apparatus within the ambit of claim 3 of patent No. 552,105 and I find, accordingly, that Mr. Seem and Mr. Stoddard made the invention defined in it at the asserted date, namely, in July, 1947, or, at the latest, early in August, 1947.

The apparatus contained all the essential elements specified in the claim. The parts are shown on Exhibits Z-152 and Z-153 and the path of the yarn is described by Exhibit Z-174. The apparatus had a support for the supply of yarn and wind-up means for the processed yarn spaced from the support and operable to draw it continuously at a selected linear speed from the supply to the wind-up means; an electrically energized heating device defining a restricted thermally isolated heated zone through which the yarn passed to heat it as required; a false-twist device, made by Mr. Stoddard, for twisting the yarn before it passed through the heated zone and untwisting it after it had passed through; control means, consisting, as Mr. Seem explained, of the voltage regulator, the step-down transformer, the rheostat, and the induction voltage regulator with the temperature sensitive resistor adjusted to the heating device, and operable automatically to regulate the supply of heat energy to the heated zone compensatively according to the rate of transfer of heat to the yarn to maintain the zone uniformly at the temperature required to heat the yarn; tension means operable to maintain the yarn at a uniform tension during its passage through the heating device and to the wind-up means; and means to regulate the tension means, as Mr. Seem explained, in order to control the tension of the yarn in correlation to the prescribed temperature and linear speed of the yarn to maintain it at a selected uniform tension relative to the contractile force and thermal characteristics of the yarn. Moreover, the evidence establishes that the apparatus invention was disclosed to "others", namely, Mr. Berger and Mr. Tecce, the Permatwist Company partners of the inventors, soon after the portable bench model had been received.

The fact that Mr. Seem and Mr. Stoddard continued to work on Exhibit Z-151 and its accompanying equipment and make further experiments does not affect the fact that they had made the invention of the apparatus defined in Claim 3 at the asserted date. They were obviously anxious to make improvements. When they had satisfied themselves, as they did, that they could use the apparatus that they had invented to produce very satisfactory stretch nylon yarn that was permanently crimped and more uniform in appearance than nylon yarn produced by the step-by-step process and that knitted fabric made from it could stand washing and boiling and still maintain its uniform crimp they proved that it was possible to put their invention into full scale commercial operation when they completed the false twist conversion of the 10 spindles of the 40-spindle-up-twister that they had borrowed from the Fletcher Works. In my opinion, the 10-spindle false twist conversion that was completed in July, 1950, was simply a full scale commercial exemplification of the invention that Mr. Seem and Mr. Stoddard had made in July, 1947 or shortly thereafter.

In this connection, counsel for the plaintiff contended that the tension device used on the 10-spindle conversion was defective and relied on the opinion of Mr. Dufort in support of his contention. The tension device referred to was similar to that shown on Exhibit Z-151 except that it had an arm extending out from the spring member with notches in it from which weights could be suspended in such a way as to apply pressure against the spring member. Mr. Seem made a drawing of this tension device, filed as Exhibit 136, and explained its working. He said that most of the tests in which this device was used were made with 200 denier yarns for which a light spring would not be satisfactory. These were heavy yarns. Mr. Seem said that he had decided that instead of putting on a heavier spring when he was dealing with the heavy yarns he would use the light one, which was very responsive, and add weights to the arm as required in order to add pressure against the spring in order to reach the necessary tension. There was a conflict of opinion regarding this device. Mr. Dufort said it was a bad tension device, indeed, a "rotten" device. But Mr. Seem said that the combination of the light spring and the weights was a good low inertia system and Dr. Dudzik

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thought that it was a very good tension device. If I had to do so I would accept the opinions of Mr. Seem and Dr. Dudzik. Mr. Seem had used it and produced satisfactory crimp nylon yarn with its use. But I need not express any opinion on the matter, for Mr. Seem made it clear that the tension device referred to was used with heavy deniers, but that he and Mr. Stoddard had finally decided on a tension device that was substantially the same as that which had been used in Exhibit Z-151.

Mr. Seem made a drawing of a single spindle of the 10-spindle conversion, showing the path of the yarn in its passage through the machine, filed as Exhibit 134b. This drawing, together with his description of the conversion, satisfactorily establishes that there was no essential difference between the 10-spindle conversion and Exhibit Z-151 with its accompanying equipment and that all the elements specified in Claim 3 were present in it.

A similar statement may properly be made with regard to the single 220-spindle false twisting machine that was constructed in the basement of the Marionette Mills Inc. plant at Coatesville and completed in the spring of 1952. When it was completed the arrangement of its parts was the same as that shown on Figure 8 of patent No. 552,105. In my opinion, it was essentially another exemplification of the 1947 invention in a full scale commercial form. There is nothing in the evidence to indicate that it was different in any essential particular from the 10-spindle conversion or Exhibit Z-151 with its accompanying equipment and it was substantially similar to the defendant's Fluflon False Twisting Machine of which an exemplification was put in as Exhibit Z-161. And it is clear that on May 20, 1952, the date of the secret disclosure, Mr. Seem showed the machine in operation to the representatives of Synthetic Yarns Inc. and described its parts. Counsel for the plaintiff contended that the inventors had not obtained an induction voltage regulator with a temperature sensitive resistor for use with the machine but Mr. Seem stated that in order to demonstrate how the machine would eventually run he had used an induction voltage regulator with a temperature sensitive resistor which he had borrowed from the Radio Corporation of America. I accept his statement. In my opinion, the evidence clearly establishes that all the elements specified in Claim 3 were present in the single 220-spindle machine.

And there cannot be any doubt that the six false twisting machines that Mr. Seem and Mr. Stoddard made for Synthetic Yarns Inc. and the seven additional machines that they constructed in the basement of the Marionette Mills Inc. plant came within the ambit of Claim 3. There were some differences between them and the single 220-spindle machine, as I have already set out, but there were no differences in the essentials and there was no difference in their functioning.

At first glance the defendant's Fluflon False Twisting Machine, of which Exhibit Z-161 was an exemplification, looks different from Exhibit Z-151 with its accompanying equipment, of which the portable bench model was a part, but an analysis of the two pieces of apparatus establishes that each was within the ambit of Claim 3 of patent No. 552,105.

While the evidence relating to the date of the invention of the method of processing the thermoplastic yarns defined in the claims in issue of patent No. 552,104 was not as specific as that relating to the date of the invention of the apparatus for processing them, I am satisfied that it sufficiently establishes that Mr. Seem and Mr. Stoddard used the method defined in the claims in their operation of Exhibit Z-151 and its accompanying equipment when they produced on it the satisfactory permanently crimped stretch nylon yarn to which I have already referred. There were no notes of the method used in producing the yarn and no samples of it or of the fabrics knitted from it and it is not possible to fix the date of the production more precisely than early in the spring of 1950 when Mr. Seem and Mr. Stoddard decided to build a short section of a full scale false twisting machine or at least as early as November 13, 1950, the date of the last test on the 10-spindle conversion recorded by Mr. Seem in his note book and I find, accordingly, that Mr. Seem and Mr. Stoddard invented the method defined in the claims in issue as early as November 13, 1950. By that date the method used by them included all the steps specified in the said claims.

Since Claim 1 appears to be the broadest claim it will be sufficient to review the evidence relating to the use of the method specified in it at the date referred to. Some of the evidence related specifically to the method used in operat-

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ing Exhibit Z-151 and its accompanying equipment but, in my opinion, it is equally applicable to the method used in operating the 10-spindle conversion, which, as I have found, was a commercial exemplification of the invention consisting of Exhibit Z-151 and its accompanying equipment.

There is no doubt that the method used in operating Exhibit Z-151 and its accompanying equipment or the 10-spindle conversion produced "evenly and permanently crimped, wavy or fluffed multifilament thermoplastic yarn having improved and uniform physical characteristics". The fact of such improved and uniform physical characteristics will be dealt with later. And Exhibit Z-174, showing the path taken by the yarn as it passed from the supply package through the machine to the take-up package, shows that it was continually (continuously) drawn from the source of supply and twisted. It is also clear from Mr. Seem's evidence that the yarn passed at "a selected linear speed under uniform tension through a restricted thermally isolated and uniformly heated zone". Counsel for the plaintiff contended that there was no means in the 1947 model for passing the yarn at a selected linear speed due to the fact that the use of the take-up reel on it would cause the speed of the yarn to vary in accordance with the amount of yarn on the reel and that, consequently, there was no means for providing a constant twist. Mr. Seem's evidence on this point was that any variation of speed would be very slight. He pointed out that the 1947 apparatus was a demonstration model and only a small amount of yarn could be put on the spool at a time, but there is no doubt that he and Mr. Stoddard appreciated the need for passing the yarn at a selected linear speed and operated the 1947 apparatus accordingly. In any event, the criticism has no application to the 10-spindle conversion. Mr. Seem explained in detail the manner in which the linear speed of the yarn could be controlled by changing the relationship of the sprockets on Exhibit Z-151 so that it was possible to run the yarn at any selected linear speed ranging from a few thousand revolutions of the false twist spindle per minute to 10,000.

And Mr. Seem made it clear that the yarn was run under uniform tension through a thermally isolated and uniformly

heated zone. The use of the tension device on Exhibit Z-151 gave a uniform tension to the yarn at the various points of its passage through the machine and the tension device finally selected for the 10-spindle conversion was substantially the same. Mr. Seem and Mr. Stoddard found that with the equipment used with Exhibit Z-151 they were able to keep the temperature in the heater uniform within plus or minus one per cent in spite of changes in the ambient temperature. The purpose of keeping the temperature in the heated zone uniform was "to uniformly heat the yarn to a prescribed temperature to re-orient the molecules of the yarn to the twisted formation of the yarn and yarn-set the the same". The meaning of the expression "uniformly heat the yarn to a prescribed temperature" and of the term "yarn-set" and the relationship of the expression to the term will be dealt with in detail later. It is sufficient, for the moment, to express the opinion that the purpose was to ensure that the yarn should be heated at a temperature that was high enough to result in its becoming permanently crimped. Certainly, Mr. Seem and Mr. Stoddard had this in mind for they were able to bring about changes in the temperature of the heater up to the melting point of the yarn. While there was no direct evidence that the yarn run through the 1947 apparatus was "yarn-set", Mr. Seem gave evidence that in the course of the experiments that he and Mr. Stoddard had conducted between 1938 and 1941 they had found that when the nylon yarn was heated to a high temperature they were getting a very good set with the use of dry heat alone. This, I think, was tantamount to finding that the yarn was yarn-set. At any rate, there is no doubt that when Mr. Seem and Mr. Stoddard were operating the 10-spindle conversion the yarn was "yarn-set" when it left the heater and had a satisfactory crimp when it was taken off the take-up package. Here I might mention that counsel for the plaintiff raised the objection that there was no mention of yarn setting in the application for patent No. 552,104 and contended that this indicated that the invention had not been completed at the asserted date. I do not agree. I accept Mr. Seem's evidence relating to the operation of the 10-spindle conversion that the yarn was yarn-set when it left the heater. That also establishes that he and Mr. Stoddard used a sufficiently high temperature in the heater to heat the

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yarn that passed through it to the prescribed temperature, that is to say, the temperature required to heat it so that it would be yarn-set.

I have already set out Mr. Seem's explanation of how the controls of temperature operated in the case of Exhibit Z-151 and its accompanying equipment and there is no doubt that he and Mr. Stoddard controlled the supply of heat energy to the heated zone to maintain it uniformly at the temperature required to heat the yarn uniformly to the prescribed temperature, namely, the temperature required to heat it so that it would be yarn-set. Mr. Seem stated that the voltage regulator was used to make corrections for variations in the voltage coming from the outside power source and it was able to do so within plus or minus one per cent and that the use of the step-down transformer and the rheostat enabled him to make a fine adjustment of the voltage going to the heater. And his evidence was clear that by the use of the induction voltage regulator with the temperature sensitive resistor he was able to make automatic changes in the voltage fed to the heater compensating for changes in the ambient temperature. Thus Mr. Seem and Mr. Stoddard were able to control the temperature in the heater and keep it uniform within plus or minus one per cent in spite of changes in the ambient temperature and this meant, of course, that they could maintain the heated zone at the temperature required to heat the yarn to the prescribed temperature. It is obvious, of course, that the temperature in the heated zone was higher than that of the yarn that passed through it by reason of the transfer of heat from the zone to the yarn. Mr. Seem was cross-examined at length in respect of the difference of temperature resulting from this transfer. He stated that the temperature of the yarn reached the ambient temperature very quickly and that its temperature when it was in the heated zone depended on the rate of transfer of heat from the zone to it and that this rate depended on certain factors, including the linear speed of the yarn, the type of the yarn and its thermal characteristics and the difference between the temperature of the heater and that of the yarn. He explained that when the temperature of the heater and the linear speed of the yarn had been settled so that the yarn was heated to the required temperature the control means operated automatically to regulate the supply of heat energy to the heated zone com-

pensatively according to the rate of transfer of heat to the yarn to maintain the zone uniformly at the temperature required to heat the yarn to the prescribed temperature. This was done by the use of the temperature sensitive resistor and the voltage induction regulator. Thus the control means operated automatically to compensate for changes in the temperature of the heated zone and that of the yarn due to variations in the voltage, changes in the ambient temperature and variations in the rate of transfer of heat to the yarn and to maintain the heated zone and the yarn at the uniform temperature required to yarn-set it as desired.

And Exhibit Z-174, showing the path of the yarn on Exhibit Z-151, indicates that it was continuously cooled in order to stabilize it after it had passed under tension through the heated zone and before it reached the twist trapper, that it was continuously untwisted after it had been cooled, and that the processed yarn was continuously collected in the take-up package.

Finally, there is the requirement in the claim that the tension upon the heated yarn should be correlated to the prescribed temperature of the heated yarn "to maintain the yarn under tension adequate to preclude substantially any ductility in the cooled yarn". There was much argument regarding the meaning of the expression "preclude substantially any ductility in the cooled yarn" and it will be dealt with when I come to the construction of the claims. Mr. Seem stated that he was able to operate Exhibit Z-151 and its accompanying equipment in such a way as to correlate the temperature, tension and linear speed of the yarn for the desired purpose. I accept his statement and am satisfied that the requirement of the claim to which I have referred was met. I am also satisfied from the evidence relating to the yarn that was produced on Exhibit Z-151 and its accompanying equipment that its ductility was substantially precluded.

In view of the fact that the 10-spindle conversion was a commercial exemplification of the 1947 invention all the evidence relating to uniformity of tension, control of temperature and correlation applies to the 10-spindle conversion. Counsel for the plaintiff contended that there was nothing in Mr. Seem's note book to indicate that correlation had been practised. But while no temperatures were recorded

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in the note book there were records of voltages in it which could be converted to temperatures and indicated that correlation had been practised. And there is the evidence that the yarn produced on the 10-spindle conversion was yarn-set and satisfactorily crimped.

In my opinion, there is no doubt that all the steps specified in Claim 1 of patent No. 552,104 were included in the method used by Mr. Seem and Mr. Stoddard when they operated Z-151 and its accompanying equipment and the 10-spindle conversion and that they invented the said method at least as early as November 13, 1950.

The inventions in issue have met with remarkable commercial success. The first license to use them was given to G. H. Heath & Co. Ltd., a large throwster operating in Macclesfield, on March 22, 1954, only a little more than two months after the date of the applications for the United States patents. Evidence of the events leading to the license and the circumstances under which it was given was adduced by Mr. Seem. He had known Col. Heath, the managing director of the company, and Mr. John Barnett, Sr., his assistant, for many years. They had made a practice of coming to the United States about every two years to keep in touch with developments in the industry. Prior to the war they had visited Mr. Seem's father at the Julius Kaiser Company and Mr. Seem at Georgetown. On one of their visits after the war they heard that Mr. Seem and Mr. Stoddard were working on nylon yarn and were told that when patent applications for their inventions had been filed they would be notified. Soon after the applications were filed on January 4, 1954, they were notified of the fact and that the inventors had eight machines operating on various types of yarn, various deniers and various twists. A few weeks later Col. Heath and Mr. Barnett came to Coatesville and saw Mr. Seem and his associates. He showed them yarn that had been produced on the eight machines by the use of the invented process and fabric, stockings, sweaters and various other garments made from it. He also showed them skeins of yarns made by the step-by-step or conventional process showing the better dyeing and other qualities of the inventors' yarn. There were meetings on at least seven consecutive days at which representatives of both parties were present and on March 22, 1954, a licensing agreement

for the use of the inventions was entered into between Warren A. Seem, Nicholas J. Stoddard, Fred Tecce and Harold P. Berger, co-partners trading as The Permatwist Company, as Licensors, and G. H. Heath & Co. Ltd., as Licensee. This agreement, filed as Exhibit Z-172, contained certain representations on the part of the licensors regarding the inventions. Under its terms, G. H. Heath & Co. Ltd. paid the licensors $5,000 in cash to be applied as a credit on royalties, obligated itself to pay the licensors an additional $10,000, whether it used the inventions or not, and agreed to pay a royalty of 15 per cent of the selling price of all yarn produced by the use of the inventions. This agreement was executed before the representatives of G. H. Heath & Co. Ltd. saw any of the machines or were given any information about the invented process other than the representations contained in the agreement. After the agreement had been executed Mr. Seem showed Col. Heath and Mr. Barnett the eight machines and described and demonstrated the method of their operation. G. H. Heath & Co. Ltd. then gave The Permatwist Company an order for machines for 10,000 spindles.

Licenses similar to the one given to G. H. Heath & Co. Ltd. were given by The Permatwist Company to seven United States companies and to one Canadian company as set out in a list filed as Exhibit Z-173. The dates of these licenses extended from August 17, 1954, to November 26, 1954. Mr. Seem stated on his cross-examination that to the best of his knowledge all the licensees listed in Exhibit Z-173 paid $5,000 in advance and committed themselves to the payment of $10,000 more regardless of whether they used the inventions or not.

Counsel for the plaintiff objected to evidence of commercial success outside of Canada, but it should be noted that all the licenses thus far referred to were licenses to use the inventions and were given before any patents were issued. The evidence was, therefore, admissible for it is established that an invention is not limited to any particular locale. It is an invention wherever made: *vide Christiani & Nielsen v. Rice*[1]. After careful consideration of the matter, I am of the opinion that evidence of commercial success of an invention anywhere is admissible. Conse-

[1] [1930] S C R 444; [1931] A C 770; (1931) 48 R P C 511.

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quently, evidence of the commercial success of the inventions in issue outside of Canada was admissible.

After December 14, 1954, the defendant, which had acquired the inventions from The Permatwist Company, as already stated, continued the licensing of the inventions without waiting for the granting of patents for them.

The sale of the inventions to the defendant did not extend to rights to use them outside of the United States and Canada. There were provisions in the licensing agreement between The Permatwist Company and G. H. Heath & Co. Ltd. relating to the formation of corporations. The licensors, The Permatwist Company, were to cause to be organized a corporation under the laws of Great Britain, to be called Corporation 'A', to which the licensors should transfer exclusive licensing rights for Great Britain and Continental Europe and the exclusive right to apply for British and Continental patents for the inventions. It was further provided that the licensors and the licensee, G. H. Heath & Co. Ltd., should jointly cause to be organized a corporation under the laws of Great Britain, to be called Corporation 'B', the capital stock of which should be issued in equal shares to each of them. It was further agreed that Corporation 'A', after entering into an agreement with the licensee, would transfer to Corporation 'B' the exclusive right to issue further licenses of the use of the invention to applicants in Great Britain and in Continental Europe. The two corporations were formed, Corporation 'B' being called Fluflon Limited. This corporation entered into licensing agreements with nine licensees for the use of the inventions, representing that applications for Letters Patent for them had been filed in the British Patent Office. The dates of the nine licensing agreements ran from March 22, 1954, to November 15, 1955. Of the nine licensees, all of whom were in Great Britain, eight are in the Macclesfield area in which the plaintiff operates and their production represents 90 per cent of the throwing capacity of England.

Further evidence of the commercial success of the inventions in issue was given by Mr. W. S. Berky, the defendant's comptroller. Particulars of the production of yarn by the use of the inventions by licensees of the defendant for the period from April 1, 1955, to June 30, 1961, were set out in a table filed as Exhibit Z-195 and a statement of the gross royalties received by the defendant from its licensees for

the inventions was filed as Exhibit Z-196. The gross royalties from licensees in the United States, Canada and the rest of the world in the said period came to a total of $9,264,537. This came from licensees of three machines known as Fluflon, Superloft and High Speed. The Fluflon machine referred to was the same as the defendant's Fluflon False Twisting Machine, of which an exemplification was set up in the basement of the Court House and filed as Exhibit Z-161. The Royalties received for its use for the period in question came to a total of $5,870,062 out of the total previously referred to.

In addition, there were the royalties paid by the licensees of the inventions in England in which the defendant had no interest.

The evidence establishes that the defendant and its licensees, The Permatwist Company, G. H. Heath & Co. Ltd., Fluflon Limited and its licensees all considered that the inventions in issue were very valuable. There is, in my opinion, no doubt that it was.

In order that the Court may construe the claims in issue in the light of the common knowledge which a person skilled in the art to which the inventions in issue relate is assumed to have had as at the date of the inventions it should determine not only the date of the inventions but also the state of the relevant art at such date. And since the Court must as far as possible put itself or be put with the aid of experts in a position similar to that of the skilled person referred to it is desirable to keep in mind the kind of skilled person to whom the patents in issue are assumed to have been addressed. I have already found that the invention of the apparatus defined in Claim 3 of patent No. 552,105 was made in July, 1947, or, at the latest, in August, 1947, and that the invention of the method or process defined in the claims in issue of patent No. 552,104 was made at least as early as November 13, 1950. Consequently, the construction must be made in the light of the common knowledge which the kind of skilled person referred to is assumed to have had at the specified dates respectively.

There was a dispute between the parties as to the relevant art in the present case. Counsel for the plaintiff contended that it was the whole of the textile art but counsel for the defendant took the position that the relevant art was that

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segment of the textile art known as the throwing art. He submitted that the textile art included a great variety of arts, including spinning, weaving, knitting, dyeing, braiding, lace making, thread making and yarn making as well as throwing, and that it is unreasonable to assume that the patents in issue were addressed to persons skilled in the entire textile art if, indeed, there are any such persons. While there was confusion on the part of some of the witnesses regarding the matter and Mr. Seem himself on several occasions referred to the textile art, I agree substantially with the submission made by counsel for the defendant with certain reservations. In my opinion, patent No. 552,104 was addressed to throwsters with a good deal of knowledge of the arts of their customers for the yarns produced by them, namely, weavers, knitters and dyers, for they had to produce yarns that met the needs of such customers. And patent No. 552,105 was addressed to manufacturers of false-twist process machines with knowledge of the needs of throwsters like the plaintiff or the defendant who would be the users of them.

Prior to July, 1947, the only thermoplastic yarn of the kind with which the patents in issue are concerned that was in commercial production was nylon yarn and it was only of recent production. But throwsters were familiar with cellulose acetate yarn. Cellulose acetate was discovered as early as 1865. Cellulose is a chemical substance found in wood and cotton, composed of carbon, hydrogen and oxygen, $C_{12}H_{22}O_{11}$, and cellulose acetate is formed when cellulose unites with acetic acid and acetic anhydride, the chemical formula of the latter being different from that of the former by reason of the fact that a molecule of water is removed from it. The fibres of cellulose acetate yarn are natural fibres. The thermoplastic yarns of the kind specified in the patents in issue, on the other hand, are synthetic in the sense that the fibres of which they are composed are wholly man made.

Nylon yarn was the first of the synthetic yarns to be produced. Nylon was discovered by Carrothers in England in 1928. It is made from coal, water, petroleum and limestone. One of the nylons known as "nylon 66" is described as polyhexamethyleneadipimide. Its name indicates a large number of molecules, six methylene groups of CH_2 and six atoms of adipic acid. The mixture referred to is extruded

into fine continuous filaments or fibres, which are twisted together to form yarn. Nylon yarn is much stronger than cellulose acetate yarn but the fundamental difference between cellulose acetate and nylon lies in the character of the links that hold their respective molecules in a molecular chain. The links of the former are large and bulky, whereas those of the latter are long and thin.

Terylene was discovered by Whinfield in England about 1949. In the United States it is called dacron. Its proper name is polyethylene teraphthalate. Its origin was by the polyester route instead of the polyamide one. Terylene (dacron) is stronger than nylon. The chemical formulae for cellulose acetate, nylon and dacron (terylene) were set out in detail in Exhibit 93, after Dr. Finlayson had consulted Professor Speakman about them. These show the arrangement of the atoms in the molecules and the manner in which the molecules are linked with one another in a continuous molecular chain.

The work on nylon yarn that Carrothers had discovered in 1928 progressed rapidly. I have already referred to the fact that Mr. Seem and Mr. Stoddard had received some nylon yarn in the fall of 1938. By 1939 it was in production on a commercial scale. The first nylon yarn was used almost entirely for women's hosiery and sewing yarn. The sheerness of the yarn made it especially useful for women's stockings. During the war years in the United States, meaning thereby the period after Pearl Harbour on December 7, 1941, nylon was taken over almost exclusively for military use purposes, namely, for cartridge belts, parachute cloth and airplane tires. After the war the supply of nylon yarn rapidly expanded but it did not meet the demand for it until late in 1952 or early in 1953.

The thermoplastic yarns specified in the patents in issue are remarkable substances in that they have the physical characteristics of great strength and resistance to wear. But they also had undesirable characteristics. The evidence of these characteristics related particularly to nylon yarn. When it was first produced for commercial use it was in a flat or raw form. While it had great strength and resistance to wear, the articles knitted or woven from it had an undesirable sheen or lustre and had what was called a cold hand, that is to say, they were cold to the touch. In addition, they

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were transparent and not absorbent. The yarn lacked the opacity and bulk of such yarns as cotton and wool.

Various efforts were made to overcome the undesirable characteristics to which I have referred. One of them was to cut the continuous nylon filaments into short lengths like those of cotton or wool fibres and spin them into yarn. But these filaments were slippery and in the course of wear and washing of sweaters and men's socks made from spun nylon yarn the filaments pulled out and got entangled and formed what were called pills. Moreover, the articles tended to become felted. There is now very little spun nylon yarn, its use being mainly that of a blend with other staple yarns in heavier garments.

Other methods of processing nylon yarn were used. For example, in the Agrilon method the yarn was run over a knife edge in order to cut a curl in it; in the Taslan method it was fed into a tube in such a way as to separate the filaments and a strong jet of cold compressed air tangled them; and in the Banlon method it was stuffed into a tube in order to deform it.

The yarn produced by the use of these methods was not as useful as that produced by the use of the apparatus and method invented by Mr. Seem and Mr. Stoddard. By their use a uniform and permanent crimp was put into the yarn and this gave it the desired bulk, with the result that articles knitted or woven from it no longer had an undesirable lustre or sheen, they were soft to the touch and they were no longer transparent. Consequently, in addition to its great strength and resistance to wear the yarn had aesthetic qualities similar to those of cotton and wool yarns. As a result there has been a very great extension in the use of the synthetic thermoplastic yarns specified in the patents in issue.

The idea of putting a crimp in nylon yarn for the purpose of giving it the desired qualities that I have mentioned was not conceived by Mr. Seem and Mr. Stoddard. The specification of patent No. 552,104 recognizes the existence, as at January 4, 1954, the date of the application for the patent, of a method of producing crimped thermoplastic yarn. This was known as the step-by-step or conventional method. The specification refers to it as the normal prior art procedure. Mr. Seem stated that it first appeared in the

United States late in 1952 and that, to his best recollection, it had started in Europe in 1949 or 1950. Thus, while the step-by-step method of crimping nylon yarn antedates the date of the inventors' applications for their United States patents, it does not antedate the date of the invention defined in Claim 3 of patent No. 552,105, namely, July or early in August, 1947.

There were five separate operations in the step-by-step method. They are set out in the specification of patent No. 552,104 but Mr. Seem described them in greater detail. The first step was to redraw the yarn from the producer's pirn (a term similar to bobbin or supply package) on to a spinner bobbin (supply package), the second to place the spinner bobbin on an up-twister and insert the desired twist in the yarn, the third to put the take-up package on the up-twister into a pressure steam box where it was treated with from 15 to 20 pounds steam pressure for a period of two hours, the fourth to redraw the yarn from the steamed take-up package and put it back on the spinner bobbin and the fifth to place the spinner bobbin on an up-twister running in the opposite direction in order to remove the twist. The yarn was deformed by the high twist put into it in the second step of the method, the deformation was set by the steam pressure in the third and the twist was removed in the fifth leaving the yarn in its deformed state with the desired crimp in it.

There were several disadvantages in the step-by-step method. Its greatest fault lay in the third step where the take-up package was steamed. This resulted in a lack of uniformity in the yarn due to the fact that the yarn tended to shrink under the pressure of the steam and the yarn closest to the centre of the package did not shrink as much as that on the outside. There was also the fact that the method was slow and expensive. Mr. Seem stated that the step-by-step method was used until 1954, 1955 or 1956 when the manufacturers purchased false twisting equipment and that this supplanted the step-by-step method. The latter part of his statement is not correct. The step by step method has not been entirely supplanted. Steps have been taken to lessen the effect of the fault to which I have referred and the method is still in use, but the sale of nylon yarn produced by it is now comparatively small.

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As already stated, the invention covered by patent No. 552,104 is especially concerned with the production of substantially permanently crimped wavy or fluffed thermoplastic yarns of the kind specified in the patent. Its chief aim, as set out in the specification, is to provide a simple, continuous, rapid and economical method for producing, *inter alia*, uniformly processed, continuous filament thermoplastic yarns having increased elasticity and the appearance of spun yarn. The invention covered by patent No. 552,105 is concerned with apparatus for processing the thermoplastic yarns specified in the patent by thermal treatment according to the method referred to. It is directed towards the provision of simple, reliable apparatus with the aid of which the method referred to can be expediently carried out at high speeds and at much less cost than possible with stepwise methods for the production, *inter alia*, of thermoplastic yarns of improved uniformity, as regards their physical characteristics.

There cannot be any doubt about the superiority of the inventors' method, known as the continuous false twist process, over the step by step method. While it might be said that nylon yarn produced by the step by step method, refererd to as conventional yarn, was comparable to continuous false twist process yarn in the sense that each overcame the undesirable characteristics of flat or raw thermoplastic yarns, the evidence is conclusive that the nylon yarn produced by the continuous false twist process was more uniform than conventional yarn in appearance and superior in quality. While some irregularities show up in continuous false twist process yarns, resulting in seconds, more seconds result from the use of the step by step method. The quality of conventional yarn for dyeing purposes is considerably inferior to that of the continuous false twist process yarn. The variation in dyeing quality was the chief reason why step by step yarn was not used in knitted or woven garments but put only into men's socks or white fabrics. Nor was there any dispute of the fact that the continuous false twist process yarn had a softer hand than the conventional yarn and that its introduction opened up a wide variety of uses for nylon yarn, including, for example, carpets, for which conventional yarn was not acceptable.

The evidence indicates that the superior uniformity of the continuous false twist process yarns was due to the

uniformity of the conditions under which they were produced. There was recognition of this fact in the statement of Mr. Seem that he had never seen the step by step method used for the production of permanently crimped terylene (dacron) yarn and that he did not believe that it could be used for that purpose by reason of the fact that the step by step method did not lend itself to the necessary uniformity and correlation of tension, temperature and linear speed with the result that the yarn produced by it would be too ductile and the crimp could be easily pulled out. But permanently crimped terylene yarn could be produced on the defendant's Fluflon False Twisting Machine.

Morever, the evidence is conclusive that the continuous false twist process was superior to the step by step method from an economic point of view. There was a great saving in the floor space respectively required by the two methods. The operation of the step by step method took up four times as much floor space as that of the continuous false twist process. Moreover, the cost of the latter was no greater than that of one of the steps in the step by step method. There was also a saving in electrical energy.

There is no doubt in my mind that the superiority of the continuous false twist process over the step by step method, both as to the quality of the yarn produced and as to the cost of production, was the cause of the commercial success to which I have referred.

Before I come to the construction of the claims in issue and consideration of the attacks on their validity by counsel for the plaintiff I should refer to his submissions relating to certain matters which were said to lead up to the charge that the invention defined in the claims in issue of patent No. 552,104 had been anticipated. His comments related to the state of the prior art. I shall deal with them briefly.

Counsel's first submission was that the product of the use of the patented process, that is to say, the continuous false twist process, namely, a crimped thermoplastic yarn, was old and he relied on the fact that crimped cellulose acetate yarn had been produced by Dr. Finlayson prior to the date of the invention in issue. But Mr. Seem's evidence was that the crimp in the yarn produced by the use of Dr. Finlayson's machine, to which I shall refer later, was not permanent in the same sense as that in the thermoplastic

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yarns specified in the patents in issue. Moreover, as already stated, while crimped thermoplastic yarn had been produced by the step by step method, the yarn produced by the continuous false twist process of the claims in issue was superior to it and, to the extent of its superiority, it was not an old product but a new one.

Counsel's next contention was that the dry heat setting of thermoplastic yarns at high temperatures was known in the art prior to the date of the invention in issue. There was conflicting evidence on this. It was disputed by Mr. Seem. I have already referred to his evidence that in the course of their experiments between 1938 and 1941 he and Mr. Stoddard had found that when nylon yarn was heated to a high temperature they were getting a very good set with the use of dry heat alone and that this surprised them for the teaching in the industry had been that moisture was always used for setting the fabric or the twist in the yarn.

In support of his contention counsel relied on certain patents and on the evidence of Professor Speakman and Dr. Hoff. The first reference in a patent to the setting of crimp in a nylon yarn was in U.S. patent No. 2,197,896, dated April 23, 1940, and issued to the Dupont Company as the assignee of J. B. Miles, Jr. This related to the setting of crimp in a nylon yarn in a step by step process and it was stated that while heat setting with steam was preferred it was within the scope of the invention to set the crimp by other methods, e.g., dry heating at 100-150°C. And in U.S. patent No. 2,199,411, dated May 7, 1940, and issued to the Dupont Company as the assignee of E. V. Lewis, it was stated that if oriented synthetic polyamide filaments or yarns (nylon) are subjected to dry heat to a temperature of over 100°C. under low tension they will shrink rapidly and the residual shrinkage is greatly reduced. There was evidence that the dry heat setting of nylon fabrics was known at least as early as 1946. Mr. Seem gave a qualified admission that it was known at least as early as 1949 that nylon fabrics could be set by dry heat well up to the melting point but he knew of no thermoplastic yarn having been yarn set prior to the date of the invention in issue. Professor Speakman gave evidence that the dry heat setting of running nylon fabrics was known at least as early as 1946. But he also stated that he did not think that the continu-

ous dry heat setting of nylon yarn was being practised at that time except in the form of fabrics. Later, he expressed the opinion that there was no difference between the setting of nylon fabrics and the setting of nylon yarn. Dr. Hoff stated that at first the nylon yarn was kept as little set as possible. And the avoidance of yarn setting appears in the Lewis patent to which I have referred. Indeed, it led away from the teaching of yarn setting. Dr. Hoff stated that the dry heat setting of running nylon yarn at a higher temperature than that of steam in order to manufacture satisfactorily hosiery was known in 1945. There is no doubt that he had in mind the Miles and Lewis patents of which his company was the owner.

Mr. Seem did not agree that the effect of dry heat setting of nylon yarn at a high temperature was well known prior to the date of the invention in issue. He and Mr. Stoddard had had to experiment in order to ascertain what effect any particular degree of heat had. The dry heat setting of stretch nylon yarn, meaning thereby a nylon yarn having a permanent crimp with extensive stretch and recovery, taught by the patent in issue became known in the art only after he and Mr. Stoddard had told their licensees how to operate their machine. Mr. Seem stated categorically that in his experience he had never encountered any commercial operation prior to 1947 where a throwster set any fibre by dry heat, that, apart from the patented machine, there was no commercial process in existence, prior to 1954, in which thermoplastic yarn was produced with dry heat near the melting point or in which it was highly twisted and subjected to dry heat near the melting point. I have not found anything in the evidence that controverts his statements. Certainly, there was no evidence that the dry heat setting of thermoplastic yarns of the kind specified in the patent in issue was known in the art prior to 1947 or, indeed, prior to 1954.

Counsel's next submission was that adjustable constant tension devices were old. The evidence discloses that there were many types of tension controlling devices, including finger gate and disc type tension devices, that were available prior to 1947. I have already referred to Mr. Seem's evidence relating to the date of the inventions in issue that in the experiments which he and Mr. Stoddard were

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making in respect of nylon yarns they were using all the tension devices that were commercially available and that the tension device appearing on Exhibit Z-151, the portable bench model made in July, 1947, with its additional equipment, was made by Mr. Stoddard. There was also his evidence in connection with the 10-spindle conversion in 1950 that before they made their final decision they used tension devices of all the kinds that were commercially available, tested them and made modifications of them in their attempt to find a tension device that would suit their purpose, that they were trying to design an apparatus that could be applied to conventional up-twisters of various kinds in order to convert them from a true twisting process to a false twisting one, that what they needed was a multi-point tensioner and that they finally decided on a tension device that was substantially the same as the one in Exhibit Z-151 which Mr. Stoddard had made. Mr. Seem stated that the gate tensioners that were available prior to 1947 were not capable of supplying a tension that was sufficiently uniform to be useful in the false twisting art and that he and Mr. Stoddard had disclosed a tension device that was capable of maintaining a uniform tension within plus or minus one gram. There was justification, therefore, for his statement that in his experience there was no commercial apparatus, prior to January 1954, that was available to throwsters for the purpose of obtaining uniform tensions.

It was also submitted that false twist devices were known in the art prior to 1947. There is support for this submission in patents issued prior to 1947 and in the evidence of Dr. Hoff and Mr. Dufort but, as Mr. Seem stated, there was no false twisting device prior to 1947 for the production of stretch yarn, that is to say, permanently crimped thermoplastic yarn, such as that specified in the patents in issue, having extensive stretch and recovery.

Counsel made several submissions relating to the subject of correlation but I shall for the moment consider only those that were put forward in the attempt to show that the correlation referred to in the patents in issue was known in the prior art, namely, that the direction to correlate tension and temperature is nothing more than a direction to the workman in the art to make the necessary adjustments in operating conditions of the type that had always been made on textile machines to produce the desired or

best result, that the correlation referred to is nothing more than the controllable tension disclosed in the Lewis patent and practised by Dr. Finlayson, that in producing a false twist yarn there is no particular or critical relationship between the conditions of tension, temperature and linear speed of twist to produce satisfactory results, that correlation is old and was known in the art as early as 1940, as appears from the Lewis patent, and that while the term correlation was not mentioned in the Finlayson patents they did in effect teach correlation of tension, temperature and linear speed.

In effect, counsel's submission was that the correlation referred to in the patents in issue was old. I do not agree. The correlation of tension and temperature as a step in the process of producing a permanently crimped thermoplastic yarn of the kind specified in the patents in issue was not old. It had not been taught in the prior art and had never been practised in a continuous false twist process prior to the date of the invention in issue. It was not the same as the controllable tension referred to in the Lewis patent and there is no evidence that it was practised by Dr. Finlayson at Spondon. The direction to correlate is not merely a direction to the workman in the art to make adjustments in operating conditions of the kind known in the textile art. It is a direction to correlate tension to temperature in such a way as to preclude substantially any ductility in the yarn as a step in the process of producing a permanently crimped yarn that will withstand the stresses and temperatures of commercial use. As Mr. Seem put it, he had never, prior to January 4, 1954, known of any commercial operation in a false twist process other than that of the inventions in issue, in which correlation of tension and temperature was practised to produce a yarn that could withstand the stresses and temperatures involved in subsequent processes and commercial use. In my opinion, the use of correlation of the kind referred to or for the purpose described was not known in the prior art.

Counsel also submitted that the requirement of uniformity of heating and uniformity of tension to produce a uniform product was not new, but was no more than direction to the workman to adopt the optimum conditions of operation to get the best results and that if he kept his conditions of operation uniform his result would be uniform.

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Mr. Seem admitted that all experienced throwsters would have sufficient intelligence to feel that the more uniform any process is the better it would be but it was also true that the machinery that was sold had variations of tension but it was satisfactory to the trade. He also stated that the throwing equipment used prior to 1947 was not capable of accurate uniform tension control. And there was his statement, as already set out, that in his experience there was no commercial apparatus, prior to January 1954 that was available to throwsters for the purpose of obtaining uniform tensions.

In his argument relating to the state of the prior art counsel for the plaintiff referred to a great many patents but, in my opinion, there is no support in any of them for any of the attacks made on the validity of the claims in issue and no useful purpose could be served by discussing them.

The kind of skilled person to whom the specification of a patent is assumed to be addressed was considered by the House of Lords in *King, Brown and Co. v. The Anglo-American Brush Corporation*[1]. There it was laid down by Lord Watson that the contemplated addressee is a workman of ordinary skill. At page 320, he said:

> Every patentee, as a condition of his exclusive privilege, is bound to describe his invention in such detail as to enable a workman of ordinary skill to practise it;

In Blanco White on Patents, Second Edition, the author states, at page 136, that a specification is addressed to the man who must use it, not to expert scientists, not to amateurs, but to those who will be responsible for putting it into practice and have the necessary skill for doing so. There is support for his statement in the remarks of Lord Parker in the House of Lords in *Osram Lamp Works Ld. v. Pope's Electric Lamp Company Ld.*[2]:

> A patentee must, in his Specification, describe and ascertain not only the nature of his invention but also the manner in which the same is to be performed. A Specification may therefore be considered as addressed, at any rate primarily, to the person who would, in normal course, have to act on the directions given for the performance. These persons may be assumed to possess not only a reasonable amount of common sense, but also a competent knowledge of the art or arts which have to be called into play in carrying the patentee's directions into effect. I say "art or arts" because in carrying out the directions given by the patentee it may well

[1] (1892) 9 R.P.C. 319.

[2] (1917) 34 R.P.C. 369 at 391.

be necessary to call in aid more than one art. Some of the directions contained in a Specification may have to be carried out by skilled mechanics, others by competent chemists. In such a case, the mechanic and chemist must be assumed to co-operate for the purpose in view, each making good any deficiency in the other's technical equipment.

And in *British Thomson-Houston Company Ld. v. Charlesworth, Peebles & Co.*[1] it was stated by Lord Buckmaster in the House of Lords:

the document must be regarded as addressed to craftsmen in the particular branch of the industry to which the alleged invention relates.

Thus, in the present case, the specification of patent No. 552,104 must be assumed to have been addressed to throwsters for they are the persons who will be called upon to carry its directions into effect and the specification of patent No. 552,105 must be assumed to have been addressed to manufacturers of false twist process apparatus who must meet the needs of the throwsters who are to use it. Finally, I refer to the statement of Upjohn, L.J., in the Court of Appeal in *Van der Lely (C.) N. V. v. Bamfords Limited*[2]:

The supposed addressee is the ordinary, the average man of the relevant class.

Vide also the remarks of Lord Reid in the House of Lords[3] and of Viscount Radcliffe, at page 77.

I come now to the construction of the claims in issue. I had occasion recently in the case of *Lovell Manufacturing Company et al. v. Beatty Bros. Limited*[4] to consider the principles to be applied in construing a patent specification. There I referred to several decisions in which the governing principles are set out and particularly to the statements of Lord Loreburn, L. C. in *Ingersoll Sergeant Drill Company v. Consolidated Tool Company Ld.*[5]; of Lord Buckmaster in *British Thomson-Houston Company Ld. v. Charlesworth, Peebles & Co.*[6] and of Lord Russell of Killowen in *Electric and Musical Industries Ld. v. Lissen, Ld. et al.*[7] My references to these statements are incorporated in these reasons for judgment without repetition of them.

While the Golden Rule of construction of a document, namely, that its words should be given their plain and

[1] (1925) 42 R.P.C. 180 at 208.
[2] (1961) R.P.C. 296 at 305.
[3] (1963) R.P.C. 61 at 71.
[4] (1963) 23 Fox Pat. C. 112.
[5] (1908) 25 R.P.C. 61 at 83.
[6] (1925) 42 R.P.C. 180 at 208.
[7] (1939) 56 R.P.C. 23 at 39 and 41.

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ordinary meaning applies to the claims of a patent it is a fundamental principle of patent law that a patent specification should be construed fairly. The Court must recognize the fact that just as there may be imperfections in speech and words may be used that do not convey the meaning of the speaker as precisely as the use of more appropriate words would do so there may be lack of precision in the use of the words in a patent specification and in a patent claim, but this must not be allowed to defeat the claim if its meaning, notwithstanding the misuse of some of its words, would be plain to the person of ordinary skill in the art to which the invention covered by the patent relates. The Court must, therefore, construe the claims in issue accordingly without regard to any faults of expression or misuse of words that do not mislead the addressee of the patents in issue.

The proper attitude of mind of the Court in construing a patent specification was defined by Sir George Jessell, M. R. in *Hinks & Son v. Safety Lighting Co.*[1] where he said:

> I am anxious, as I believe every Judge is who knows anything of patent law, to support honest bona fide inventors who have actually invented something novel and useful, and to prevent their patents from being overturned on mere technical objections, or on mere cavillings with the language of their specification so as to deprive the inventor of the benefit of his invention. This is sometimes called a "benevolent" mode of construction. Perhaps that is not the best term to use, but it may be described as construing a specification fairly, with a judicial anxiety to support a really useful invention if it can be supported on a reasonable construction of the patent.

This basic principle of fair construction of a patent specification was stated graphically by Chitty, J. in *Lester v. Norton Brothers and Co.*[2] where he said:

> Before reading the specification, I will briefly mention some of the leading principles applicable to the construction of a specification, and bearing on the points argued. Its office is to describe particularly and to ascertain the nature of the invention and in what manner the same is to be performed. It ought to be construed, like any other document, as a whole. It certainly ought not to be construed malevolently. I will not say it ought to be construed benevolently; I do say that it ought to be construed fairly. It must be read by a mind willing to understand, not by a mind desirous of misunderstanding. Inventors and those who assist them are seldom skilled in the use of language; faults of expression may be got over when there is no substantial doubt as to the meaning The persons to whom a specification is particularly addressed are those who are conversant with

[1] (1876) 4 Ch. D. 607 at 612. [2] (1886) 3 R.P.C. 199 at 203.

the business to which the business relates. The specification is sufficient if a person of ordinary skill and intelligence in the business can understand the directions, and work upon them without experiments. The specification must define in reasonable terms the ambit of the invention and thus give fair warning to the public what the invention is for which the monopoly is claimed.

The principle thus stated by Lord Esher, M. R. and Chitty J. has received full acceptance. There is support for it in the reasons for judgment of Lord Parmoor in the House of Lords in *Natural Colour Kinematograph Co. Ld. (in liquidation) v. Bioschemes Ld. (In the Matter of G. A. Smith's Patent)*[1]. The Supreme Court of Canada has shown the same attitude. In *French's Complex Ore Reduction Co. v. Electrolytic Zinc Process Co.*[2] Rinfret J., as he then was, in delivering the judgment of the Court, stated that the specification "should not be construed astutely" and approved the statement of Sir George Jessell that a patent should be approached "with a judicial anxiety to support a really useful invention." And in *Baldwin International Radio Company of Canada, Limited v. Western Electric Co. Inc. et al.*[3] Rinfret J., again speaking for the Court said that the respondents in the case were entitled to have the claims interpreted "by a mind willing to understand, not by a mind desirous of misunderstanding", thus approving the remarks of Chitty J. in the *Lester v. Norton Brothers case* (*supra*). And in *Western Electric Co. v. Baldwin International Radio of Canada*[4] Duff C.J., delivering the judgment of the Court, said:

the courts, as in the case of other documents, have, where they have been satisfied that there was a meritorious invention, resorted to the maxim *ut magis valeat quam pereat*. And, where the language of the specification, upon a reasonable view of it, can be read so as to afford the inventor protection for that which he has actually in good faith invented, the court, as a rule, will endeavour to give effect to that construction.

I refer also to the salutary admonition of Lord Greene M. R. in *The Cleveland Graphite Bronze Company and Vandervell Products Ld. v. The Glacier Metal Coy. Ld.*[5]:

Much time and much ingenuity were occupied in endeavouring to establish meanings for words and phrases without paying due regard to the context in which they appear in the specification. It is sometimes forgotten that the notional person skilled in the art to whom specifications are addressed must be assumed to read them, not with a view of picking holes,

[1] (1915) 32 R.P.C. 256 at 272.
[2] [1930] S.C.R. 462 at 470.
[3] [1934] S.C.R. 94 at 106.
[4] [1934] S.C.R. 570 at 574.
[5] (1949) 66 R.P.C. 157 at 160.

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but with common sense and with an understanding of at least that rule of construction which requires words to be interpreted not in the air but in relation to the context.

It is essential to the fair construction of a patent claim that the specification should be read as a whole. In *The British Hartford-Fairmont Syndicate, Ld. v. Jackson Bros. (Knottingley), Ld.*[1] Lord Romer said, at page 556:

> One may, and one ought to, refer to the body of the Specification for the purpose of ascertaining the meaning of words and phrases used in the claims or for the purpose of resolving difficulties of construction occasioned by the claims when read by themselves.

Lord Romer's statement was cited with approval by Lord Russell of Killowen in the *E. M. I. v. Lessen* case (*supra*). The Supreme Court of Canada has stated the same principle. In *Electrolier Manufacturing Co. Ltd. v. Dominion Manufacturers Ltd.*[2] Rinfret J., as he then was, after construing the claims, said, at page 440:

> That is an interpretation of the claims to which, in our view, the respondent is entitled upon a fair reading of the whole of the specification.

And in *Rosedale Associated Manufacturers Ld. v. Carlton Tyre Saving Coy. Ld.*[3] Lord Evershed M. R. said, at page 69:

> it is clearly legitimate and appropriate in approaching the construction of the claims to read the specification as a whole. Thereby the necessary background is obtained and in some cases the meaning of the words used in the claims may be affected or defined by what is said in the body of the specification.

The principle of fair construction of a patent claim must be applied in such a way as to give effect to the expressed or necessarily implied intent of the inventor as it would be understood by the assumed addressee of the patent, namely, the workman of ordinary skill in the art to which the invention relates.

While the Golden Rule of construction requires that the words of a patent claim should be given their plain and ordinary meaning this is on the assumption that the words have a plain and ordinary meaning, but it is well established that the words may bear a "special or unusual meaning by reason either of a dictionary found elsewhere in the Specification or of technical knowledge possessed by persons skilled

[1] (1932) 49 R.P.C. 495. [2] [1934] S.C.R. 436.
[3] [1960] R.P.C. 59.

in the art": *vide* Lord Russell of Killowen in the *E. M. I. v. Lessen* case (*supra*), at page 41. There he went on to say:

> The *prima facie* meaning of words used in a claim may not be their true meaning when read in the light of such a dictionary or of such technical knowledge; and in those circumstances a claim, when so construed, may bear a meaning different from that which it would have borne had not such assisting light been available That is construing a document in accordance with the recognized canons of construction.

It is established that experts in the relevant art may give evidence of the meaning of technical terms and expressions in a patent claim as they would be understood by the assumed addressee of the patent. The permissive rule, together with the limitation of its applicability, was defined by Lord Buckmaster in *British Thomson-Houston Company Ld. v. Charlesworth, Peebles & Co.*[1] in the following terms:

> As, however, in ordinary cases, the existing circumstances in which documents were prepared, the relationship of the parties and the interpretation of terms of art are the proper subject-matter of evidence, so in specification of patents the state of knowledge in the craft, art or science to which the specification is directed and the explanation of technical terms, words and phrases are the proper subject-matter of testimony to aid interpretation, but, beyond this, evidence affecting construction should not be allowed to stray.

In the present case there were many instances of such expert evidence and in several cases there was conflicting evidence.

There are also many decisions in which the Courts have recognized the fact that inventors have used the specification of the patent as a dictionary in which they have defined the meaning of certain terms and expressions used by them in the claims and they have construed the terms and expressions according to the meaning defined in the specification. In such cases the specification serves a purpose similar to that of the definition section of a statute. The first decision on this subject to which I shall refer is that of *Needham et al. v. Johnson & Co.*[2] where Lindley, L.J., after referring to the term "conduit" in the second claim of the patent in suit in the case, said, at page 58:

> The expression "conduit" requires explanation, and one must look for it, and see what it does mean Of course, it does mean that which the patentees have said it means You are not to look into the dictionary to see what "conduit" means, but you are to look at the specification in order to see the sense in which the patentees have used it.

[1] (1925) 42 R P C 180 at 208 [2] (1884) 1 R P C 49.

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The principle of construction thus expressed was authoritatively recognized by the House of Lords in *British Thomson-Houston Company Ld. v. Corona Lamp Works Ld.*[1] In that case one of the patent claims was for an incandescent lamp having a filament "of large diameter", and one of the attacks on the patent was that the ambit of the claim had not been sufficiently defined. Sargent J. gave effect to this objection and the Court of Appeal affirmed his judgment, but the House of Lords unanimously reversed it. Viscount Haldane, after stating that the specification must be read as a whole, said, at page 67:

> The Claiming Clauses, for example, are not to be taken as standing in complete isolation. For if the Patentee has used in these clauses expressions which he has already adequately interpreted in the body of the Specification, he is entitled to refer to the Specification as a dictionary in which the meaning of the words he uses has been defined.

The principle has also been recognized by the Supreme Court of Canada. In *Western Electric Co. v. Baldwin International Radio of Canada*[2] Duff C.J., speaking for the Court and referring to certain terms in one of the claims under consideration, said, at page 593:

> the specification itself provides the dictionary by which the scope and effect of these terms is to be ascertained.

And in *Smith Incubator Co. v. Seiling*[3] Duff C.J., referring to the two cases just cited, said, at page 256:

> Lord Haldane's judgment in *British Thomson-Houston Co Ld. v. Corona Lamp Works Ld.* (*supra*), at page 67, affords an illustration of the manner in which expressions used in the claims may be interpreted by reference to the body of the Specification. *Western Electric Co. Inc. v. Baldwin International Radio of Canada* is another case in which the description in the body of the specification provided a lexicon interpreting the phrases in the claim.

And, as already stated, Lord Russell of Killowen in the *E. M. I. v. Lessen* case (*supra*) recognized that the specification may provide a dictionary by which the meaning of terms in a claim is defined. *Vide* also the recognition of the principle by Lord Evershed M. R. in the *Rosedale Associated Manufacturers* case (*supra*) in the passage which I have cited. Finally, in this connection, I refer to the note of caution sounded by Lord Reid, in delivering the judgment of the Judicial Committee of the Privy Council in

[1] (1922) 39 R.P.C. 49. [2] [1934] S.C.R. 570.
[3] [1937] S.C.R. 251.

Minerals Separation North American Corporation v. Noranda Mines Ld.[1] After referring to the appellant's contention in that case that in the earlier part of the specification there was a definition of the word "xanthate" as used by the patentee which was in effect a "dictionary" and that, as the patentee had shown that he intended the word to be understood in a limited sense throughout, that limited sense ought to be attached where it occurred in Claim 9, Lord Reid said, at page 94:

> Their Lordships do not doubt that it is possible for a patentee to make his own dictionary in this way. If he has put something in the earlier part of the specification which plainly tells the reader that for the purpose of the specification he is using a particular word with a meaning which he sets out, then the reader knows that when he comes to the claims he must read that word as having that meaning.

After this recognition of the principle to which I have referred, made seemingly with reluctance but made nevertheless, Lord Reid sounded this caution:

> But this is an awkward method of drafting and is very undesirable when a simpler method could easily be adopted, and it is in all cases incumbent on a patentee who chooses to adopt this method to make his intention plain to those who read the specification.

It may, I think, be fairly said, with reference to this caution, that it is easy, after the trial of a patent action, to point out the respects in which a specification could have been improved and the claims expressed with a greater degree of precision.

In my opinion, the decisions to which I have referred establish that the applicant for a patent may in the specification define the meaning of terms or expressions used by him in the claims and thereby make the specification a dictionary for the purpose of interpreting the said terms or expressions as they appear in the claims and that, if he has made his intention plain to the person of ordinary skill in the relevant art to whom the patent is assumed to be addressed that the terms or expressions referred are to be read with the meaning defined for them in the specification, the Court, in pursuance of its duty of fair construction of the claims, must construe the said terms or expressions as having such meaning.

[1] (1952) 69 R.P.C. 81.

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There are several terms and expressions in the claims in issue that require comment. The first one to which I shall refer is the term "thermoplastic yarns". There was a dispute between the parties as to its ambit and whether the patents in issue relate to cellulose acetate yarn. It was argued for the plaintiff that cellulose acetate yarn is thermoplastic and that, consequently, the term must be construed as inclusive of it. On the other hand, it was submitted on behalf of the defendant that the inventors have defined the meaning of the term in the specification of patent No. 552,104 by the statement that the invention relates to thermoplastic yarns "such as nylon, vinyon, orlon, velon, dacron, saran and the like" and that cellulose acetate yarn is not one of the specified yarns. It was also argued that cellulose acetate yarn is specifically excluded from the ambit of the term by the expression in the specification "(as distinguished from silk, rayon, cotton, linen or wool, etc.)" on the ground that the meaning of the term "rayon" is wide enough to include cellulose acetate.

There was a difference of expert opinion on the ambit of the term "thermoplastic". Dr. Finlayson gave it a very wide meaning and said that it applies to any material that is capable of being softened by the action of heat. To him "thermoplastic" meant "becoming plastic by reason of heat". Consequently, in his opinion, silk is thermoplastic because it softens when heated, and the same is true of such fibres as wool, mohair and alpaca. Dr. Finlayson realized that Professor Speakman's definition of thermoplastic was different from his but he thought that his was generally accepted.

Professor Speakman gave the term a narrower meaning. He defined a thermoplastic fibre as one that melts without decomposition. Consequently, since silk does not do that, it is not thermoplastic. Similarly, wool, mohair and alpaca are not thermoplastic.

Counsel for the plaintiff relied on several technical dictionary and other definitions of which I need refer only to Chamber's Technical Dictionary which defines "thermoplastic" as follows:

(Chem) Becoming plastic on being heated. Specifically *(Plastics)* any resin which can be melted by heat and then cooled, the process being able to

be repeated any number of times without appreciable change in properties: *e g.* cellulose derivatives, vinyl resins, polystyrenes, polyamides, acrylic resins.

The first sentence of this definition confirms Dr. Finlayson's definition but the rest of it indicates a specific and more particular meaning.

The plaintiff's experts, Dr. Finlayson, Professor Speakman and Dr. Hoff were all of the opinion that cellulose acetate yarn is thermoplastic. But I should refer to Dr. Finlayson's recognition of the fact that there are degrees of thermoplasticity. This was implicit in his admission that silk is not thermoplastic to the same extent as the synthetic yarns such as nylon and the like.

Mr. Seem disagreed with Dr. Finlayson's definition of thermoplastic material as material which softens when heated. In his opinion, if this broad meaning of the term were accepted almost everything would be thermoplastic. He did not accept the opinion that silk is thermoplastic. On his examination in chief he gave his definition of thermoplastic material as material which will become soft and plastic when heated and become set when cooled and can then be plasticized again by heating it and set again by cooling it. On his cross-examination he agreed that cellulose acetate yarn softens when heated, sets when cooled and can then be re-softened by heating it and re-set when cooled and had to admit that cellulose acetate yarn is thermoplastic. His admission, however, was a qualified one, namely, that while in some respects it is thermoplastic in other respects it is water plastic. On his examination for discovery he said that cellulose acetate was considered a thermoplastic before the wholly synthetic yarns came on the market and that it would hardly qualify as truly thermoplastic to the same extent as other thermoplastic yarns. He expressed the opinion that there is a great deal of confusion among the experts on whether cellulose acetate yarn should be called thermoplastic or not by reason of the fact that while it is thermoplastic it is also water plastic so that a setting or deformation of the yarn that has been induced by heat can be removed by moisture or water which is not possible in the case of the specified yarns. While he could not disagree with the definition in Chamber's Technical Dictionary as a good general one it was not what was thought of in the textile industry since the creation of the wholly synthetic

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thermoplastic yarns. Mr. Seem's evidence read as a whole indicates that he considered that the water plastic characteristics of cellulose acetate outweigh its thermoplastic characteristics and that he did not consider cellulose acetate yarn as truly thermoplastic.

And Dr. Dudzik expressed the opinion that cellulose acetate yarn is not a thermoplastic yarn such as nylon, vinyon, velon, orlon, dacron and saran as thermoplastic yarns are known in the textile and throwing industry.

The evidence establishes that the characteristics of cellulose acetate yarn are different from those of the specified thermoplastic yarns. It was submitted by counsel for the defendant that cellulose acetate yarn is hydrophilic, meaning thereby that it absorbs water and is, therefore, water plastic, whereas all the specified yarns are hydrophobic, meaning thereby that they repel water and are, therefore, not water plastic. The submission is an over simplification. Dr. Finlayson stated that cellulose acetate, nylon and terylene (dacron) are all affected by water, cellulose acetate being affected the most and terylene the least. According to him water has a softening or plasticizing effect on both cellulose acetate and nylon particularly at high temperatures but it has very little effect on terylene. And Professor Speakman expressed the opinion that nylon has an affinity for water and that water does soften it but that terylene absorbs only a very small amount of water. On his cross-examination he agreed that in terms of water plasticity nylon is more akin to terylene than to cellulose acetate. Mr. Seem admitted that nylon has a certain affinity for water and is water plastic to that extent which, he said, is very small. He pointed out that nylon is classified in the Dupont Company literature as hydrophobic.

It is clear from the evidence that cellulose acetate yarn is water plastic to the extent that a crimp inserted in it by heat can be taken out by plasticizing it with water, whereas this cannot be done with the specified thermoplastic yarns which are all more resistant to water than cellulose acetate yarn is, and that its water plasticity is such as to differentiate it from the specified yarns. This fact alone affords some justification for Mr. Seem's exclusion of it as a thermoplastic yarn as the term is known in the textile and throwing industry.

In addition, there are the basic differences between cellulose acetate yarn and the new synthetic thermoplastic yarns to which I have already referred.

As I view the situation, the dispute between the parties on whether the patents in issue relate to cellulose acetate yarn must be resolved in favor of the defendant. The inventors have, in the specification referred to, plainly defined the meaning of the term "thermoplastic yarns" as being thermoplastic yarns "such as nylon, vinyon, orlon, velon, dacron, saran and the like" and have made their intention plain to any person of ordinary skill in the relevant art who reads the patent with a mind willing to understand it that when he comes to the claims he must read the term "thermoplastic yarns" as having the meaning defined in the specification, namely, "thermoplastic yarns such as nylon, vinyon, orlon, velon, dacron, saran and the like". In view of the dispute to which I have referred this is an appropriate case for making the specification a dictionary for the purpose of interpreting the meaning of the term "thermoplastic yarns" as it appears in the claims in issue. It does not matter, therefore, whether cellulose acetate yarn is thermoplastic or not or whether its water plasticity outweighs its thermoplasticity and is such as to differentiate it from the specified thermoplastic yarns or whether it is basically different from them in the other characteristics referred to, for the inventors have made it clear that it is not included in the category of thermoplastic yarns which they have specified. Cellulose acetate yarn is not one of the specified thermoplastic yarns "such as nylon, vinyon, orlon, velon, dacron, saran and the like". It is not, therefore, within the ambit of the term "thermoplastic yarns" as the inventors have defined it.

Counsel for the plaintiff sought to construe the expression "such as" as meaning simply "for example". I do not agree. It is clearly restrictive and definitive of the term "thermoplastic yarns" and limits its meaning to thermoplastic yarns of the kind or type specified. Cellulose acetate yarn is not one of the specified yarns. If it were intended that the term "thermoplastic yarns" should include all thermoplastic yarns there would be no need for the expression "such as" and no sense in it.

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In this connection I am mindful of the caution sounded by Lord Reid in the *Mineral Separation v. Noranda* case (*supra*). In my opinion, the inventors have plainly told the assumed reader of the patent that when he comes to the claims he must read "thermoplastic yarns" as having the meaning defined for it in the specification and they have made their intention clear that it does not include cellulose acetate yarn. The assumed reader of the patent could not have any reasonable doubt of such intention.

In view of this finding I need not, strictly speaking, consider the argument that cellulose acetate yarn is specifically excluded from the ambit of the term "thermoplastic yarns" on the ground that it is within the meaning of the term "rayon". There is no doubt that Mr. Seem considered that cellulose acetate is a rayon and there is support for his opinion in Chamber's Technical Dictionary in the 1944 and 1957 editions, portions of which were filed as Exhibits Z-87 and Z-87A, where rayon is defined as "artificial silk" and "acetate rayon" is defined as rayon made from cellulose acetate. Mr. Seem agreed with these definitions and on his cross-examination agreed that there was confusion in the trade regarding the definition of rayon in general and whether cellulose acetate was properly so classified. Moreover, the Encyclopedia Britannica, 1958 Edition, a portion of which was filed as Exhibit Z-247, describes cellulose acetate as the fourth method for making rayon, and the Encyclopedia Canadiana, 1958 Edition, a portion of which was filed as Exhibit Z-248, says that acetate rayon consists of cellulose acetate.

For the plaintiff Dr. Turl outlined the history of the use of the term "rayon" and I summarize his evidence; the term was first coined in 1924 to take the place of the term "artificial silk"; rayon was produced by several processes and the products were known as viscose rayon, cuprammonium rayon and acetate rayon; this was the situation up to 1948 when the American Society for Testing Materials published a tentative list of definitions in which the term "rayon" was defined in such a manner as to exclude fibres made of cellulose acetate; and in 1951 the Federal Trade Commission of the United States published definitions according to which "rayon" means fibres of re-generated cellulose and fibres made of cellulose acetate are not

included. Dr. Turl stated that these definitions have been accepted very widely.

While the evidence, viewed as a whole, indicates that as at the date of the application for the patents in issue the term "rayon" did not include cellulose acetate, the fact remains that the inventors made it plain to the assumed reader of the patents that the terms "thermoplastic yarns" in the claims in issue did not include cellulose acetate yarn.

It follows from what I have said that the term must be construed accordingly.

One of the elements in the claims in suit of patent No. 552,104 is stated as follows, namely, "continually passing the yarn at a selected linear speed under uniform tension through a restricted thermally isolated and uniformly heated zone to uniformly heat the yarn to a prescribed temperature to reorient the molecules of the yarn to the twisted formation of the yarn and yarn set the same." There are two terms in this statement that require comment. One of these is "yarn-set" and the other "prescribed temperature".

I shall deal with the term "yarn-set" first. This is clearly a technical term in the art to which the patent relates. There was a great deal of evidence and argument about it. Mr. Seem sought to draw a distinction between twist setting thermoplastic yarn and yarn setting it. In his opinion, twist setting makes the torsion forces in the fibres of the yarn temporarily dormant so that it will not snarl in the course of subsequent processing of it, whereas yarn setting extinguishes, in effect, the torsion forces in the sense that the molecules, which have been re-oriented in a helical formation by twisting the yarn at a high temperature and then cooling it before it is untwisted, are permanently fixed in their distorted helical formation with the result that the crimp in the yarn is permanent.

The terms "permanent" and "fixed" in the claims are relative for it is agreed that the condition that brings either twist setting or yarn setting about may be altered by subjecting the yarn to more extreme conditions than those at which it was twist set or yarn-set. Mr. Seem sought to establish that the lowest temperature in the false twist process at which thermoplastic yarns of the kind defined in the specification can be said to be yarn set is 40 per cent

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below the melting point of the yarn. In the case of nylon yarn which melts at 482°F this is 289.2°F. Mr. Seem concluded from experiments that he and Mr. Stoddard had made that he could get a yarn set in the specified thermoplastic yarns if the yarn was heated to a temperature ranging from 40 per cent below its melting point to a point as close as possible to its melting point. In his opinion, a temperature within that range was required for yarn setting and he would not consider that a yarn had been yarn-set if it had been heated at a temperature lower than 40 per cent below its melting point. But on his cross-examination he was forced to admit that there is not really a sharp dividing line between twist setting and yarn setting.

Counsel for the plaintiff submitted that the difference is merely a matter of degree, and not of kind. His submission was supported by the plaintiff's experts. For example, Professor Speakman found that the higher the temperature at which nylon was treated while it was in a state of deformation the greater was the set imparted to it and the greater its resistance to subsequent removal. Dr. Hoff and Dr. Turl were of a similar opinion but there was agreement that yarn that had been yarn set will tend to retain the physical configuration it had at the time of the yarn setting, that is to say, that the molecules will be fixed in the helical formation into which they were reoriented.

For the purpose of construing the term "yarn-set" as it appears in the claims in issue it is immaterial whether the difference between twist setting and yarn setting is one of kind or only one of degree, for the specification itself clearly defines its meaning. It is disclosed that, in order to be yarn-set, the yarn must be heated to a pre-determined temperature of not less than 40 per cent below its melting point, that while the yarn is in this plastic state it is twisted, and that it is cooled before it is untwisted. The specification then states:

> As a result of this continuous processing in accordance with our invention, an improved substantially permanent crimp, wave or fluff is set into the yarn. By this it is meant that the yarn is yarn-set, that is, the molecules in the thermoplastic yarn are permamently and uniformly reoriented or realigned therein according to the twisted formation of the yarn at the time of yarn-setting so that the individual filaments of the yarn have an inherent tendency to twist uniformly and assume the twisted formation which they had at the time of yarn-setting.

Yarn-setting is, therefore, in effect, the stabilization of the molecules of the yarn in the helical deformation into which they were reoriented by the twisting while the yarn was in its plastic state followed by the cooling of the yarn before it was untwisted. In my opinion, the inventors made it plain to those who read the specification that this is the meaning to be given to the expression "yarn-set" as it appears in the claims in issue.

The term "prescribed temperature" gave rise to controversy. It is clear that the temperature referred to is that of the yarn and not that of the heater. The evidence establishes that there is no known way of determining precisely the temperature to which the yarn is heated during its passage through the heated zone, that the temperature of the yarn is lower than that of the heated zone and that all that can be precisely determined is the temperature to which the yarn is subjected. It was urged, accordingly, on behalf of the plaintiff that the term is objectionable on the ground that, since the temperature of the yarn cannot be determined, the person of ordinary skill in the art to whom the patent is assumed to be addressed is left in doubt as to the prescribed temperature. There is no merit in the submission. It is clear from the wording of the claims that the purpose of controlling the supply of heat to the heated zone is to maintain it uniformly at the temperature required to heat the yarn uniformly to the prescribed temperature, namely, the temperature that is required "to reorient the molecules of the yarn to the twisted formation of the yarn and yarn-set the same". The use of the word "prescribed" in the expression is inept but its meaning is clear to any addressee of the patent who is willing to understand it. The "prescribed temperature" of the yarn is the temperature to which the yarn must be subjected in order to yarn-set it, that is to say, a temperature between 40 per cent below the melting point of the yarn and a point as close as possible to it. It is not, therefore, necessary to determine the precise temperature of the yarn so long as it is high enough to enable the yarn to be "yarn-set" within the meaning of that term as defined in the specification.

The expression "to preclude substantially any ductility", which appears in the claims in issue, followed by the words "in the cooled yarn" or "in the yarn after cooling", gave rise to controversy. There was a difference of opinion on its

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meaning and conflicting evidence relating to tests made for the purpose of determining whether there has been a substantial preclusion of ductility in yarn produced on the plaintiff's CS3 machine. Counsel for the plaintiff dealt extensively with the subject but I shall at this stage confine myself to the determination of the meaning of the expression as used in the claims in issue.

The experts for the plaintiff were in general agreement on the meaning of the term "ductility" in relation to textile yarns. Dr. Finlayson defined it as meaning "the property of a textile yarn which allows it to be lengthened or stretched permanently so that when the stress is removed the yarn does not recover to its previous length". Professor Speakman said that the word "ductility" meant to him "that if a stress is applied to a fibre it extends but does not recover completely when the stress is removed, and the extent to which recovery is incomplete is the measure of the ductility of the material". Dr. Hoff stated that ductility is an inherent property of a yarn which appears when the yarn is subjected to longitudinal stress when a load is applied to it, that if the load is removed and the yarn recovers completely to its former length the yarn is completely elastic but to the extent to which it fails to return to its original length it is ductile and the amount of its ductility can be measured. There was also the definition of ductility in the Calloway Textile Dictionary: "that property of a material that allows it to be stretched or elongated permanently so that it will not recover its original length when the stress is removed". And Mr. Dufort said that ductility in relation to thermoplastic fibres means that if the yarn is stretched and the stretching load is removed the ductility of the yarn is the extent to which it does not recover fully from the stretching.

These definitions are open to the criticism that they focus attention on the lack of capacity of the yarn to recover its former length after the stress or load by which it was lengthened has been removed rather than draw attention to the fact that the word "ductility" indicates a particular quality or state.

On his examination for discovery, Mr. Seem said that the term "ductility", as applied to thermoplastic yarn, meant "the ability to be drawn out and extended in length without elastic recovery", but on his cross-examination he said that this answer was not complete. He also stated

that in 1954, as also in 1947, the term "ductility" was not generally applied to textiles and that he had adopted the use of the word because he "could find no generally accepted word in our textile art that would better describe the condition we were trying to describe" and he would assume that in the textile art the dictionary definition of ductility would be used.

Webster's New International Dictionary, Second Edition, 1953, defines "ductility" as "Ductile quality or state" and gives the following as the first definition of "ductile":

> 1. Capable of being permanently drawn out or hammered thin;—said esp. of metals; capable of being molded or worked; specif., capable of being drawn out into wire or thread.

and the New English Dictionary, Volume III, defines "ductility" generally as "The quality of being ductile" and specifically as:

> 1. Capability of being extended by heating, drawn out into wire, worked upon or bent; malleability, pliableness, flexibility.

and includes the following under the definition of "ductile":

> 1. Of metal: *a.* That may be hammered out thin; malleable; flexible, not brittle. *b.* Capable of being drawn out into wire or thread, tough.
> 2. Of matter generally: Flexible, pliant; capable of being moulded or shaped; plastic.

Webster's New International Dictionary, Second Edition, defines "plastic" as including the following:

> 6. *Physics.* Capable of being deformed continuously and permanently in any direction without rupture under a stress exceeding the yield value.

and defines "yield value" as

> *Mech.* The minimum shearing stress required to produce continuous deformation in a solid.

I should also refer to the definition of "preclude" in Webster's New International Dictionary, Second Edition, as follows:

> 1. To put a barrier before; to close; to shut up; to shut out; to hinder; stop; impede, to close beforehand.
> 2. To shut out or obviate by anticipation; to prevent or hinder by necessary consequence or implication; to deter action of, access to, enjoyment of, etc.; to render ineffectual.

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Mr. Seem related the idea of substantial preclusion of ductility in the specified thermoplastic yarns to that of their retentivity of the permanent crimp put in them by the use of the patented process. His line of reasoning was clear. On his examination in chief he gave a detailed description of what happens to the yarn from the time of its production by the use of the false twist process of the patent to its incorporation in a knitted or woven garment and the use of such garment. After the yarn has been produced and while it is still in the throwster's plant it goes through other processes before it is delivered to the throwsters' knitter or weaver customer. It is doubled on a down-spinner machine with a yarn of a different twist and is then wound on a cone by a coning machine. During these processes it is subjected to bending, compressional, tensile and tortional stresses. While it is in the throwster's plant and during its delivery to the customer it is subjected to wide variations of temperature. In the knitter's or weaver's plant it is subjected to the stresses involved in the knitting or weaving process and the knitted or woven article is scoured and dyed. Knitted stockings are stretched on a form and woven fabrics are finished and set to their desired shape. Some of these processes involve the use of high temperatures. The finished knitted or woven article is then subjected to the stresses of use by the wearer and washing and drying. Mr. Seem stated, that if the yarn were ductile the various stresses and temperatures to which it is subjected would cause the crimp in it to be pulled out with the result that the knitted or woven article would be useless for the purpose for which it was bought, whereas, if the article retained its permanent crimp this showed that the use of the process by which the permanent crimp had been put into the yarn had the result of preventing or hindering it from becoming ductile and that, consequently, its ductility had been substantially precluded.

It is admitted that it is not possible to eliminate ductility from a thermoplastic yarn altogether and there are instruments for measuring it in the case of a flat yarn. Mr. Seem stated that no machine was available to determine the ductility of a permanently crimped yarn but that this can be determined in a practical way by examining the extent to which the crimp in the yarn has been retained. It was Mr. Seem's opinion that if a yarn has retained its perma-

nent crimp it cannot be said to be ductile and his conclusion, put briefly, was that since the use of the patented process results in the production of a thermoplastic yarn that is permanently crimped in such a manner that it can withstand the stresses and temperatures to which he referred and still retain its permanent crimp it may properly be said that the use of the process has precluded substantially any ductility in the yarn produced by it.

I adopt Mr. Seem's opinion and conclusion. There is ample support for both in the specification of patent No. 552,104. The term "ductility" is a technical one and I accept Mr. Seem's evidence that it was not generally applied to textiles. It would, therefore, be fair to say that it was not generally applied to thermoplastic yarns of the kind specified in the patents in issue. Certainly, the experts for the plaintiff, except Mr. Dufort, were not asked to define it as applied to thermoplastic yarns. Under the circumstances, it is proper to look to the specification for an indication of the meaning of the term "ductility" and of the expression "to preclude substantially any ductility" as used in the claims in issue. In my opinion, the specification plainly defines the meaning to be given to them.

The specification recites that "thermoplastic yarns of the kind referred to materially respond to shrinking by becoming more ductile or plastic and thermally stabilized in cooling which, after subjected to the action of heat assume new and substantially permanent physical characteristics when twisted, stretched or shrunk while heated". Thus the specification regards "ductile" and "plastic" as synonymous terms and thereby equates ductility with plasticity. Consequently, the ductility of the thermoplastic yarn of the specified kind is its quality of being capable of being permanently drawn out or of being deformed continuously and permanently in any direction and the preclusion of substantially any ductility in it means, in effect, that it has been substantially prevented or hindered from assuming the ductile or plastic quality or state of which it would otherwise have been capable. This is effected by subjecting it to the process described in the specification and defined in the claims in issue.

The specification also contains the following instruction, namely, "By the use of adequate tension while twisting-

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untwisting, we can draw the yarn approximately the same degree as normally drawn by the producers, and by this method any ductile yarn is drawn helically due to the simultaneous twisting and drawing and this spiralled formation of the yarn substantially remains after untwisting. Thus in the case of yarns having thermal characteristics, such as Dacron, for example, which exhibits substantial ductility when heated, the yarn is processed under sufficiently high tension during heating to preclude substantially any ductility in the yarn when cooled." Thus the specification teaches that a ductile yarn may be drawn helically by the use of adequate tension during the process of twisting-untwisting and that the spiralled formation thus produced in the yarn substantially remains in it after untwisting if it is processed under sufficiently high tension during heating to preclude substantially any ductility in it when cooled. The assumed addressee of the patent is told that the tension on the heated yarn should be correlated to its temperature, being its "prescribed temperature", in such a way as to maintain the yarn under a sufficiently high tension to keep it permanently in its spiralled formation to preclude substantially any ductility in it.

Moreover, it should not be forgotten that the specification requires that the yarn should be yarn-set. As I have already stated in construing the term "yarn-set", the specification teaches that yarn-setting stabilizes the molecules of the yarn in the twisted helical deformation into which they were reoriented by the twisting while the yarn was in its plastic state followed by the cooling of the yarn before it was untwisted.

The claims in issue define a method of producing a permanently crimped yarn and then specify the steps by which the method is accomplished. These include, *inter alia*, a yarn-setting of the yarn under closely controlled uniform conditions of temperature involving twisting it and stabilizing its molecules in their twisted helical deformation, whereby a spiralled helical formation is set in it, and correlating the tension and the temperature in the manner referred to. If the specified steps are taken the desired permanently crimped yarn will be produced.

The specification is concerned with the commercial production of substantially permanently crimped thermoplastic yarns of the kind specified in it. It is not addressed to

scientists but to practical throwsters and should be read in the light in which a practical throwster would read it. Such a person would know the purposes for which the yarn is to be used and the conditions of stress and temperature to which it would be subject. He would be concerned with whether the crimped yarn was ductile or not, for he would know that if it were ductile the crimp in it would pull out and it would be useless for its intended use. On the other hand, if the crimp should remain substantially permanent in the yarn this would show that the use of the process had precluded substantially any ductility in it, for the purposes for which it was intended.

The specification has set the preclusion of substantially any ductility in the yarn as the standard of the proper correlation of tension and temperature. The assumed addressee of the patent knows that the best proof of the attainment of the standard and of the proper correlation is the retention of the permanent crimp in the yarn under the conditions of its actual commercial use and that he should make the necessary adjustments to ensure such a result before he sets his machine for full scale production.

It is, therefore, proper to relate the preclusion of substantially any ductility in the cooled yarn to the retention of the permanency of its crimp under the conditions of its actual use. There has been a preclusion of substantially any ductility in the yarn if it has been produced according to the process defined in the claims in issue under such a correlation of tension and temperature that it can be subjected to the stresses and temperatures described by Mr. Seem and substantially retain its permanent crimp characteristics.

Only a brief reference need be made to the term "twist". Here a distinction should be drawn between true twist and false twist. The first occurs in a length of yarn when one end of it is held and the other is rotated. This inserts a true twist in the yarn. False twist occurs in a length of yarn when both ends of it are held and the portion in between the ends is rotated in one of two directions.

The meaning of the term "contractile force", as it appears in the claims in issue, was given by Dr. Finlayson and Professor Speakman. Their evidence indicates peculiar qualities of almost a human character in the synthetic thermoplastic yarns. Dr. Finlayson explained that when the fibres

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of synthetic thermoplastic yarns are stretched in the direction of their length the molecules in it are arranged in the direction of their length, that this is an unnatural state for them, for, according to the teachings of thermodynamics, they seek to get back to their original non-stretched random state, that the attributed desire of the molecules to return to their original disorderly state results in a tendency on the part of the yarn to shrink and that the contractile force referred to is the amount of force required to prevent the yarn from shrinking or contracting as it would ordinarily have the tendency to do. Pofessor Speakman gave a graphic description of the behaviour of the molecules of nylon. When the melted mixture of coal, water, petroleum and limestone, of which nylon is composed, is extruded through the small holes of what is called a spinnerette the molecules in the resulting chilled continuous filament are in random order. This is their natural state. When the manufacturers of the nylon stretch the filaments the chain molecules in it are pulled into line along the length of the filaments. Their natural tendency is to revert to their normal original random order and the higher the temperature of the filaments is the greater is the agitation of the molecules in them and the greater their tendency to revert to their former order. As Professor Speakman put it, the amount of force that must be put on the ends of the filament to prevent it from contracting and so prevent the molecules from reverting to their original random order is called the contractile force of the yarn. Put simply, it is the amount of force that must be applied to the ends of the filament to prevent it from contracting as it would do if the force were not applied.

I now come to consideration of the attacks on the validity of the claims in issue but before I do so I must refer to the statutory provision for the *prima facie* validity of a Canadian patent enacted by section 48 of the *Patent Act*, R.S.C. 1952, Chapter 203, which reads 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 and avail the grantee and his legal representatives for the term mentioned therein, ...

This section was previously section 47 of the *Patent Act*, 1935, Statutes of Canada, 1935, Chapter 132.

The first reference to this statutory presumption of the validity of a Canadian patent, or statutory provision for its *prima facie* validity, was in *The King v. Uhleman Optical Company*[1]. Since then I have referred to it in several cases: *O'Cedar of Canada Ltd. v. Mallory Products Ltd.*[2]; *Riddell v. Patrick Harrison & Co. Ltd.*[3]; *Reliable Plastics v. Louis Marx*[4]; *Unipak Cartons v. Crown Zellerbach*[5]; *The McPhar Engineering Company of Canada Ltd. v. Sharpe Instruments Limited et al.*[6]; *Durkee-Atwood Co. v. Richardson*[7] and *Lovell Manufacturing Company et al. v. Beatty Bros. Limited*[8].

The broadest statement of the ambit of the provision was made in the *McPhar Engineering Company* case and repeated in the *Lovell Manufacturing Company* case. The provision of *prima facie* validity extends to all the attributes of patentability that an invention must have in order to be patentable under the Act. The attributes of novelty, utility and inventive ingenuity or lack of obviousness are all presumed to be present in an invention for which a patent has been granted until the contrary is shown. The provision also extends to the obligations imposed by law on a patentee and the requirements specified in the Act. Compliance with them is presumed until the contrary is shown. It follows that the onus of showing that a patent is invalid lies on the party attacking it, no matter what the ground of attack may be. This does not mean, of course, that the patent is immune from attack or that the patentee is free from the obligations that he owes by way of consideration for the grant of the monopoly to him or from the requirements of the Act. But it does mean that when an attack has been made on the patent in an action, either for infringement or for impeachment, the owner of the patent need not prove the existence of any of the necessary attributes of patentability or performance of his legal obligations or compliance with the requirements of the Act, for there is a presumption in his favor that all the necessary attributes of patentability are present in the

[1] [1950] Ex. C.R. 152 at 161.
[2] [1956] Ex. C.R. 299 at 316.
[3] (1957-58) 17 Fox Pat. C. 83 at 99.
[4] (1958) Fox Pat. C. 184; 29 C.P.R. 113 at 127.
[5] (1960) 20 Fox Pat. C. 1 at 33.
[6] (1960) 21 Fox Pat. C. 1 at 27.
[7] (1963) 23 Fox Pat. C. 30 at 44.
[8] (1963) 23 Fox Pat. C. 112.

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invention and that he has performed his obligations and met the requirements of the Act.

Counsel for the plaintiff submitted that the section does not cast any onus on a party attacking a patent for invalidity other than that of introducing some evidence tending to establish invalidity. This was the first attempt to cut down the ambit of the statutory provision for validity under consideration since I first referred to it in *The King v. Uhlemann Optical Company* case. I disagree with counsel's submission. While the presumption of validity created by section 48 is a *prima facie* one, and, therefore, rebuttable, it cannot be rebutted as easily as counsel attempted. Parliament has deliberately endowed a patent granted under the Act with the quality of validity specified in the section. Although the presumption of validity thus created is only a *prima facie* one it is reasonable to assume that Parliament intended that its provision for validity should be a substantial one. Indeed, it would be unreasonable to assume that it intended that its provision should be whittled away and, in effect, nullified by the mere introduction of some evidence tending to show invalidity. The evidence required to rebut the presumption must be more than "some evidence". It must be credible evidence and substantial enough to satisfy the Court that the patent is invalid. In my opinion, the presumption of validity created by the section remains in effect unless the party attacking the patent shows to the satisfaction of the Court that it is invalid. Thus the section does impose on the party attacking the patent for invalidity the onus of showing that it is invalid and, in my opinion, the onus so imposed is not an easy one to discharge. There is support for this opinion in Halsbury's Laws of England, Third Edition, Vol. 15, where the author says, at page 343:

> The nature of a presumption of law is that the court treats as established some fact of which no evidence has been given, and when rebuttable, it can have no weight capable of being put in the balance against opposing evidence which is believed.

The author then goes on to say:

> It does not follow that such a presumption may be rebutted in every case by any evidence however slight. The rebutting evidence must be considered on its merits: its credibility is neither increased or diminished by the existence of the presumption; but, if it is believed, the presumption is displaced.

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In my opinion, the provision for the validity of a patent granted under the Act enacted by section 48 enures to the benefit of the owner of the patent until the party attacking it shows to the satisfaction of the Court that it is invalid.

There were several grounds on which the plaintiff based its action for impeachment of the patents in issue. The first was that the process invention defined in the claims in issue of patent No. 552,104 had been anticipated. It was not contended that there had been any anticipation of the apparatus invention defined in Claim 3 of patent No. 552,105. In support of the charge of anticipation of the process invention counsel for the plaintiff relied at the outset on two prior publications and an alleged prior use. The prior publications were two patents issued to Dr. Finlayson, one being United Kingdom patent No. 424,880, dated March 4, 1933, filed as Exhibit 1, and the other United States patent No. 2,111,211, dated March 15, 1938, filed as Exhibit 51. The alleged prior use was that of a machine said to have been used by Dr. Finlayson at Spondon in England, which was set up in the basement of the Court House and filed as Exhibit 62. At a later date, counsel also relied on two patents issued to Moulinage et Retordie de Chavanoz S. A., one being a French patent No. 63,983, dated October 14, 1955, filed as Exhibit 90, and the other a Canadian patent No. 538,463, dated March 19, 1957, filed as Exhibit 92.

The requirements that must be met before an invention should be held to have been anticipated by a prior publication have been stated in many cases. I summarized them in *The King v. Uhlemann Optical Company*[1] and cited the leading cases in which they were set out, and in *Lovell Manufacturing Company et al. v. Beatty Bros.*[2] I dealt more particularly with them.

It is established that a prior publication must not be held to be anticipatory of an invention in issue in an action for infringement or impeachment of a patent unless the conditions specified in the leading cases are clearly shown to be present in it. The basic tests may be stated briefly. The information as to the invention in issue given by the prior publication must, for the purposes of practical utility, be equal to that given by the patent for the invention and show everything that is essential to it so that a workman

[1] [1950] Ex C R. 152 at 157.

[2] (1963) 23 Fox Pat. C 112 at 137.

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of ordinary skill in the relevant art would at once have perceived, understood and been able practically to apply the invention without the necessity of further experiment. It is not enough to prove that the information could have been used to produce the result of the invention in issue; there must have been a clear and unmistakable direction to use it for such purpose. Nor is it sufficient that the prior publication contained suggestions which, taken with other suggestions, might be shown to have foreshadowed the invention in issue or important steps in it, or that it contained the nucleus of the idea of the invention which could have been regarded as the beginning of its development. If the prior publication is to be regarded as a prior publication of the invention in issue it must be shown that it published to the world the whole invention with all the material necessary to instruct the public how to put it in practice and that it so disclosed the invention to the public that no person could subsequently claim it as his own. Put in different terms, there is the test stated by Viscount Dunedin, in delivering the judgment of the Judicial Committee of the Privy Council in *Pope Appliance Corporation v. Spanish River Pulp and Paper Mills Ld.*[1] that a prior publication is not to be regarded as an anticipation of the invention in issue unless it can be shown that a person grappling with the problem solved by the patent and having no knowledge of it but having the prior publication in his hand would have said "That gives me what I wish". Nor can anticipation of the invention in issue be proved by resort to alleged inventions that were not put into practice or were inoperable.

Under the circumstances, it is not surprising, in view of the severity of the tests which a prior publication must meet before it should be regarded as anticipatory of an invention in issue, that attacks on the validity of a patent on the ground that the invention covered by it was anticipated by a prior publication so seldom succeed. Indeed, although I have been the President of this Court for over twenty-one years, I have not yet heard a patent case in which the validity of the claims in suit in the case has been successfully attacked on the ground that the invention defined in them had been anticipated by a prior publication.

[1] (1929) 46 R.P.C. 23 at 52 and 56.

I find without hesitation that the invention defined in the claims in issue of patent No. 552,104 was not anticipated by either of the Finlayson patents or by the alleged prior use of the Finlayson machine. There was no teaching of the solution of the problems that faced Messrs. Seem and Stoddard prior to the date of the invention in issue. To put it briefly, there was no information, for the purposes of practical utility, in either of the patents or in the machine as to the invention in issue equal to that given by patent No. 552,104 and, consequently, there was no meeting of the test of an anticipatory publication that was set as early as 1862 by *Hill v. Evans*[1]: *vide* also *Canadian General Electric Co., Ltd. v. Fada Radio Ltd.*[2]

I shall deal first with United Kingdom patent No. 424,880. This was concerned particularly with the production of continuous filament yarns of cellulose acetate or other organic derivatives of cellulose but was not limited to the production of such yarns. The heat called for in the production was that of steam with its constant temperature of 100°C (212°F) but it was stated in the specification that "heat may be used to bring about the setting of filaments which are thermoplastic" and it is clear that the heat referred to was intended to be dry heat. In support of his charge that patent No. 424,880 was an anticipation of the invention in issue counsel for the plaintiff relied on Dr. Finlayson's statement that if he had been asked to produce a false twist nylon yarn in 1946 all that he would have had to do was to put in a Dalgleish heater in the place of the steam tube specified in the patent and he would have found the proper temperature for dealing with the new synthetic thermoplastic yarns as they came into existence. It would have been simply a matter of adjusting the supply of electrical energy to the heater to ensure a temperature that would produce the desired result. If the nylon yarn had been run through the steam and it was found that the fabric made from it could not stand washing this would have disclosed that dry heat would be better for the purpose than steam heat had been. Dr. Finlayson would have known, so he said, that he should use a temperature between 150°C and the melting point of the yarn and would have found the correct temperature by experimentation.

[1] (1862) 4 De G.F. & J. 288.
[2] [1927] Ex. C R. 134; (1940) 47 R.P.C. 69.

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Counsel also relied on the statement of Professor Speakman that if he had been asked to crimp nylon yarn in 1946 he would have approached Dr. Finlayson for the use of his machine as it was and observed its results, that if the crimp had been satisfactory he would have got all that he wanted, that if it was not satisfactory he would have moved to his alternative of hot air and if that had not been satisfactory, knowing that the setting of nylon is more difficult than that of cellulose acetate, he would have moved to a higher temperature until he arrived at the desired result.

The statements of Dr. Finlayson and Professor Speakman on which counsel relied are subjected to critical comment. It was clear that each was made with the knowledge possessed at the date of the statement. They should, therefore, be carefully scrutinized, for it is exceedingly difficult for an expert who is asked for his opinion regarding a matter that happened in the past, even if he seeks to be objective, to divest himself of his knowledge at the date of his expression of his opinion and confine himself to the knowledge that he would have had at the date of the happening of the matter on which his opinion is requested.

I am unable to accept Dr. Finlayson's statement that all that he would have had to do in 1946 to produce a false twist nylon yarn was to put in a Dalgleish heater in the place of his steam tube as proof that patent No. 552,104 anticipated the invention in issue. There is no evidence that the Dalgleish heater was known prior to its disclosure in United Kingdom patent No. 557,597, dated November 26, 1943. Knowledge of it would not have been available at the date of patent No. 424,880 to a man who was grappling with the problem solved by the invention in issue and had no knowledge of the patent in issue and had only patent No. 424,880 in his hand in such a way as to enable him to say in 1935, "That gives me what I wish." The test of whether a prior publication should be considered as an anticipation of an invention put by Viscount Dunedin in *Pope Appliance Corporation v. Spanish River Pulp and Paper Mills Ltd.*[1] cannot, therefore, be met in this case. Counsel's reliance on Dr. Finlayson's statement was an attempt on his part to make a mosaic of the Finlayson

[1] (1929) 46 R.P.C. 23 at 52.

patent issued in 1935 and the Dalgleish patent issued in 1943, which is not permitted: *vide* the decision just cited. There is a further reason for not accepting Dr. Finlayson's statement as proof that his patent anticipated the invention in issue. Even if he had used the Dalgleish heater it would not have enabled him to control the temperature within the limits necessary for uniform heat. Mr. Seem stated that the limits of control exerciseable by the Dalgleish heater were not such as to control the temperature within the necessary limits of plus or minus 1 per cent. The inertia of the system was not finely sensitive enough for the purpose. He admitted that he had never seen a Dalgleish heater but he had had experience with every known type of heater control and based his opinion that the Dalgleish heater would not be capable of controlling the temperature within the fine limits required from reading the specification and the drawings of the Dalgleish United States patent No. 2,373,550, dated April 10, 1945. I accept his opinion.

I reject Professor Speakman's statement. It is subject, of course, to the criticism to which I have already referred. But I must say that in addition to this criticism I formed the impression that a good deal of his evidence including his statement lacked the objective character that might have been expected from an expert of his high qualifications and during his evidence I gave expression to this impression. Moreover, his own reading of patent No. 424,880 demonstrates that it did not anticipate the invention in issue. He agreed that it showed that the yarn being processed under its method was cooled after it was untwisted, which is contrary to the teaching of the patent in issue which calls for cooling of the yarn before it is untwisted as an essential requirement of yarn-setting it. That being so, the patent did not teach him how to accomplish the result for if he had followed its teaching he could not have achieved the necessary yarn-setting taught by the patent in issue. Under the circumstances, his statement in reply to counsel's question to the effect that the element in the claims in issue calling for yarn setting was included in patent No. 424,880 was incorrect.

There are several reasons for finding that patent No. 424,880 did not anticipate the process invention in issue.

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It was particularly concerned with the production of continuous filament yarns of cellulose acetate or other organic derivatives of cellulose. At the time of its issue the synthetic thermoplastic yarns with which the patents in issue are concerned were not in commercial production. Their characteristics, as already stated, were different from those of cellulose acetate and their production raised problems that could not have been contemplated by patent No. 424,880.

It is an essential element of the invention in issue that the yarn being produced by its use should be uniformly heated "to a prescribed temperature to reorient the molecules of the yarn to the twisted formation of the yarn and yarn-set the same". As already stated, it is disclosed that in order to be yarn-set the yarn must be heated to a predetermined temperature of not less than 40 per cent below its melting point, that while it is in this plastic state it is twisted and it is cooled before it is untwisted. Patent No. 424,880 did not disclose the essential element of yarn setting or the need for cooling the yarn before it is untwisted. On the contrary, it appears from Figure 1 of the drawings accompanying the specification that the cooling of the yarn produced under it took place after it was untwisted. This was certainly Professor Speakman's understanding of what Figure 1 indicated. This was contrary to the teaching of the patent in issue. It follows, accordingly, that, if Professor Speakman had used a machine constructed according to the teaching of patent No. 424,880, he could not have produced a permanently crimped nylon or other thermoplastic yarn because it would not have been yarn-set. Mr. Seem expressed his opinion to this effect and I accept it.

Moreover, the steam called for by the patent, being at a constant temperature of 100°C (212°F), would not be hot enough to yarn-set the thermoplastic yarns specified in the patent in issue. It is true that the specification states that heat may be used to bring about the setting of filaments which are thermoplastic but there was no direction to use heat. In the absence of such a direction the mere statement that heat may be used is not enough to make the patent an anticipation of the invention in issue: *vide* the decision of Parker J. in *Flour Oxidizing Company Ld. v. Carr &*

Co. Ld.[1] Moreover, there is no indication in the patent of how high the temperature of the heat should be. There was certainly no suggestion that it should be as high as the "prescribed temperature" referred to in the claims in issue.

Under the circumstances, patent No. 424,880 fails to meet the test of an anticipatory patent laid down by Fletcher Moulton L.J. in *British Ore Concentration Syndicate Ld. v. Minerals Separation Ld.*[2] where he said, at page 147:

> It cannot be too carefully kept in mind in patent law, that in order to render a document a prior publication of an invention it must be shown that it publishes to the world the whole invention—*i.e.*, all that is material to instruct the public how to put the invention into practice.

The failure of the patent to disclose the essential element of yarn-setting and the necessary conditions for its accomplishment was a failure "to publish to the world the whole invention" and disposes of it as an anticipation.

There are other reasons for finding that patent No. 424,880 did not anticipate the invention in suit. It did not disclose that if dry heat should be used the tension should be correlated to the temperature "to maintain the yarn under tension adequate to preclude substantially any ductility in the cooled yarn" or that there must be a close control of temperature and uniform processing conditions in order to produce a permanently crimped thermoplastic yarn. And there is Mr. Seem's statement that a device such as that disclosed in patent No. 424,880 would not enable the production of a stretch yarn.

I now turn to United States patent No. 2,111,211 issued to Dr. Finlayson and Mr. L. Lathem, dated March 15, 1938. The invention covered by it related to a process and apparatus for crimping filamentous threads and was said to be of special advantage in crimping organic derivatives of cellulose, whether by means of solvent vapours or by means of other setting agents including steam or hot air.

There are several reasons for finding that it did not anticipate the invention in issue. It was not concerned with thermoplastic yarns of the kind specified in the patents in issue, which were not in commercial production at the date of its issue, and it did not give the necessary information for the solution of the problems attending the processing of such yarns as they came into commercial existence. The

[1] (1908) 25 R.P.C. 428 at 457. [2] (1909) 26 R.P.C. 124.

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characteristics of the new yarns were different from those of the cellulose derivative yarns with which it was particularly concerned and the problems in connection with processing them were not the same.

There are several respects in which patent No. 2,111,211 did not disclose the whole invention defined in the claims in issue and, therefore, failed to meet the test of an anticipatory prior publication stated in the *British Ore Concentration Syndicate v. Minerals Separation* case (*supra*) to which I have already referred.

As in the case of United Kingdom patent No. 424,880 it did not disclose the essential element of yarn-setting specified in the claims in issue. On the contrary, any yarn processed under it could not have been yarn-set. A blown-up drawing of Figure 1 of the specification, filed as Exhibit Z-32, shows the path of the yarn through the machine. It is clear from this drawing that the orifice in the steam pipe by which the yarn left the steam pipe was immediately below the opening of the false twist spindle through which the yarn entered the spindle. The steam from the orifice would have kept the yarn hot and moist when it should have been cooled before it entered the false twist spindle to be untwisted. Moreover, the heat of the steam would not have been high enough to cause yarn-setting within the meaning of the patent in issue. It follows that a permanently crimped yarn such as that contemplated by the patent in issue could not have been produced by the use of the apparatus and process described in patent No. 2,111,211. And, while it was stated in the specification that hot air might be used as a setting agent, there was no direction that it should be used and no indication that the temperature required in order to yarn-set the yarn must be not lower than 40 per cent below its melting point. Indeed, yarn-setting as defined in patent No. 552,104 was not contemplated at all by patent No. 2,111,211. This fact, by itself, is enough to dispose of it as being anticipatory of the invention in issue.

There is also the fact that the patent did not disclose that if hot air should be used as a setting agent for the yarn being processed there should be correlation of tension to temperature of the kind and for the purpose disclosed and specified in the patent in issue.

Moreover, it was established that the system disclosed in the patent made for a lack of uniformity and permanency of crimp in the yarn processed by its use. Both the twist trapper of the device and the twist stop allowed slippage of the yarn with the result that some of the twist might not be removed from it and it would lack uniformity and the crimp in it would not be permanent. Moreover, the tension means was not such as to produce a uniform tension. Indeed, the patent did not contemplate the uniform processing conditions of the kind disclosed in the patent in issue. It could not, therefore, be said that it anticipated an invention in which uniformity and permanency of crimp were essential objectives. Nor did the patent teach the need for close temperature control. There was no need for this, of course, so long as steam was used, for its temperature is constant at 100°C. But that heat, as already stated, was not high enough to process in a satisfactory manner such yarns as nylon or terylene (dacron). And if hot air were to be used there was no direction in the patent relating to close control of it to ensure the uniformity of heat necessary for the production of a uniform and permanently crimped thermoplastic yarn.

In addition, there was the evidence of Dr. Dudzik that it would not be possible to produce a commercial cellulose acetate yarn by the use of the invention disclosed in the patent. Nor could the process be used for the production of a satisfactory permanently crimped nylon or terylene yarn.

Thus, neither of the Finlayson patents anticipated the invention in issue.

There remains the question whether the machine operated by Dr. Finlayson at Spondon which I shall refer to as the Spondon machine was a prior use of the invention in issue and, therefore, anticipatory of it. The evidence relating to the machine prior to its being set up in the basement of the Court House may be stated briefly. It was operated from 1936 to 1947 and its use enabled the production of 424,000 lbs. of cellulose acetate yarn that went into commercial use but this yarn was made with three ends together and was doubled and plied. The use of the machine stopped in 1947. It was purchased by the plaintiff in 1958 at about the date of the commencement of the present action. Prior to the trial it was dismantled in England and set up in the basement of the Court House. In England the only heat

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used was that of steam but when the machine was set up in the basement a hot air system was added to it. Tests were run on the machine and three types of yarns, namely, cellulose acetate, nylon and terylene, were processed on it on both the steam side and the air side. But, of course, for the purposes of determining whether the machine was a prior use of the invention in suit only its steam side need be considered. While the Spondon machine was said to have been made according to the teaching of United Kingdom patent No. 464,981, which was the United Kingdom counterpart of United States patent No. 2,111,211, it differed from the apparatus disclosed in that patent in several particulars. A drawing filed as Exhibit Z-31 is a schematic representation of the machine and shows the path of the yarn through it. A comparison of Exhibit Z-32 and Exhibit Z-31 will indicate the differences referred to. They were all made for the purpose of overcoming defects of the apparatus disclosed in patent No. 2,111,211 and its United Kingdom counterpart. I need only mention them. There were improvements in the supply package, in the thread line of the yarn, in the tension device, in insulation of the steam pipe, in the position of the spindle in relation to the orifice in the steam pipe and in the false twist spindle itself. I shall refer particularly to only one difference. In the Spondon machine the spindle was offset so that the orifice in the steam pipe by which the yarn left it was not directly below the opening of the spindle through which the yarn entered the spindle. But this did not remedy the defect to which I have referred. Some of the steam from the orifice hit the yarn as it was running and kept it moist and hot when it should have been cooled.

Even with the differences referred to the Spondon machine cannot be regarded as an anticipation of the invention in issue. It is obvious that it could not produce a yarn that was yarn-set within the meaning of the patent in issue. As a matter of fact Mr. Seem expressed the opinion that cellulose acetate yarn cannot be yarn-set within such meaning and I accept his opinion. Nor could its use result in yarn-setting the thermoplastic yarns specified in the patent in issue.

The comments relating to the defects in the twist trapper and the twist stop of the apparatus disclosed in patent No. 2,111,211 apply also to the Spondon machine. The slippage of the yarn would adversely affect its uniformity and the permanency of its crimp. Mr. Seem expressed the opinion

that a false twist spindle and trapper, whether of the type shown on the Spondon machine or of the type disclosed in patent No. 2,111,211, if used on the Spondon machine would not operate to produce a commercial crimped thermoplastic yarn. He explained that while the yarn was being run on the Spondon machine in the basement he had picked a piece of it while it was running between the tension device and the orifice at the bottom the steam pipe and saw that it was snarling which fact indicated to him that there had been a slippage of twist with the result that there would be a lack of uniformity in the yarn. The twist slippage showed a defective system. There was also the fact that the heat of the steam was not high enough for yarn-setting thermoplastic yarns of the kind specified in the patent in issue. Mr. Dudzik confirmed Mr. Seem's evidence that the operation of the Spondon machine in the basement showed that there was twist slippage in it and that the system of processing was defective. While there is no reference in the claims in issue to a twist trapper or to a twist stop it was of the essence of the invention defined in them that a permanently crimped yarn of uniform characteristics should be produced. It could not, therefore, be said that a machine with the defects referred to anticipated an invention in which uniformity and permanency of crimp in the yarn produced by its use were essential objectives.

The fact that commercial crimped thermoplastic yarns could not be produced by the use of the Spondon machine was conclusively proved by Dr. Dudzik. He made tests of the yarns produced by use of the Spondon machine in the basement on its steam side. These were made in the presence of representatives of the plaintiff. The tests included knitting of the yarns, finishing the fabrics made from them and dyeing them. Dr. Dudzik gave a detailed account of how the tests were conducted but it will be sufficient to state his conclusions of what they disclosed. He found, in effect, that the crimp in the cellulose acetate yarn was almost all out and that it was valueless for commercial purposes, and that in the nylon and terylene yarns there was a loss of crimp, a diminution of stretch quality and an increase in lustre and that neither was a commercial yarn.

Consequently, I find that the Spondon machine was not a prior use of the invention and did not anticipate it. This

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makes it unnecessary to consider whether the state of the pleadings permitted evidence of it to be given or whether there had been a disclosure or use of the machine in such a manner that it had become available to the public within the meaning of section 63(1) of the *Patent Act*.

In view of my finding that the invention defined in the claims in issue of patent No. 552,104 was made at least as early as November 13, 1950, the Chavanoz patents, on which counsel for the plaintiff relied, cannot be regarded as anticipatory of the invention in issue. Nor need I consider the argument of counsel for the plaintiff that since the Chavanoz applications and the application for the patent in issue were co-pending in the Patent Office at the same time they should have been placed in conflict under section 45 of the Act.

It follows from what I have said that the attack on the validity of the claims in issue of patent No. 552,104 on the ground that the invention defined in them had been anticipated fails. In my opinion, there was not a vestige of support for it. I find, therefore, that the invention defined in the claims in issue was new.

The usefulness of the invention in issue was established beyond any possibility of dispute. I have already referred to the evidence relating to the undesirable characteristics of the specified thermoplastic yarns in their raw or flat form, the efforts made and the methods used to overcome them, the use of the step by step method of putting a uniform and permanent crimp into the yarns in order to overcome the undesirable characteristics referred to and give the yarns the desired aesthetic qualities, the disadvantages of the method and the superiority of the inventors' continuous false twist process over it. And I have found that the nylon yarn produced by the use of the apparatus and method invented by Mr. Seem and Mr. Stoddard was more uniform than that produced by the use of the step by step method and superior to it in quality and that this greater uniformity and superiority resulted from the uniformity of the operating conditions under which the yarn was produced. I have also found that the use of the apparatus and process was superior to the use of the step by step method from an economic point of view.

There is no doubt that when Col. Heath and Mr. Barnett of G. H. Heath & Co. Ltd. came to Coatesville early in 1954 they were greatly impressed with the yarn produced

on the inventors' machines by the use of the invented process and the fabric, stockings, sweaters and other garments made from it shown to them and the superiority of the yarn over that in the skeins of yarn made by the use of the step by step method which were also shown to them.

Counsel for the plaintiff referred in detail to the representations on the part of The Permatwist Company contained in the licensing agreement between it and G. H. Heath & Co. Ltd., filed as Exhibit Z-172, namely, that the use of the methods and apparatus referred to made possible the production of fluffed thermoplastic yarn similar in appearance and other physical characteristics to the so-called "helanca" yarn, being yarn produced by the step by step method, the production of fluffed thermoplastic yarn substantially uniform in appearance, dyeing qualities and elasticity, the economical production of many novelty fluffed yarns, the saving of floor space, in that to produce essentially the same yarn by conventional equipment approximately four times as much floor space would be required, the elimination of many operations detrimental to quality, the economical production of single or plied fluffed yarn ready for coning at no greater labour cost than required to perform one of the twisting operations of conventional methods, economy through using electrical energy and the ease of conversion of the licensee's conventional throwing machinery, and he submitted that it was economy of production that was at the back of the license agreement. Even if this submission were accepted the fact is that G. H. Heath & Co. Ltd. certainly considered that the inventions in issue were useful. Moreover, their remarkable commercial success even before any patents for them were granted is, in my opinion, conclusive proof that the inventions defined in the claims in issue were useful and I so find. Thus the inventions were new and useful within the meaning of section 2(*d*) of the Act which defines "invention" as follows:

> 2 In this Act, and in any rule, regulation or order made under it,
> (*d*) "invention" means any new and useful art, process, machine, manufacture or composition of matter, or any new and useful improvement in any art, process, machine, manufacture or composition of matter;

I now come to the charge that the patents in issue are invalid on the ground that the inventions in issue did not involve the exercise of any inventive ingenuity having

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regard to the state of the prior art but were obvious. There was no substance in the charge and I dismiss it. But in view of the fact that the validity of a patent is so frequently attacked on the ground that the invention for which it was granted was obvious it is desirable, I think, to set out the considerations that ought to govern the Court in determining whether an invention that is new and useful was obvious and, therefore, unpatentable. The fact referred to warrants a statement of the basic principles to be applied in dealing with this important question.

Counsel for the plaintiff submitted that it ought not to be assumed from the fact that in *Ciba Limited v. Commissioner of Patents*[1] Martland J., in delivering the judgment of the Supreme Court of Canada, did not specifically mention inventive ingenuity or lack of obviousness as an essential attribute of patentability that it was thereby decided that it was not necessary to the validity of an invention that this attribute should be present, and he submitted further that the cases, both in Canada and in Great Britain, decide that the presence of this attribute is essential. I accept these submissions. In *Farbwerke Hoechst A.-G vormals Meister Lucius & Bruning v. Commissioner of Patents*[2] I commented on the decision in the *Ciba Limited* case and stated, at page 164, that prior to the decision in that case the courts had proceeded on the assumption that it is not sufficient to constitute an invention that the subject of a patent should be new and useful but that a further attribute of patentability, namely, the exercise of inventive ingenuity must also be present. I proceed on that assumption in the present case.

The question whether an alleged invention was obvious or not is exclusively a matter for the Court. It is not within the competence of a witness, whether an expert or not, to express his opinion on the subject. Moreover, the question is one of fact. It follows, therefore, that a decision in a particular case that the alleged invention there under consideration was obvious is of little, if any, value to the Court in helping it to decide whether the alleged invention before it was obvious or not.

Moreover, since the question is one of fact the trial judge has no right to determine it according to his own opinion on whether the invention in issue before him was obvious.

[1] [1959] S.C.R. 378. [2] (1962) 22 Fox Pat. C. 141.

He must do his utmost to abstain from a subjective approach to the matter and deal with it as objectively as possible. The issue is not whether the alleged invention would have been obvious to him but whether it would have been obvious to the person of ordinary skill in the relevant art. The judge must, as far as possible, as already stated, put himself or be put in the position of such a person and determine the question accordingly. This may be difficult in some cases but in others, including the present, it is simple.

There is authority for holding that the Court should look askance at the effort of a party to defeat a new and useful invention by the plea that it was obvious. That plea is frequently the last resort of the infringer. In this connection, I refer to the caustic statement of Lord Esher, M. R. in *The Edison Bell Phonograph Corporation, Limited v. Smith and Young*[1] where he said, at page 398:

> What is the meaning of subject matter? It is not the same thing as want of invention, or rather as I should say as want of novelty: it is not the same thing as want of utility, but, where you cannot maintain either of those propositions which would be sufficient to destroy the patent, it is something else, which some one or other, at some time, has invented as an idea for destroying patents. It really comes to this, that, although the invention is new—that is, that nobody has thought of it before—and although it is useful, yet, when you come to consider it, you come to the conclusion that it is so easy, so palpable, that everybody who thought for a moment would come to the same conclusion; or, in more homely language, hardly judicial, but rather businesslike, it comes to this; it is so easy that any fool could do it. Well, I look, as I say, upon that objection, when all others have failed, generally with amused contempt. It can be made out, but hardly ever.

While the language used by Lord Esher was extreme, his admonition to look askance at an effort to destroy a new and useful invention by the plea of obviousness should not be disregarded.

Moreover, the Court should keep in mind the fact that it has never been possible to define with precision, apart from the statutory definition, what constitutes an invention. Some of the attempts to do so have verged on the ludicrous. One of the reasons for the difficulty is the lack of a standard for differentiating an invention from a workshop improvement. This was the subject of comment by Tomlin J. in

[1] (1894) 11 R P C. 389.

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Samuel Parkes & Co. Ltd. v. Cocker Brothers Ltd.[1] where he said:

> Nobody, however, has told me, and I do not suppose anybody ever will tell me, what is the precise characteristic or quality the presence of which distinguishes invention from a workshop improvement . . .

In the English cases the term "subject matter" has been used to define the attribute under discussion. In the Canadian cases this attribute of patentability has been variously described. For want of a better term, and fully recognizing its inadequacy, I have referred to it as the exercise of inventive ingenuity. The term "exercise of the inventive faculties" has also been used: *vide Crosley Radio Corpn. v. Canadian General Electric Co. Ltd.*[2] And the term "lack of obviousness" has also been used. It follows from the fact that the quality of inventiveness has thus far not lent itself to precise definitions that the provision of *prima facie* validity enacted by section 48 of the *Patent Act* is of particular importance so far as this attribute of patentability is concerned. Its presence in the invention need not be proved by the patentee for its existence is presumed until the party attacking the patent shows to the satisfaction of the Court that the invention is obvious. The statement that the onus of showing that a patent is invalid imposed by section 48 is not an easy one to discharge is particularly applicable in cases where a party seeks to destroy a new and useful invention by the plea that it was obvious.

While care must be shown in applying English decisions on the subject of obviousness in view of the fact that there is no provision in the English *Patents Act* similar to section 48 of the Canadian *Patent Act*, there are many English decisions indicating what should not be regarded as a negation of the presence of the attribute of inventive ingenuity in an invention. It is well established, for example, that a mere scintilla, meaning thereby "the slightest trace", of an invention is sufficient to support a patent: *vide* the statement to this effect of Lord Tomlin in the *Samuel Parkes v. Cocker Brothers* case (*supra*), at page 248, and the approval of his statement by Lord Russell of Killowen in *Non-Drip Measure Corp., Ld. v. Strangers, Ld. et al.*[3]; by Lord Normand in *Cleveland Graphite Bronze Corpn. et al. v.*

[1] (1929) 46 R.P.C. 241 at 248. [2] [1936] S.C.R. 551 at 556.
[3] (1943) 60 R.P.C. 135 at 143.

Glacier Metal Corp. Ld.[1] and by Lord Morton of Henryton in *Martin and Biro Swan Ld. v. H. Millwood Ld.*[2]

There are numerous decisions to the effect that the simplicity of a device is not proof that its production did not involve the exercise of inventive ingenuity and that it was obvious. This was stressed as early as 1890 in *Vickers, Sons and Co., Limited v. Siddell*[3] where Lord Hershell said in the House of Lords, at page 304:

> If the apparatus be valuable by reason of its simplicity, there is a danger of being misled by that very simplicity into the belief that no invention was needed to produce it. But experience has shown that not a few inventions, some of which have revolutionized the industries of this country, have been of so simple a character that when once they were made known it was difficult to understand how the idea had been so long in presenting itself, or not to believe that they must have been obvious to everyone.

This statement has been cited with approval: *vide Patent Exploitation, Ld. v. Siemen Brothers & Co., Ld.*[4] per Lord Davey, at page 549; *Van der Lely (C.) N. V. v. Bamfords Ltd.*[5] per Upjohn L.J., at page 317.

Indeed, it is established that an invention is not to be considered obvious because of its simplicity. For example, in *Pope Appliance Corporation v. Spanish River Pulp and Paper Mills Ld.*[6] Viscount Dunedin said, at page 55:

> there may be invention in what, after all, is only simplification

And in *Electrolier Manufacturing Co. Ltd. v. Dominion Manufacturers Ltd.*[7] Rinfret J., as he then was, said of the device under consideration, at page 441:

> Though simple, his device cannot be said to have been obvious.

And in *The Rheostatic Co. Ltd. v. Robert McLaren & Co., Ltd.*[8] the Lord Justice Clerk (Aitchison) said, at page 117:

> Again the simplicity of the device does not exclude invention; on the contrary inventive ingenuity may, and often does, consist in finding a simple and, when discovered, the apparently obvious solution of the problem.

There is another aspect of the question which should be considered, namely, that the invention of a combination,

[1] (1950) 67 R.P.C. 149 at 156.
[2] (1956) R P.C. 125 at 139.
[3] (1890) 7 R P.C. 292.
[4] (1904) 21 R P.C. 541.
[5] [1961] R P.C. 296.
[6] (1929) 46 R P.C. 23.
[7] [1934] S.C.R. 436.
[8] (1936) 53 R P.C. 109.

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such as, for example, that defined in the claims in issue, must not be considered obvious, even although it might be shown that several or, indeed, many of its integers were obvious. Just as a combination may be new, and its invention consequently not anticipated, notwithstanding the fact that many of its integers were old, so also there may be inventive ingenuity in a combination although many of its integers were obvious. The fact that the inclusion of certain parts in an apparatus or certain steps in a process was obvious does not warrant the conclusion that the invention of the apparatus or process was obvious. There was a strong admonition against any such conclusion by Fletcher Moulton L. J., in *British Westinghouse Electric and Manufacturing Company Ld. v. Braulik*[1] where he said:

> I confess that I view with suspicion arguments to the effect that a new combination, bringing with it new and important consequences in the shape of practical machines, is not an invention, because, when it has been once established, it is easy to show how it might be arrived at by starting from something known, and taking a series of apparently easy steps. This *ex post facto* analysis of inventions is unfair to the inventors, and in my opinion it is not countenanced by English Patent Law.

This admonition was approved by Lord Russell of Killowen in the House of Lords in *Non-Drip Measure Coy., Ld. v. Strangers, Ld., et al.*[2]

And in the same case Lord Russell of Killowen made a classic statement when he said, also at page 142:

> Whether there has or has not been an inventive step in constructing a device for giving effect to an idea which when given effect to seems a simple idea which ought to or might have occurred to anyone, is often matter of dispute. More especially is this the case when many integers of the new device are already known. Nothing is easier than to say, after the event, that the thing was obvious and involved no invention.

It was after this statement that he approved the admonition of Fletcher Moulton L. J. to which I have referred. There was also the statement of Lord Macmillan in the same case, at page 143:

> It might be said *ex post facto* of many useful and meritorious inventions that they are obvious. So they are, after they have been invented.

I agree with the submission of counsel for the plaintiff that in considering whether an invention was obvious the whole of the relevant prior art may be looked at. There is

[1] (1910) 27 R.P.C. 209 at 230. [2] (1943) 60 R.P.C. 135 at 142.

authority for this view in *Allmanna Svenska Elektriska A/B v. The Burntisland Shipbuilding Coy. Ld.*[1] where Jenkins L.J. said, at page 69:

> The matter of obviousness is to be judged by reference to the "state of the art" in the light of all that was previously known by persons versed in the art derived from experience of what was practically employed, as well as from the contents of previous writings, specifications, text books and other documents.

This statement was approved by the House of Lords in *Martin and Biro Swan Ld. v. H. Millwood Ld.*[2] But while Viscount Simonds voiced approval of the statement he emphasized the fact that although it might be shown that individual integers in a combination were obvious that fact did not make the combination itself obvious. Indeed, as he found in the case before the Court, there might well be many integers in a combination that were obvious but there might be one integer that was not obvious and of such a nature as to warrant the conclusion that the combination was not obvious. The issue is not whether the integers in a combination invention were obvious but whether the invention of the combination was obvious, or, to put it in other terms, a patent for the invention of a combination should not be found invalid for obviousness of the invention for which it was granted unless it is shown to the satisfaction of the Court that it was obvious that the integers of the combination should be combined as specified in the claim defining the invention. The unobvious nature of one integer of a combination may be such as to establish the unobviousness of the combination. Viscount Simonds found that many of the integers in the combination invention under consideration were obvious but that there was one that was not and that this supported the conclusion that the invention of which it was an integer was not obvious. At page 136, he said:

> I am of the opinion, therefore, that in this combination of integers there is at least one which by itself was not obvious. This leads to and supports the view that the combination, in which the invention is said to consist, was not obvious.

Moreover, the practical utility and commercial success of an invention may be material in determining whether it involved the exercise of inventive ingenuity. I dealt with this question in detail in *The King v. Uhlemann Optical*

[1] (1952) 69 R.P.C. 63.

[2] [1956] R.P.C. 125 at 133.

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Company[1] and in *The King v. American Optical Co.*[2] In the latter case I held, as set out in the head note:

> That the practical utility and commercial success of a new device may be material in determining whether the new result produced by it was an obvious workshop improvement or involved the exercise of inventive ingenuity. Commercial success, by itself, without the solution of a difficulty, is not sufficient to establish subject matter. But when it is found that there has been a problem calling for solution and that the new device has solved it then its practical utility and commercial success in displacing alternative devices should be considered strong evidence that its production required the taking of an inventive step and that the applicant for the patent was the first to take it.

In making this finding I followed Lord Tomlin in the *Samuel Parkes v. Cocker Brothers* case (*supra*) where he said, at page 248, after referring to the large user of the device under consideration:

> The truth is that, when once it has been found, as I find here, that the problem had waited solution for many years, and that the device is in fact novel and superior to what had gone before, and has been widely used in preference to alternative devices, it is, I think, practically impossible to say that there is not present that scintilla of invention necessary to support the Patent.

and Lord Russell of Killowen in the *Non-Drip Measure v. Stranger's* case (*supra*) where, at page 142, he approved Lord Tomlin's statement.

In view of the considerations which I have outlined the contention of counsel for the plaintiff that the inventions in issue were obvious must be rejected.

As I have already stated, there is no support for the contention in any of the many prior art patents to which he referred and on which he relied.

Moreover, there are several reasons for finding not only that the plaintiff has failed to discharge the onus imposed by section 48 of the Act of showing that the inventions in issue were obvious but also that they were not obvious.

The dry heat setting of nylon yarn at a temperature well up to its melting point that was accomplished by the use of the apparatus invented by Mr. Seem and Mr. Stoddard was not obvious. I have already referred to Mr. Seem's evidence, which I accept, that between 1938 and 1941 he and Mr. Stoddard experimented with heaters of various types and found that the use of steam for the purpose of setting twist in the yarn was not satisfactory, that they also

[1] [1950] Ex.C.R. 142 at 163. [2] [1950] Ex.C.R. 344 at 367.

tried other means for the purpose, including the use of certain chemicals, wetting the yarn and running it through the heater and adding high boiling point materials to it, that in the course of their experiments they found that when the yarn was heated to a high temperature they were getting a good set with the use of dry heat alone and that this surprised them because the teaching in the industry had been that moisture was always used. There was also his evidence that apart from the patented machine there was no commercial process in existence, prior to 1954, in which thermoplastic yarn was produced with dry heat near the melting point. It might be argued that the use of an electrically energized heating device was obvious since the idea of using dry heat at a high temperature was known but the invention of the apparatus for thermally processing thermoplastic yarn involving heating the yarn to the prescribed temperature, meaning thereby the temperature required to enable the yarn to be yarn set, defined in Claim 3 of patent No. 552,105 was not obvious.

And the concept that the thermoplastic yarn should be yarn-set as required in the claims in issue of patent No. 552,104 was not obvious. No one had taught the technique of stabilizing the molecules of the yarn in the helical deformation into which they were reoriented by twisting the yarn while it was in its plastic state, having been heated to a temperature not less than 40 per cent below its melting point and then cooling it before untwisting it and finally untwisting it. Neither the idea involved in this step in the process nor the means for putting it into effect was obvious. Nor were the integers of close control of operating conditions in order to produce a uniform crimp in the yarn obvious. And the requirement of correlation of tension and temperature for the purpose of precluding substantially any ductility in the yarn when cooled and producing a permanent crimp that would withstand the stresses and temperatures to which it would be subject was certainly not obvious.

It would be unreasonable to find that inventions of combinations in which there are so many unobvious integers such as those defined in the claims in issue were obvious.

Moreover, the great commercial success of the inventions in issue is further evidence, if any is needed, that they were not obvious. Surely the licensees of the inventions would not be likely to pay the large royalties that have been paid

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if the inventions were obvious. I find that the inventions in issue were not obvious.

Consequently, the three essential attributes of patentability, namely, novelty, utility and inventive ingenuity or lack of obviousness were all present in the inventions in issue.

There were other attacks on the validity of the patents in issue. Each was attacked on the grounds of insufficiency and ambiguity in the specification. I shall deal first with the attack on the ground of insufficiency. It was directed particularly against patent No. 552,104 and the requirement in the process claims in issue relating to correlation.

Counsel for the plaintiff contended that the applicants for the patents in issue had failed to comply with the requirements of section 36 of the *Patent Act* that they should in the specification correctly and fully describe the invention applied for and its operation and use as contemplated by the inventor and set forth clearly the various steps in the process in such full, clear, concise and exact terms as to enable any person skilled in the relevant art to use the invention. He submitted that, while the claims require that the tension on the heated yarn should be correlated to its prescribed temperature to maintain the yarn under tension adequate to preclude substantially any ductility in the cooled yarn, the only direction in the specification relating to correlation is that care must be exercised to maintain the proper correlation between heat, speed and tension, that there is no information of the relationship of these factors to one another or direction of how the correlation should be effected in order to accomplish the desired result, that the specification does not contain any statements or examples of how the factors of linear speed of the yarn, tension and temperature are to be correlated, that the mere direction to exercise care to maintain the proper correlation between them without a statement of their relationship or any specific examples of the correlation is useless to the addressee of the patent, that the failure to give the necessary information or direction or examples sets a problem for him requiring him to engage in research and experiment in order to find out how to practise the invention without knowing what trials or experiments to make or how to make them and that, consequently, the specifica-

tion is insufficient and the patent invalid. In support of his submission counsel relied, *inter alia,* on the statement of Wills J. in *Hookham v. Johnson*[1] that the patentee must not set a problem and the statement of Fletcher Moulton L. J. in *Vidal Dyes Syndicate Ld. v. Levinstein Ld.*[2] to the effect that if the patentee has left it to the public to find out by research and experiment the practical way of obtaining the result claimed by the patent he has failed to perform his duties to the public and his failure is fatal to the validity of the patent. Put briefly, the contention of counsel was that the applicants for the patents in issue should have given specific examples of the rate of speed of the yarn, the degree of twist required, the temperature of the heated zone or of the yarn, the amount of tension to which the heated yarn should be subjected and specific instructions on how the proper correlation of speed, heat and tension should be maintained in order to accomplish the desired result and that their failure to do so invalidates the patent on the ground of insufficiency in the specification.

The submission thus put forward should not be accepted. It is settled law that a patent specification is not insufficient by reason of the fact that a competent workman of ordinary skill in the art to which the invention relates may have to make trials or experiments in order to accomplish the result of the invention, if such trials or experiments are not themselves inventions and the competent workman can accomplish the desired result by following the teaching of the specification. The specification is sufficient if it enables him to put the invention into practice and sufficient directions are given to him to enable him to know what trials or experiments he may have to make and how to make them. The applicable principle was clearly laid down in *No-Fume Ld. v. Frank Pitchford & Co. Ld.*[3] In that case Lord Hanworth M. R. reviewed and followed the earlier decisions on the subject.

Lord Hanworth stated that the question whether there is insufficiency in the specification is an issue of fact. In the present case there was some conflict of evidence. Professor Speakman expressed the opinion that examples of tension, temperature and speeds of travel of the yarn were needed to make it possible to carry out the process of the

[1] (1897) 14 R.P.C. 563. [2] (1912) 29 R.P.C. 245 at 279.
[3] (1935) 52 R.P.C. 231.

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claims. But Mr. Seem said that he had enough information in the specification to enable him to obtain a commercial stretch yarn and Dr. Dudzik stated that nothing else was needed than the specification for the realization of the invention. It is significant that neither Mr. Seem nor Dr. Dudzik was cross-examined on these statements. I accept their evidence rather than the opinion of Professor Speakman.

I do so for several reasons. In the first place the defendant has been able to carry out the inventions in issue. The purpose of the inventions is clear, namely, to enable the production by the use of the continuous false twist process defined in the process claims in issue of thermoplastic yarns of the kind specified in the patents having a crimp that is uniform and permanent in the sense that it can withstand the stresses and temperatures to which it will be subjected in the course of the processes subsequent to its production to which Mr. Seem referred and the commercial uses of the articles into which it may be knitted or woven, the said yarns being not only more uniform in appearance than yarns produced by the step by step method and superior to them in quality but also producible at a lower cost of production. The evidence that the purpose of the inventions has been accomplished is conclusive. Mr. Seem demonstrated the fact in a convincing manner to the representatives of G. H. Heath & Co. Ltd., early in March of 1954 and the remarkable commercial success of the inventions since then is a strong indication that its licensees have been able to put them into practice effectively.

Moreover, any competent workman of ordinary skill in the art can do so by following the teaching of the specification just as easily and effectively as Mr. Seem could do himself. He is taught to use a temperature ranging from 40 per cent below the melting point of the yarn up to as close as possible to its melting point in order to yarn-set it. This means that the temperature in the heated zone must be high enough to heat the yarn to the "prescribed" temperature which, as already stated, means the temperature that is required in order to enable it to be yarn-set. This involves twisting the yarn, heating it to the prescribed temperature, cooling it before untwisting it and then untwisting it. This, if the proper tension in correlation to

the prescribed temperature is used, will result, as already stated, in the stabilization of the molecules of the yarn in the helical deformation into which they were reoriented by the twisting while the yarn was in its plastic state due to its heating followed by cooling it before untwisting it. This fixes the crimp in the yarn.

The claims in issue require that the tension on the heated yarn should be correlated to its prescribed temperature to maintain it under tension adequate to preclude substantially any ductility in the cooled yarn. The specification teaches the addressee of the patent that he must subject the yarn to an adequate tension in correlation to its temperature in order to accomplish the desired result and that care must be exercised to maintain the proper correlation.

He is told, in effect, that the degree of heat required for the purpose of enabling a particular yarn to be yarn-set depends on such factors as the speed of the yarn and its kind or denier. It is obvious, for example, that if the selected linear speed of the yarn is so fast that it cannot be heated to the prescribed temperature in the time it takes to pass through the heated zone the speed of the yarn must be reduced or the temperature of the heated zone increased. Similarly, the degree of heat required will be affected by the factors of the kind of yarn to be heated and its size. He is also told that the preclusion of substantially any ductility in the yarn so that the permanency of its crimp will be retained depends on the proper correlation of the tension on the heated yarn to its prescribed temperature.

It will be clear to the addressee that the invention covers a very wide range for the differences in the possible combinations of speed, heat and tension will result in corresponding differences in the resulting yarn. He knows, therefore, that in order to make a particular yarn he must make adjustments of the speed, heat and tension in order to correlate them properly. The fact that he must make trials and experiments in order to accomplish the desired result does not set a problem for him that would invalidate the claims, for the specification prescribes the limits within which the trials and experiments may be made and contains sufficient instructions on how to make them.

The range of the prescribed temperature that may be used runs from a low of 40 per cent below its melting point

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to a high of as close as possible to it, for example, 20°F. below it. This appears clearly from the specification. Mr. Seem stated, on his cross-examination, that he had produced satisfactory yarn on the defendant's Fluflon False Twisting Machine with the use of temperatures in the heated zone ranging from well up to the melting point of the yarn down to 40 per cent below it. In a test run on Exhibit Z-161, being the exemplification of the defendant's machine set up in the basement of the Court House, he had used a temperature of 465°F. in the heated zone but he said that variations of temperature could be used. He explained that if the temperature in the heated zone were reduced to 445°F. the yarn produced by its use might be satisfactory to a particular customer. Indeed, he might prefer it to a yarn produced with the use of a higher temperature for it would have a softer hand. Even if the temperature were reduced to 435°F or 400°F or even 350°F the yarn produced by the use of such a lower temperature would be satisfactory for some commercial uses. Much depended on the demand of the throwster's knitter or weaver customer. Yarns produced by the use of a temperature lower than 465°F had a softer hand but less stretch and recovery than yarn produced by the use of the higher temperature of 465°F. If the customer wanted a particular yarn the throwster would make the necessary adjustments in order to produce the kind of yarn he wanted. But Mr. Seem stated that while the use of a temperature in the heated zone as low as 350°F would enable the production of a yarn suitable for some commercial purposes he could not think of any commercial use for a yarn produced with the use of a temperature of 300°F for the temperature of such a yarn would be at least 15° below that of the heated zone and, therefore, not high enough to enable it to be yarn-set. On the other hand, according to Mr. Seem, it would not be safe to use a temperature much above 465°F. Perhaps 475°F was as high as it would be safe to go. This evidence indicates that any competent workman of ordinary skill in the art can successfully use temperatures in the range prescribed in the specification for the production of satisfactory yarns just as easily as Mr. Seem did.

The specification also sets the upper and lower limits of the tension to which the heated yarn should be subjected in correlation to its prescribed temperature in order to

accomplish the desired result of preclusion of substantially any ductility in the cooled yarn and the production of permanently crimped yarn. It teaches the addressee of the patent that if the yield value of the heated yarn is intermittent or uniformly exceeded by the tension the resultant yarn, after untwisting, will be uneven and lack uniform crimp and that the portions of the yarn where the tension exceeds the yield value of the heated yarn "will assume the appearance and other characteristics of monofilament yarn". Thus he knows the upper limit of the tension that may be used. It must not be so high as to cause the heated yarn to assume the appearance and other characteristics of monofilament yarn. If there is any indication of this being about to happen the tension must be reduced. The addressee also knows the lower limit of the permissible tension. It must be high enough to preclude substantially any ductility in the cooled yarn.

Earlier in these reasons I dealt at length with the meaning of the expression "to preclude substantially any ductility", as used in the claims in issue, and came to the conclusion that it is proper to relate the preclusion of substantially any ductility in the yarn to the retentivity of the permanency of its crimp in the sense that it will withstand the stresses and temperatures to which I have referred and retain its crimp.

The opening paragraph of the specification states that the thermoplastic yarns referred to in the patent materially respond to shrinking by becoming more ductile or plastic, so that when the addressee of the patent is instructed to correlate the tension on the heated yarn to its prescribed temperature in order to maintain it under a tension adequate "to preclude substantially any ductility in the cooled yarn" he knows that if an adequate tension in correlation to the prescribed temperature is used it will prevent the shrinkage of the yarn and result in the production of a yarn that is not ductile or plastic and he will correlate the tension on the heated yarn to its prescribed temperature accordingly. He knows that if the yarn is ductile or plastic the crimp in it will pull out but that if an adequate tension is used he will be able to produce a yarn that is not ductile or plastic and will retain its crimp. By the use of an adequate tension on the heated yarn in correlation to its prescribed temperature he will have succeeded in precluding substantially any

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ductility in the cooled yarn and producing a yarn which is permanently crimped. He will be concerned, therefore, with producing a yarn with the desired uniform and permanent crimp and to that end will maintain it under an adequate tension to keep it in its spiralled formation due to the helical deformation of the molecules to which I have referred in order to preclude substantially any ductility in it so that the permanency of its crimp may be retained.

The effect of a change in tension on the crimp in a yarn that is being processed was vividly illustrated by Mr. Holden, one of the plaintiff's workmen, when he was operating the air side of Exhibit 62 in the basement of the Court House. When he was running the yarn through the air side he examined it by "milking" it, an expression to which I shall refer later, in order to determine whether the crimp in it was satisfactory and finding that it was not good he adjusted the tension means by adding weights to it in order to increase the tension on the yarn and produced a yarn that had a better crimp in it.

Under the circumstances, it is clear that the specification, when read as a whole and fairly, teaches any competent workman of ordinary skill in the art who is willing to understand it what is necessary to the production of yarn of the superior uniformity and quality promised by the patent and how it should be accomplished. It is not necessary in a patent specification to give directions of a more minute nature than a person of ordinary skill and knowledge of the art might fairly be expected to need: *vide* Terrell and Shelley on Patents, Tenth Edition, at page 74, and the cases there cited. By following the teachings of the specification the addressee of the patent can put the invention into practice as easily and effectively as the inventors could do themselves. Consequently, he does not need any of the specific examples or directions referred to by counsel for the plaintiff. As a matter of fact, in view of the wide limits within which the invention may be operated in order to satisfy the various demands of knitter or weaver customers, the general directions in the specification give more effective information on how the result of the invention is to be accomplished than if the specific examples and directions referred to had been given. In my opinion, the specification was not insufficient.

The contention of counsel for the plaintiff that there is ambiguity in the specification falls next to be considered. The principle to be applied in determining whether a patent is invalid for ambiguity was laid down by the House of Lords in *Natural Colour Kinematograph Co. Ld. v. Bioschemes Ld.*[1] There Earl Loreburn said, at page 266:

> It is the duty of a patentee to state clearly and distinctly, either in direct words or by clear and distinct reference, the nature and limits of what he claims. If he uses language which, when fairly read, is avoidably obscure or ambiguous, the Patent is invalid, whether the defect be due to design, or to carelessness or to want of skill.

and Lord Parker said, at page 269:

> It is open to the Court to conclude that the terms of a specification are so ambiguous that its proper construction must always remain a matter of doubt, and in such a case, even if the Specification had been prepared in perfect good faith, the duty of the Court would be to declare the Patent void. Once again, though the Court may consider that the meaning of the Specification is reasonably clear, yet if the Specification contain statements calculated to mislead the persons to whom it is addressed, and render it difficult for them without trial and experiment to comprehend in what manner the patentee intends his invention to be performed, these statements may avoid the Patent.

Counsel for the plaintiff submitted that since the temperature of the yarn cannot be determined the addressee is left in doubt as to its "prescribed temperature" and that the expression is ambiguous. I have already dealt with this submission and dismissed it as being without merit and my reasons for doing so are set out earlier in these reasons. While the use of the word "prescribed" is inept its meaning is clear to any addressee of the patent who is willing to understand it, namely, that the "prescribed" temperature of the yarn means, to put it simply, the temperature required to enable it to be yarn-set, that is to say, a temperature ranging from 40 per cent below the melting point of the yarn up to as close as possible to its melting point, for example, 20°F below it. If a yarn is heated to a temperature within this range it has the "prescribed" temperature contemplated by the claims in issue and the fact that its precise temperature may not be known is of no importance. The expression "prescribed temperature" is not ambiguous.

In support of his contention that there was ambiguity in the specification counsel relied on the statement of

[1] (1915) 32 R.P C 256.

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Professor Speakman that he found certain passages in it difficult to understand. He referred to the statement that "The degree and permanency of the crimp, wave or fluff is attained by maintaining the treating temperature well up to the melting or equivalent point of the thermoplastic, i.e., not less than forty per cent below the melting or equivalent point" and the statement that as the yarn passes down through the heater "it is uniformly heated to a temperature within twenty degrees of the melting point of the thermoplastic" and expressed the opinion that there was a contradiction in the two statements and ambiguity in the expression "not less than forty per cent below", which implied, as he put it, that it must be "more than forty per cent below". I was not favorably impressed with Professor Speakman's statement and opinion on this matter. It seemed to me at the time that it was the statement and opinion of a person not willing to understand and I expressed my reaction accordingly. It would be clear to any person, let alone a competent workman of ordinary skill in the relevant art, that the expression "not less than forty per cent below" does not mean "more than forty per cent below". The word "less" is inept but it is clear that the temperature to be used must not be "lower" than forty per cent below the melting point of the yarn. Moreover, there is no contradiction between the two statements. The first teaches the use of a temperature "not less than forty per cent below" the melting point of the yarn and the second gives, for the purposes of illustration, an example of a multifilament yarn being uniformly heated to a temperature within twenty degrees of the melting point. Thus a range of temperature from forty per cent below the melting point of the yarn up to close to its melting point, namely, 20°F below it, is clearly indicated. And there is no merit in the submission that it is not clear whether the "treating temperature" referred to in the first statement is that of the heated zone or that of the yarn and that the expression is, therefore, ambiguous. In my opinion, it does not matter which it is, for it is clear that the temperature of the yarn must be "not less than forty per cent below the melting point".

Professor Speakman also said that he found a contradiction between the statement in the specification, "Care must, of course, be exercised to maintain the proper correlation between heat, speed and tension, for if the yield value of

the heated yarn being processed is intermittent or uniformly exceeded by tensile stress the resultant yarn, after untwisting, will be uneven and lack uniform crimp, wave or fluff and the degree of the crimp, wave or fluff will be relative to the degree to which the tension exceeds the yield value", on the one hand, and the statement in Claim 8 calling for "correlating the tension in said yarn to said prescribed temperature and linear speed of travel of the yarn to maintain the yarn at a uniform tension substantially in excess of the contractile force of the yarn resulting from heating and twisting the same" on the other. There is no contradiction between the two statements. They refer to related situations. The first is concerned with the undesirable result of applying tension to a yarn while it is being heated that is in excess of its yield value and the care to be exercised to avoid such a result, whereas the second contemplates the use of a tension substantially in excess of the contractile force of the yarn resulting from heating and twisting it. The statements are not inconsistent with one another, for it is clear that a tension substantially in excess of the contractile force of the yarn may be applied to it while it is being heated without such tension being in excess of its yield value. On his cross-examination, Mr. Seem established this fact. He stated that any substantial change in tension would result in a change in the yarn but a customer might prefer a yarn produced with a lower tension than one produced with a higher one. Both Dr. Finlayson and Professor Speakman gave the meaning of the term "contractile force" as it appears in the claims in issue. Put simply, the contractile force of the yarn is the amount of force that must be applied to the ends of the filament in it to prevent them from contracting as they would do if the force were not applied. Mr. Seem explained that the contractile force of a yarn is measured in terms of grams per denier, that if a tension greater than its contractile force is applied to it while it is being heated it will be stretched, that if the tension is less it will be shrunk and that if it is equal it will be neither stretched nor shrunk. Any prospective operator of the invention would, therefore, be able to tell from the result whether the tension that he had applied to the yarn while it was being heated was greater than, less than or equal to its contractile force and make such adjustments of tension as might be necessary to satisfy his cus-

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tomer's demand. Mr. Seem stated that he had produced yarns that were not ductile by using tensions equal to the contractile force of the yarn, less than such force and greater than it. He gave evidence of a particular case where it was necessary, in order to produce a yarn with preclusion of substantially any ductility in it, to use a tension that was in excess of the contractile force of the yarn by reason of the fact that if a lower tension had been used the crimp would have pulled out. Mr. Seem thus proved that it is possible to produce a satisfactory continuous false twist process yarn by the use of a tension in excess of the contractile force of the yarn but is not in excess of its yield value. Mr. Seem also gave an example of the production of a nonductile yarn by the use of a tension less than the contractile force of the yarn. Any workman of ordinary skill in the art could do what Mr. Seem had done. There was thus no support for Professor Speakman's opinion that the statements referred to are contradictory.

Counsel for the plaintiff also submitted that the directions in the specification relating to the correlation of the tension on the heated yarn to its prescribed temperature are contradictory of one another and that this results in ambiguity. He referred to the statement that "the portions of the yarn where the tensile strength exceeds the yield value of the heated yarn will assume the appearance and other characteristics of monofilament yarn" and the later statement that "in the case of yarns having thermal characteristics such as Dacron for example, which exhibits substantial ductility when heated, the yarn is processed under sufficiently high tension during heating to preclude substantially any ductility in the yarn when cooled" and contended that the yield value referred to in the earlier statement is the stress applied to the yarn where it reaches the yield point and that the yield point is the point beyond which the yarn begins to be drawn out. In effect, his submission was that in order to preclude substantially any ductility in the yarn it is necessary to draw it out or stretch it beyond its yield point and that if a tension is used that will have such a result it will be a tension in excess of the yield value of the yarn and result in the yarn having the appearance of a monofilament yarn. Consequently, according to his submission, it is impossible to reconcile the teachings with one another, namely, on the one hand, that a

tension must not be used that will exceed the yield value of the yarn so that it will go beyond its yield point and, on the other, that in order to produce a yarn with preclusion of substantially any ductility in it it is necessary to use a tension that will result in a yarn being drawn out or stretched beyond its yield point and, therefore, a tension in excess of the yield value of the yarn.

There is a clear answer to this submission. It was based on the erroneous assumption that "yield value" and "yield point" are the same. They are not. The statement in the specification that "the portions of the yarn where the tensile strength exceeds the yield value of the heated yarn will assume the appearance and other characteristics of monofilament yarn" contains as implied definition of the yield value of the heated yarn, namely, that it is the state of the heated yarn beyond which, if too great a tension is applied, it will assume the appearance of monofilament yarn. The specification does not mention the term "yield point" but it was defined as the point in a cooled yarn beyond which there is still some non-recoverable extension or ductility. "Yield value", according to the specification, has reference to the tension on a heated yarn, whereas "yield point", according to the evidence, relates to a cooled yarn that is being tested for residual ductility. "Yield value" and "yield point" cannot be equated. The attempt to equate them was responsible for the submitted contradiction in the directions. They were not contradictory of one another. The attack on the patents based on alleged ambiguity in the specification fails.

Counsel for the plaintiff also contended that the claims in issue were invalid by reason of being indefinite and flexible. He referred to the requirement of section 36(2) of the *Patent Act* that the specification shall end with a claim or claims stating distinctly and in explicit terms the things that the applicant regards as new and in which he claims an exclusive property or privilege and submitted that the claims in issue do not meet this requirement. In support of his submission he relied on the statement of Lord Russell of Killowen in *Electric and Musical Industries, Ld. et al. v. Lissen, Ld. et al.*[1]

> The function of the claims is to define clearly and with precision the monopoly claimed, so that others may know the exact boundaries of the area within which they will be trespassers.

[1] (1939) 56 R.P.C 23 at 39.

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and my statement in *Mineral Separation North American Corporation v. Noranda Mines Limited*[1]:

> By his claims the inventor puts fences around the fields of his monopoly and warns the public against trespassing on his property. His fences must be clearly placed to give the necessary warning and he must not fence in any property that is not his own. The terms of the claims must be free from avoidable ambiguity or obscurity and must not be flexible; they must be clear and precise so that the public will be able to know not only where it must not trespass, but also where it may safely go. If a claim does not satisfy these requirements it cannot stand.

A claim must be stated with such precision as to leave no doubt of the scope of the monopoly defined in it, so that an addressee of the patent will, on a fair reading of the claim, be able to determine whether what he proposes to do will infringe it or not.

Counsel contended that the process claims are vague and indefinite. He also submitted that Claim 3 of patent No. 552,105 is invalid for indefiniteness on the ground that no information is given on how the regulating means referred to in it are to be adjusted so as to correlate the tension on the yarn to its prescribed temperature and its linear speed in order to maintain it at a selected uniform tension relative to the contractile force of the yarn, that the expression "contractile force" is not defined, that the addressee is not told what the prescribed temperature of the yarn is or what its linear speed of travel is. The claims in issue are said to be indefinite for several reasons, namely, that there is no definition of the selected linear speed of the yarn and no direction as to the speed to be employed, that there is no definition of the prescribed temperature of the yarn and the workman is not told what temperature is required to yarn-set it, that there are no directions on how the tension in the heated yarn is to be correlated to its prescribed temperature and linear speed in order to produce the result referred to, that there is no definition of the tension that may be adequate and that the result itself is undefined so that a competent workman will not know whether he has produced it or not.

In support of his submission that the claims in issue are invalid for failure to define the invention counsel relied on the statement of mine in *New Process Screw Corporation v. Robertson Mfg. Co.*[2]

[1] [1947] Ex. C.R. 306 at 352. [2] (1962) 22 Fox Pat. C. 71 at 83.

In claims 2, 4 and 5 the reference was to "a pitch angle varying from substantially 12° to substantially 22°" without specifying the size of the screws for the production of which they were intended. Such a specification, without giving the diameters of the blanks to be rolled, is meaningless and the claims are invalid for failure to define the invention contemplated by the inventor.

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I must confess, after further consideration of this statement, that the reason which I assigned for finding claims 2, 4 and 5 invalid, namely, in effect, that they were invalid for failure to define the invention contemplated by the inventor because of the failure to give the diameters of the blanks to be rolled was erroneous. Even if the diameters had been given the claims would have been invalid but not for the reason I gave. I should have found them invalid for lack of utility as I did in the case of claims 1 and 3. Under the circumstances, the statement should not be regarded as proper finding of the invalidity of a claim for failure to define the invention contemplated by the inventor.

The complaints made against the claims for indefiniteness and flexibility are similar to those made against the specification for insufficiency and ambiguity and the answers to them are similar. It is established, of course, as Evershed M.R. said in *Martin and Biro Swan Ld. v. H. Millwood Ld.*[1]:

> A reader must not be left in any doubt whether any given apparatus, method or process, falls within the claim or not.

but, in my opinion, any workman of ordinary skill in the art would know, without any doubt on his part, whether his proposed action would infringe the claims or not.

It is not necessary, for example, to specify any rate of linear speed of the yarn for such rate depends on the capability of the apparatus and any rate within such capability may be used. Moreover, the addressee of the patent knows that the "prescribed temperature" referred to in the claims is that which is required to enable the yarn to be yarn-set and the specification tells him that any temperature between 40 per cent below the melting point of the yarn and 20°F below it will be sufficient. He also knows that the tension which he is to apply to the heated yarn so that he may correlate it to the prescribed temperature to obtain the desired result of preclusion of substantially any ductility in the yarn so that the crimp in it will not pull out must not

[1] (1954) 71 R.P.C. 453 at 460.

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be so high as to result in the yarn assuming the appearance of a monofilament yarn and yet be high enough to prevent the yarn from being ductile or plastic so that the crimp in it will pull out. He will be able to ascertain this just as easily as Mr. Seem did or, for that matter, as Mr. Holden did, by watching the yarn as Mr. Holden did to see whether the crimp in it is satisfactory and increasing the tension if it is not. He will also be able to determine the relationship between the tension he uses and the contractile force of the yarn by observing whether it is being stretched or shrunk or neither stretched or shrunk and make whatever adjustments may be desirable.

As I have already found, any competent workman of ordinary skill in the art would, by following the teachings of the specification, be able to put the invention defined in the claims in issue into practice as easily and effectively as the inventors could do themselves. Similarly, any addressee of the patents would know, without doubt, that if what he proposes to do is tantamount to following the teachings of the specification he will produce a uniform and permanently crimped yarn and his action will be within the scope of the monopoly defined in the claims and constitute an infringement by him.

It was submitted by counsel for the plaintiff that the evidence indicated that yarn-setting and preclusion of substantially any ductility in the cooled yarn can be determined only by making the yarn into a fabric and subjecting it to commercial use and that there is infringement only if the yarn is a commercial one and that the addressee of the patent should not have to run the risk of committing an act of infringement in order to be able to tell whether he will infringe the claims or not.

The submission is not well founded. I have carefully reviewed the evidence to which counsel referred and find that it is not necessary to the production of a yarn that is yarn-set and has substantially any ductility precluded from it to make it into a fabric and subject it to commercial use. If any person does what the specification teaches he will, of necessity, produce a yarn that is a commercially useful one and he will have infringed the claims if his act was done without the consent of the owner of the patents. When Mr. Seem's evidence on this point is read as a whole it is clear that he was describing the course that a throwster would

follow in order to ensure the production of a particular kind of yarn. As I have stated, the range of the inventions in issue is very wide and there are many variations in the kind of yarn that may be produced by their use. A knitter or weaver customer of the throwster might desire a yarn with a particular amount of twist in it or a particular amount of stretch or a yarn with a particular softness of touch or the throwster himself might wish to have a particular kind of yarn for his own needs. It is under such circumstances and in order to meet the particular wishes of his customer on his own particular needs that the throwster will subject a sample of yarn to the processes and commercial use referred to and make such adjustments of temperature and tension and correlation of tension to temperature as may be required to satisfy his customer and his own needs before he embarks on a full scale commercial run. Having made such adjustments he will know exactly what degree of temperature he should use and what tension he should apply to the heated yarn in correlation to its required temperature and will be able to produce a yarn that is exactly in conformity with the particular requirements of his customers or his own particular needs. But this does not affect the fact that the addressee of the patents knows, without doubt, that if he does what the specification teaches he will produce a yarn that is uniform and permanently crimped and that his act in doing so will bring him within the terms of the claims. The fact that they cover a wide range of invention, as they clearly do, does not invalidate them if, as I find, the limits of the claims are clearly defined and they are not indefinite or flexible.

The remaining attacks on the validity of the patents in issue may be dealt with briefly. The complaint that they fail for inoperability of the invention defined in the claims in issue by reason of the fact that there is no means available for determining the temperature to which a running yarn has been heated has been sufficiently answered. It is, as already stated, not necessary to the accomplishment of the result of the invention that the precise temperature of the yarn should be ascertained or be ascertainable, so long as its temperature is high enough to enable it to be yarn-set. The temperature to be used will depend on a variety of factors including the linear speed of the yarn, the kind of

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yarn and its size or denier, but a wide range of temperatures is available for use in order to ensure the desired result.

And there is no merit in the submission that the apparatus defined in Claim 3 of patent No. 552,105 is inoperable by reason of the alleged fact that if the temperature sensitive resistor (sensing means), to which reference has been made earlier, is inserted in one of the heaters of a group of machines and the yarn that passes through it breaks the temperature will rise not only in the said heater but also in the other heaters of the group. It makes no difference, as Mr. Seem said, from a functional point of view whether the sensing means is inserted in one of the machines in a group of machines or is mounted on a central position relative to all of them. Moreover, the claim is not limited to an apparatus having the sensing means inserted in the heater. And, in any event, even if a break in the yarn should occur with the result alleged this could not affect the validity of the claim for the interruption in processing until normal operation is restored would be of only very brief duration.

Nor is there any substance in the suggestion that the patents in issue are inoperative on the ground that vinyon, orlon, velon, dacron and saran yarns could not stand the tests of boiling such as those set out in Exhibit Z-215 to which cellulose acetate yarn was subjected. There is no evidence that these yarns are dyed at the boil as in the case of cellulose acetate yarn. Mr. Seem stated that it was possible to yarn-set all the yarns referred to and that he had been able to obtain a yarn-set in all of them by the use of temperatures within of the range of from 40 per cent below the melting point of the yarn up to as close to it as possible. I accept this evidence. And there is no evidence that such yarns could not stand the processing conditions and commercial use to which they would normally be subject and retain their crimp.

Finally, the submission that there was an independent development of the inventions defined in the claims in issue and that this indicated that they were obvious should be summarily dismissed. There was no evidence of any independent development of the apparatus invention or the process invention at the respective dates of invention that

I have found. Mr. Seem said that he first saw a one or two-spindle experimental unit at the premises of the defendant the day after the inventions in issue were sold to the defendant on December 14, 1954. He was unable to give any description of it other than to say that it was a device for the continuous false twisting of a running thermoplastic yarn. He had heard about it about a month earlier. But Dr. Dudzik was able to give additional particulars about the machine. He said that it had a roller above the yarn supply in order to forward the yarn to the heater and that the roller rested in a U-shaped water trough below the heater in order to wet the yarn before it entered the heater. The trough was used because it was thought at the time that the use of wet heat was necessary for the production of the yarn. Later, it was learned from Mr. Seem, early in 1955, that the use of dry heat was sufficient and the machine was no longer supplied with a trough. Even if the purpose of the machine was similar to that of the invention in suit there is no evidence of when it was devised and the use of the water trough showed a substantial difference from the defendant's device. Moreover, the fact that the throwsters took out licenses for the use of the invention in issue indicates that an independent development of the inventions had not taken place. I find on the facts that there was no independent development of them.

The evidence establishes that the use of the inventions in issue has made it possible to produce thermoplastic yarns of the kind specified in the patents that were more uniform than yarns produced by the step by step process and superior to them in quality and that such production was possible at greatly reduced cost. The inventors have thereby made a substantial and valuable contribution to the throwing art and the textile industry generally. In my opinion, when a meritorious invention, such as that defined in the claims in issue, has been made its owner's rights in respect of it should be protected unless it has been clearly shown that the patent granting the monopoly is invalid. Consequently, in dealing with the attacks on the validity of the patents in issue, all of which have failed, I have applied the principle laid down by Lord Evershed M. R. in the

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recent case of *Rosedale Associated Manufacturers Ld. v. Carlton Tyre Saving Corp. Ld.*[1] where he said:

> When it is established that an invention in the true sense has been made, the Court will not be astute in construing the claims to deprive the inventor of the protection that his invention merits.

In making this statement he applied the principle expounded by Lord Normand in the case of *Cleveland Graphite Bronze Corp. et al. v. Glacier Metal Corp. Ld.*[2] who referred to the case of *British Thomson-Houston Company Ld. v. Corona Lamp Works Ld.*[3] which I cited earlier in these reasons, and said:

> It is important that the principle established in the *Corona* case should not be whittled down by refinements and exceptions that would impair the protection due to an inventor who has made an honest and careful disclosure of the invention and given as clear a definition of the monopoly claimed as the subject admits of.

Lord Normand's statement is applicable in the present case, notwithstanding the fact that there are instances in the patents in issue of inept expressions and the misuse of words, none of which would mislead any addressee of the patents who would read them fairly with a willingness to understand them. An inventor's rights are not to be measured by his capacity for precision of speech if he has fairly complied with the requirements of the law, as the inventors in the present case have done.

Since all the attacks on the validity of the patents in issue have failed, I find that as between the parties all the claims in issue are valid from which it follows that the plaintiff's action, so far as it seeks to impeach the patents in issue, must be dismissed.

There remains for consideration the issue of infringement. The plaintiff seeks a declaration that it has not infringed the defendant's rights under the patents in issue and the defendant counterclaims for infringement of them.

Counsel for the plaintiff contended that there was no evidence that the plaintiff manufactured, used or sold in Canada any machines that fall within the scope of Claim 3 of patent No. 552,105 and that since it has not itself operated any such machines in Canada it has not infringed any of the process claims in issue of patent No. 552,104 and

[1] [1960] R.P.C. 59 at 68.
[2] (1950) 67 R.P.C. 149 at 154.
[3] (1922) 39 R.P.C. 49.

he submitted, accordingly, that the defendant's counterclaim must fail.

The facts do not support the contention. It is admitted in the statement of claim that the plaintiff manufactures and sells textile machinery and has sold such machinery in England and Canada and elsewhere throughout the world. One of the textile processing machines manufactured and sold by it is a crimp twisting machine known as the "Crimp-Spin" machine. This is of the types known as CS1, CS2 and CS3. The CS3 machine was brought out by the plaintiff in England in August of 1957 and, pursuant to a sales contract, dated December 2, 1957, and filed as Exhibit Z-139, the plaintiff sold two CS3 machines to Galtex Company Limited at Galt in Ontario. Counsel for the plaintiff contended that the sale was made in England but it is clear from Mr. Dufort's evidence that the plaintiff delivered the machines to Galtex Company Limited at its premises at Galt. Mr. Dufort explained the procedure followed by the plaintiff when it makes a sale to a customer in Canada such as Galtex Company Limited. The machine is erected in England with the necessary shafting, main gearing, motors and belts for a run without yarn, then dismantled and shipped to Canada and re-erected on the customer's premises by an erector sent by the plaintiff to the customer's plant for the purpose of putting the machine together and staying until it is started to the customer's satisfaction. Delivery of the machine to the customer takes place two weeks after the boxes containing the dismantled machine arrive at the customer's premises. It is clear that the plaintiff's two CS3 machines were delivered to Galtex Company Limited some time after December 2, 1957, and Mr. Dufort stated that he believed that one of the plaintiff's erectors went to the Galtex Company Limited plant and erected the machines there. According to the sale contract the charges for the erection of the machine were not included in the sale price.

It was also finally proved, after strenuous opposition on the part of the plaintiff, that the plaintiff subsequently gave Galtex Company Limited instruction on how to run the CS3 machines which the plaintiff had sold to it, the instructions being contained in a document headed "Some Observations On Running CS3 Machine" which was handed

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to Mr. Tomlin by Mr. S. Pimlott, a service engineer in the plaintiff's employ. Mr. Tomlin stated that the document was given to him "to assist us in the running of the Scragg machines" and that it had been used for that purpose. Mr. Pimlott took the document away with him after three photostat copies of it had been made, one of which was filed as Exhibit Z-138. Mr. Dufort, after having made enquiries in England about the document, explained that it had been written by Mr. Pimlott during his visit in Canada at the request of Mr. N. Kent of Crowther Limited, the plaintiff's sales representative in Canada. Two Canadian customers other than Galtex Company Limited also received copies of it. The plaintiff must assume responsibility for the document and Mr. Pimlott's purpose.

The contention of counsel is inconsistent with his statement in opening that the plaintiff is responsible for certain machines now operating in Canada and the method of their use and with the statement in paragraph 8 of the statement of claim which reads as follows:

> 8. The plaintiff manufactures and sells a textile processing machine known as the "CrimpSpin" machine. The plaintiff instructs its customers in the operation of the said machine in the processing of textile yarns. The plaintiff has reasonable cause to believe that the said machinery might be alleged by the defendant to constitute an infringement of Canadian Letters Patent No. 552,105. The plaintiff has further reason to believe that the use of the said "CrimpSpin" machine in the practice of the processing of textile yarns carried on by purchasers of the said machine in accordance with the instructions of the plaintiff might be alleged by the defendant to constitute an infringement of Canadian Letters Patent Nos. 552,103 and 552,104.

This statement together with the prayer for a declaration that the said machine and its use does not constitute an infringement of the plaintiff's rights under the patents in issue is an implied admission that the plaintiff has sold its "CrimpSpin" machine in Canada and used its process in Canada. If it were otherwise, there would be no basis for considering whether the declaration should be made or not.

There was also an agreement between the parties for the purpose of the trial of the action, filed as Exhibit 49. Seven exhibits were attached to it and filed respectively as Exhibits 49A to 49F. A brief description of them is given. Exhibit 49A is a photograph of the CS3 machine similar to the machines sold by it to Galtex Company Limited and Exhibit 49B is a diagrammatic side view of it. Exhibit 49C is an instruction brochure describing the Fielden System which

was employed by the plaintiff in its CS3 machines. A copy of this brochure was furnished by the plaintiff to Galtex Company Limited when it sold the two CS3 machines to it. Exhibit 49D is a pamphlet prepared and distributed by the plaintiff relating to its CS1 machine, an earlier type of its "CrimpSpin" machine, Exhibit 49E is a copy of an article in a publication called "The Textile Industry" relating to the plaintiff's "CrimpSpin" machine, Exhibit 49F is a pamphlet prepared and distributed by the plaintiff relating to its CS3 machine and Exhibit 49G is a copy of an article by Mr. Philip Scragg published in "Man-made Textiles" relating to the plaintiff's "CrimpSpin" machines.

It was stated in the agreement that type 66 nylon, 70 denier, 34 filament and terylene 75 denier multifilament yarns were processed as described in Exhibit 49C on "CrimpSpin" machines sold by the plaintiff to its customers in Canada prior to the institution of the action and after issuance of the defendant's patents. And the parties agreed that the issue which arises in the action should be tried with reference to the plaintiff's CS3 model and that the judgment rendered on this basis should be applicable and binding with respect to the plaintiff's CrimpSpin and FalSpin machines.

Under the circumstances, it is clear that if the CS3 machines which the plaintiff sold to Galtex Company Limited and the process used in their operation are respectively within the ambit of the invention defined in the claims in issue the plaintiff cannot escape from the charge of infringement laid against it in the defendant's counterclaim and it is not entitled to the declaration of non-infringement sought by it.

In dealing with the issue of infringement it will be convenient, notwithstanding the fact that Galtex Company Limited is the owner of the CS3 machines which the plaintiff sold to it and the operator of the process for which they were used, to refer to the premises of the Company simply as Galtex and to the two CS3 machines as the CS3 machines at Galtex and to the process used in their operation as the plaintiff's process.

I shall deal first with the question whether the plaintiff's process is within the ambit of the invention defined in the process claims in issue. The determination of this question requires consideration of the evidence describing the process.

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The course of the yarn through the CS3 machine was illustrated by schematic drawings, including a long line drawing of the machine, filed as Exhibit 48, and a diagrammatic side view of it, filed as Exhibit O, shown also in Exhibit 49B. These drawings carry numbers showing the parts through or over which the yarn passes. Counsel for the defendant also filed as exhibit Z-6 a model or mockup of a single unit of the CS3 machine. This carried tags corresponding to the numbers on Exhibit 48. It was established that Exhibit Z-6 was made from actual parts of a CS3 machine. Mr. Tomlin said that when Mr. Seem and Mr. Stoddard came to Galtex early in 1960 he gave them a complete spindle of one of the CS3 machines at Galtex with heater and feed rolls, meaning thereby a complete single unit of the machine. Exhibit Z-6 was made by Dr. Dudzik and Mr. Seem from the parts thus obtained together with some schematic additions. Counsel for the plaintiff also filed as Exhibit 95 a schematic model of the operating parts of the CS3 machine employing actual parts of it.

Evidence describing the course of the yarn through the machine was given by Professor Speakman and by Mr. Dufort. I summarize their evidence, using the numbers shown on Exhibit 48 to indicate the parts referred to. Exhibit 48 and Exhibit Z-6 show the paths of two yarns processed together. At the bottom of the machine there is a creel with two pegs each carrying a bobbin or supply package of yarn (1). Yarn is led from the top of each bobbin through a tension device (2) above it and the two yarns are then led together through a pigtail guide (3) to a separator (4*a*) which spaces them apart. The yarns are then led side by side around the upper input roller (4) of the machine and between it and the lower input roller (5) to and around the separator (4*a*) again. The two yarns pass through a guide (6) below the heater (8) and through the heater. They each leave the heater by a guide (9) and pass through the cooling zone (10) between the heater and the false twist spindle (11). Each yarn passes through a false twist spindle and is wrapped around a twist trapper immediately above it. Only one false spindle and twist trapper are shown on Exhibits 48, 49C and 0, but there are two false spindles and twist trappers on the machine, as shown by Exhibit Z-6. The two spindles are driven in opposite directions by a driving belt (12) shown schematically on Exhibit Z-6. After

the yarns have passed through their respective false twist spindles and been wrapped around their twist trappers they come together and go through a pigtail guide (9*a*) to and around a separator (13*a*), then around the upper output roller (13) and between it and the lower output roller (13*b*) and back to and around the separator (13*a*) again. The two yarns then separate and proceed to the wind up means and their respective take up packages (14), one yarn to the upper package and the other to the lower one. Two sets of wind-up means and take-up packages are indicated on Exhibit 48 but there was only one set on Exhibit Z-6. I should add that the lower input and output rollers drive the upper input and output ones.

I should also refer to Mr. Dufort's evidence relating to the adjustments that are available to purchasers of the CS3 machines. These enable variations to be made in the speed of the yarn through the machines, the tension on the yarn and its temperature. The machine is driven by an electric motor fitted with a driving belt, shown as (12) on Exhibit Z-6, that runs around the machine. Customers are supplied with pulleys that enable them to increase the speed of the spindles and, consequently, the speed of the yarn. For example, one pulley would give a spindle speed of 40,000 revolutions per minute, whereas a larger one would give a spindle speed of 60,000 revolutions per minute, without any change in the speed of the motor. Customers are also given a train of gears, called a twist-gearing, with means for adjusting the speed of the output rollers relative to the speed of the spindles so that desired variations of twist may be made. Then between the output rollers and the input rollers there is another train of gears which will enable the customer to operate the machine with a zero or a two per cent or a three per cent overfeed. This makes possible a variation in the relative speeds of the input and output rollers with resulting variations in the tension on the yarn. If the gears give a zero overfeed the speed of the input roller is the same as that of the output roller, but if the gears result in a two per cent or three per cent overfeed this means that the speed of the input roller is two or three per cent greater than that of the output roller or, in other words, that the input roller feeds the yarn two or three per cent faster than the output roller operates to take it up. A variation in the overfeed results in a variation in the tension on

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the yarn. If a zero overfeed is used the yarn is not allowed to shrink and there is no change in the tension on it. But if a two or three per cent overfeed is used the yarn is allowed to shrink which means that the tension on it is reduced. On the other hand, if an underfeed should be used, as is possible, the tension on the yarn will be increased. As Dr. Dudzik put it, the tension on the yarn produced by the use of the plaintiff's process at Galtex was determined by the relative speeds of the input and output rollers. There must be heat in order to shrink the yarn but variation in the tension on it resulted from variation in the relative speeds of the rollers. If the speed of the input roller was increased by the use of an overfeed the tension on the yarn was reduced because it was allowed to shrink, but if it was decreased by the use of an underfeed the tension on the yarn was increased because it was not allowed to shrink. Thus, as Dr. Dudzik found, there were means in the CS3 machines at Galtex to change the speed of the input rollers, the speed of the output rollers, the relative speeds of the rollers and the speed of the false twist spindle with its resultant linear speed of the yarn. Further facts relating to the plaintiff's process will be referred to later as consideration is given to the question whether the requirements of the process claims in issue are comprised in it. I shall also deal later with the temperature control system employed by the plaintiff in its CS3 machines.

I now come specifically to the question whether the plaintiff's process is within the ambit of the invention defined in the process claims in issue. This requires consideration of the elements of the claims and whether the requirements of the process defined in them were comprised in the process used by Galtex Company Limited in the operation of the CS3 machines at Galtex.

The determination of the question requires an analysis of the process claims in issue. I shall deal first with Claim 1. Its preamble, which is common to all the process claims in issue, reads as follows:

> A method of producing evenly and permanently crimped, wavy or fluffed multi-filament thermoplastic yarn having improved and uniform physical characteristics which comprises, . . .

Counsel for the plaintiff submitted that the word "permanent" must be read in its plain and ordinary meaning and

that the expression "permanently crimped yarn" must mean yarn in which the crimp is set as close to the ultimate set as possible at such a temperature that it cannot be altered or removed without destroying the yarn. He contended that the set imparted to a Scragg CS3 crimped yarn can be partially or wholly removed by subjecting the yarn to more severe conditions than the setting conditions, that the yarn is, therefore, not "permanently crimped" and that, consequently, the plaintiff has not infringed any of the claims in issue. The contention is summarily dismissed. No addressee of the patent who reads the specification as a whole and fairly with a mind willing to understand it could reasonably think that the expression "permanently crimped yarn" is used in the absolute sense submitted by counsel. He would know that the word "permanently" is intended to be used in a relative sense and that what is meant by the expression "permanently crimped yarn" is yarn that will withstand the stresses and temperatures to which it will be subjected in the ordinary course of processing and commercial use and still retain its crimp. It is established that it was intended by the plaintiff, as indicated by Exhibit Z-138, that the CS3 machines should be used for the production of three types of thermoplastic yarns, namely, nylon 6, nylon 66 and terylene, and Exhibit Z-138 gave instructions for the production of such yarns. Mr. Tomlin said that stretch yarn for use in half hose and leotards was produced on the CS3 machines at Galtex and sold in the open market. Mr. Seem produced a sample of 70 denier, 30 filament, type 66, nylon yarn which he had seen being processed on one of the machines when he visited the premises on November 2, 1961, and which he had taken off the machine itself. This was filed as Exhibit Z-143. It had been produced at a heater temperature of 464°F and with an overfeed of three per cent. Mr. Seem milked the yarn and showed that it was uniformly crimped. In his opinion, it was a stretch yarn, meaning thereby a crimped yarn with stretch and recovery. Subsequently, Dr. Dudzik made tests of the yarn and expressed the opinion that yarns produced on the CS3 machines at Galtex were comparable to yarns produced on the defendant's Fluflon machine. Further reference to these tests will be made later. Mr. Scragg stated that it is the act of yarn setting that produces a permanently crimped yarn. He took the term

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"permanently crimped" as meaning that when the yarn is stretched, as it is during use and subsequent manufacture, the crimp does not pull out and it was his opinion that the CS3 machine produces "as equally permanently crimped a yarn" as the defendant's machine does. Moreover, Exhibit 49D contains the statement that the heat-setting and twisting zones in the plaintiff's CS1 machine are controlled so that variation either in the crimp or in the dyeing properties of the yarn produced by it is almost impossible. There is no reason why the statement should not also be applicable to the CS3 machines at Galtex. And Exhibit 49F tells users of the CS3 machines that they can be assured of yarn production under the most controlled conditions and that the hazards of yarn variation are virtually eliminated. In my opinion, the evidence establishes that the plaintiff's process is a method of producing evenly and permanently crimped, wavy or fluffed multi-filament thermoplastic yarn having improved and uniform physical characteristics within the meaning of the preamble to the process claims in issue and I so find.

I now come to the several requirements comprised in the claim. The first of these is "continually drawing the yarn from a source of supply". In the plaintiff's process the yarn is drawn from a supply bobbin or supply bobbins, shown as (1) on Exhibit 48. The fact that the yarn is so drawn was proved by Mr. Dufort and by Mr. Seem.

The next requirement, namely, "continually twisting the yarn drawn from said supply" was also comprised in the plaintiff's process. This was done by the false twist spindle, shown on Exhibit 48 and on Exhibit Z-6. The function of the false twist spindle and its operation were described by Mr. Dufort and Mr. Seem.

There was controversy between the parties regarding the next requirement, stated as follows:

> continually passing the yarn at a selected linear speed under uniform tension through a restricted thermally isolated and uniformly heated zone to uniformly heat the yarn to a prescribed temperature to re-orient the molecules of the yarn to the twisted formation of the yarn and yarn-set the same.

This appears in all the process claims in issue.

Counsel for the plaintiff submitted that there is no heated zone in the plaintiff's CS3 machine and that, consequently,

the plaintiff has not infringed any of the claims in issue. His argument was involved. It was stated that in the case of the patented process the yarn passes through a tube, that the air in the tube is electrically heated and that, consequently, the yarn passes through a heated zone, whereas, in the plaintiff's process, the yarn is heated by passing it in direct contact with the metal strip of the heater. It was contended that, under the circumstances, it cannot be said that the yarn passes through a heated zone. The evidence is against the argument. Professor Speakman, in describing the path of the yarn through the plaintiff's machine, referred to a guide, shown as 6 on Exhibit 48, and stated that the yarn passes through the guide into the electrically heated zone, shown as 8 on the exhibit referred to. Moreover, Exhibit 49F states that the plaintiff has radically redesigned its heaters and that "each now takes two yarns, the twin yarn paths being heated by a common electric element". Exhibit Z-139 describes the plaintiff's heater units as standard equipment 12″ long and incorporating twin heat setting zones. Counsel submitted that there was a difference between the "heated zone" referred to in the claims and the "heating zone" in the plaintiff's CS3 machine, namely, that a heating zone is merely a location in which heating of the yarn takes place, whereas a heated zone is a zone which actually heats the yarn. Counsel's argument on this point is untenable. The fact that the yarn is heated by contact with the metal strip of the heater as it passes through the heater does not detract from the fact that there is a heated zone in the plaintiff's CS3 machine, namely, the space contained in the heater, and that the yarn passes through it.

And it is clear that it does so "at a selected linear speed". Mr. Seem testified that the CS3 machines at Galtex operated at a selected linear speed of the yarn and his evidence to that effect was confirmed by Mr. Tomlin and Dr. Dudzik.

It was strenuously argued by counsel for the plaintiff, on the assumption that in the plaintiff's CS3 machine the yarn does pass through a heated zone, that it does not do so under "uniform" tension as required in the process claims in issue. He submitted that the word "uniform", as applied to tension, means that the tension must be the same at every point in the zone, that in the plaintiff's process, by reason of the fact that the yarn is heated by direct contact

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with the metal strip of the heater, the tension on the yarn is greater at the top of the heater than at the bottom, that since it is not the same throughout the heater it is not uniform within the meaning of the claims in issue and that, consequently, the plaintiff has not infringed any of them. In support of his submission counsel relied on the evidence of Mr. Dufort that in the plaintiff's process the tension on the yarn immediately after it comes out of the heater is greater than just before it went in, which indicates that it has increased as it passed through the heater, and, therefore, is not uniform. I disagree with counsel's interpretation of the meaning of the word "uniform" in the context in which it appears. Webster's New International Dictionary, Second Edition, gives several definitions of the word "uniform", namely:

uniform, adj. [F.uniforme, fr L. uniformis, fr. *unus* one and *forma* form.]

1. Having always the same form, manner, or degree, not varying or variable; unchanging, homogeneous; as the dress of Asiatics has been very *uniform;* the temperature is *uniform*; a stratum of *uniform* clay.

2. Of the same form with others; agreeing with each other; conforming to one rule or mode, consonant; alike.

3. Presenting an undiversified appearance of surface, pattern, color, etc.

4. Consistent in character, conduct, opinion, etc.

It is clear from these definitions that the word "uniform" has more than one meaning and that the context in which it is used must be considered. That being so, the expression "uniform tension" in the claims in issue ought not to be interpreted as meaning that the tension on the yarn must be the same throughout the heated zone, for every workman of ordinary skill in the art would know of necessity that, just as the temperature of the yarn could not be as high when it entered the heating zone as it had become when it left it, so also the tension on the yarn would increase as it passed through the heated zone and could not be the same throughout. He would know, accordingly, without doubt, that it could not have been intended by the inventors that the tension on the yarn must be the same throughout the heated zone. Such an interpretation of the expression "uniform tension" as used in the claims is unreasonable. It does not mean that the claims require that the tension on the yarn must be the same throughout the heated zone. All that is required is that it should be invariable at any given point in the zone so that there should not be any

variation in the operating conditions, so far as tension on the yarn is concerned, for every throwster would know that variation in the operating conditions will result in lack of uniformity in the yarn and prevent the accomplishment of the desired objective of the invention. Mr. Dufort put the position of the operator of the machine properly when he said that "he would want to have the condition constant in the system at given points so that the yarn will be uniform". The word "uniform", as applied to tension, should be interpreted accordingly. The requirement that the yarn should pass through the heated zone under uniform tension means simply that the tension should be the same at any point in the zone so that there will be no variation in it as the yarn passes such point in the course of its run. That being so, the evidence established that the tension on the yarn as it passes through the heater (heated zone) of the CS3 machine is uniform within the meaning of the process claims in issue. It is clear that the operator by selecting a particular speed of the yarn and a particular overfeed can control the tension on the yarn. Mr. Scragg stated in a letter to British Nylon Spinners that the plaintiff's new machine incorporates complete control of all tensions and temperatures to very fine limits. Exhibit 49F refers to the precise yarn feed control of the CS3 machine as ensuring "absolutely constant yarn processing conditions". Mr. Seem testified that the tension on the yarn in the plaintiff's process at Galtex at any given point in the heater was constant, uniform. It might be higher at one point than at another but at any given point it was constant. And Professor Speakman was of the opinion that the tension on the yarn in the plaintiff's process was essentially uniform throughout the heater. I find, therefore, that in the plaintiff's process the yarn passes through the heated zone under uniform tension within the meaning of the process claims in issue.

There was a dispute on whether the heated zone in the CS3 machine is restricted. Counsel for the plaintiff submitted that the expression "restricted heated zone" must mean a zone of very small cross section. Mr. Dufort's opinion was that it means a zone that is closed in at the ends of the heater and Dr. Hoff thought that it means a zone that is insulated and, so far as practical, isolated from its surroundings. Counsel contended that there is no restricted

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heated zone in the CS3 machine. There is no suggestion anywhere in patent No. 552,104 that the expression "restricted heated zone" has any reference to the dimensions of the entrance or exit ends of the heater. The heated zone is defined by the length of the heater and is contained within it and is restricted accordingly to the space in the heater from its bottom to its top. This is the zone in which the yarn is heated before it enters the cooling zone immediately above it. Figures 1, 2 and 3 of the drawings accompanying the specification of patent No. 552,104 clearly indicate the extent of the heated zone and show its restriction. There is a similar restricted heated zone in the CS3 machine. It is defined by the length of the passageway in the heater through which the yarn passes and is restricted accordingly. Mr. Seem stated that the heated zone in the CS3 machines at Galtex extended from the bottom to the top of the heater, that the yarn travelled a total of approximately eight and one-half feet but its pathway through the heated zone was only one foot, that being the length of the heater. Thus the heater, shown as 8 on Exhibit 48, defined the plaintiff's restricted heated zone. Mr. Scragg contemplated that the effective length of the heated zone is restricted to 12″. Exhibit 49F refers to the heater as being of 12″ effective length and Exhibit Z-139 refers to the heat setting zones in the CS3 machines as being incorporated in the 12″ long heaters. It is clear, in my opinion, that there is a restricted heated zone in the CS3 machine.

The next point of dispute raises a question of more difficulty. Counsel for the plaintiff contended that the heated zone in the CS3 machine is not "thermally isolated" as required by the process claims in issue and that, consequently, the plaintiff has not infringed any of them. He submitted that the expression "thermally isolated zone" must mean a zone "that is removed from external conditions so far as heat is concerned" and Mr. Dufort took the position that the expression means that the thermal conditions of the heated zone are cut off from the thermal conditions outside it and that the heat inside the heated zone is kept from going out and the outside conditions are kept from coming in. Counsel contended that the expression cannot properly apply to a heater in which room air is encouraged to pass from the bottom of the heater to the top in the manner described by Dr. Hoff in respect of the CS3 machine which

he saw in the mill of Southern Silk Mills at Spring City in Tennessee. He said that he was struck by what he would call a blast of warm air coming out of the top of the heater. He was told that it had been opened up deliberately to encourage the removal of decomposed products largely from the finish applied to the yarn and also from certain volatile by-products that might come from the yarn itself. Mr. Dufort expressed the opinion that the heater in the CS3 machine is not thermally isolated for the reason that it has a hole at the bottom and a hole at the top put there for the purpose of permitting a passage of air for the purpose mentioned by Dr. Hoff, but, he agreed that the heater is insulated. There are several answers to the submission. The specification of patent No. 552,104 shows that the inventors used the expression "thermal insulation" in relation to the heater and the expression "thermal isolation" in relation to the heated zone. The use of the latter is simply another way of saying that the heater should be insulated so that as far as possible the heat in the heated zone should be kept from going out of it. That being so, the use of the expression "thermally isolated" is simply another illustration in the patent of an inept expression which would not mislead any addressee of it. In that view, there is no real difference between the heated zone in the CS3 machine and that in the defendant's Fluflon machine. Mr. Scragg, in reply to a question relating to the heated zone in the CS3 machine, appeared to consider that the expressions "thermally insulated" and "thermally isolated" mean the same thing. Exhibit 49C describes the heater as an insulated container housing a heated strip over which the yarn passes. Exhibit 49F says that the heaters of the CS3 machines "have highly efficient thermal insulation" and Mr. Seem said that the heaters in the CS3 machines at Galtex had very effective insulation. Under the circumstances, it may fairly be said that since the plaintiff's heater is effectively insulated the passageway in the heater through which the yarn passes, being surrounded by insulation, is, in effect, thermally isolated within the meaning of the process claims in issue.

If counsel's contention that the heated zone in the CS3 machine is not thermally isolated by reason of the fact that air is allowed to pass through the heater for the purpose referred to by Dr. Hoff is accepted, this is tantamount to finding that the heater is not as effectively insulated as the

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defendant's, but that would not save the defendant from the charge of infringement, for it is well established that it is not a defence to a claim for infringement that the alleged offending device or process is inferior to the patented one.

Counsel for the plaintiff next took the position that the expression "uniformly heated zone" in the process claims in issue means that the temperature in the heated zone must be the same throughout the zone and submitted that the temperature in the heated zone of the CS3 machines at Galtex was not the same throughout it and that, consequently, the plaintiff has not infringed any of the claims. In support of his contention he relied on the report which Mr. Seem made following his visits to the premises of Galtex Company Limited. This report, filed as Exhibit Z-144, showed that the temperature in the heater of one of the CS3 machines at Galtex ran from 350°F at the bottom to 440°F at three inches from the top and 375°F at the top. Dr. Speakman also stated that the temperature in the plaintiff's heater is not uniform throughout it, but is lower at the top and bottom and reaches its greatest height slightly above the middle.

Counsel's submission on this point is similar to that made with respect to the expression "uniform tension". It is equally erroneous. My reasons for rejecting the submission that the expression "uniform tension" means that the tension in the yarn as it passes through the heated zone must be the same throughout the zone are equally applicable, *mutatis mutandis*, for rejecting the submission now made. The expression "uniformly heated zone" does not mean that the temperature in the heated zone must be the same throughout the zone and no addressee of the patent in issue would think that it does. All that is meant is that the temperature in the heated zone should be invariable at any given point in it. What is required is that the temperature in the heated zone, being an element in the operating conditions for the production of the specified yarns, should be constant so that the yarn may have the desired uniformity. Every addressee of the patent who is willing to understand it would know that this is the intended meaning of the expression.

In this view, it is clear that the heated zone in the CS3 machines at Galtex was uniformly heated in the sense that

its temperature at any point in the zone was constant. Mr. Scragg said that almost from the start the plaintiff was concerned with the need for a constant temperature. In this connection, I refer again to his letter to British Nylon Spinners in which he said "our new machine incorporates complete control of all tensions and temperatures to very fine limits". It is also clear that he realized the advisability of controlling temperatures to plus or minus 1 per cent in order to produce a quality yarn. Exhibit 49F says that the temperature level of the CS3 heaters is controlled by an electronic thermostat "to maintain the temperature at an accuracy of plus or minus 1 per cent". Dr. Dudzik testified that he had made measurements of the temperature of the heaters in the CS3 machines at Galtex and found less than a plus or minus 1 per cent variation. And Exhibit Z-139 provides that the electronic control on the plaintiff's heaters ensures temperature accuracy up to limits as close as plus or minus 1 per cent.

Moreover, the requirement that the yarn should pass under uniform tension through a restricted thermally isolated and uniformly heated zone is for a specific purpose, namely, "to uniformly heat the yarn to a prescribed temperature to re-orient the molecules of the yarn to the twisted formation of the yarn and yarn-set the same." It is not essential to the accomplishment of this purpose that the tension on the yarn as it passes through the heated zone or that the temperature in the heated zone should be the same throughout the zone. What is essential is that the yarn should be heated uniformly to a prescribed temperature in order that the molecules of the yarn may be re-oriented to its twisted position and the yarn be yarn-set. All that is required is that there should be a constancy of tension and temperature in the heated zone so that the purpose specified in the claim, namely, that the yarn should be yarn-set, may be accomplished. That being so, the evidence is conclusive that the use of the plaintiff's process on the CS3 machines at Galtex resulted in the yarn produced by it being yarn-set within the meaning of the claims. Earlier in these reasons I referred to the meaning of the term "yarn-set". It is the result of the processing steps comprised in the invention in issue, consisting of the twisting of the yarn under the required temperature and necessary tension, the cooling of the yarn in the cooling zone and then the untwisting of it

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after it has been cooled. Mr. Scragg admitted that in the CS3 machine the yarn was cooled after it had been twisted in the heated zone and before it was untwisted and that the effect of this was to stabilize the arrangement of the molecules in the yarn. He did not find any difficulty in the term "yarn-set" and, as already stated, agreed that it is the act of yarn-setting that produces a permanently crimped yarn. He also stated that in order to get permanent crimp the yarn has to be treated at the correct high temperature and the correct degree of tension in the yarn at the time of the heat treatment. There was also the evidence of Mr. Seem with regard to the sample of yarn, filed as Exhibit Z-143, to which I have already referred. He took some of the yarn off the sample and showed that by stretching it between his fingers and permitting it to contract, a process called "milking", one could see that it was a uniformly crimped yarn. Mr. Seem also gave evidence regarding some yarn which he had taken from the CS3 machines at Galtex, when he made his first visit to the premises on February 18, 1960, some of which was later put in a finished fabric at Coatesville. In his report of the tests he made on the CS3 machines at Galtex, filed as Exhibit Z-144, he gave the details of the tests that he made on the yarn produced on the machines in order to determine whether it would withstand the normal combination of stresses and temperatures encountered in the production of men's hose and found that the finished fabric had the appearance and full stretch and recovery comparable to fabric similarly processed from Fluflon false-twist yarn. He found that the twist in this yarn had been yarn-set. He made this determination in two ways. I put his explanation in his own words.

> I took a length of yarn, of the twisted yarn, from the heater, which is my custom, and examined it whether it has any tendency to untwist. I found it to be in a compact, tightly twisted form, having no tendency to untwist. I also determined it was yarn set because the finished fabric maintained its full crimp characteristics after being subjected to all the stresses and temperature combinations which stretch yarns are subjected to up to their final use, and found that it was permanent, and consequently, there, of necessity, had to be a yarn set in that yarn.

There was also Dr. Dudzik's evidence, to which I shall make a further reference later, that the yarn, filed as Exhibit Z-143, was yarn-set. I find, therefore, that the purpose of the specific requirements referred to, namely, that the yarn

should be yarn-set, was accomplished at Galtex by the use of the plaintiff's process on the CS3 machines there.

The following requirements of the claim, namely,

> controlling the supply of heat energy to said zone to thereby maintain said heated zone uniformly at the temperature required to uniformly heat said yarn to said prescribed temperature, continually cooling the yarn to stabilize the same after passage under tension through said heated zone, continually untwisting the yarn after cooling the same, and finally continually collecting the processed yarn,

may be considered together.

Mr. Scragg agreed that the Fielden system, described in Exhibit 49C, also Exhibit 16, is employed on the standard CS3 machines, including the CS3 machines at Galtex, and said that under this system the temperature of the CS3 heaters is controlled through control of the temperature in a device called a hot-pot. Exhibit 49C describes the equipment used and sets out the details of how the control of the supply of heat energy to the plaintiff's heated zone is accomplished. Mr. Seem testified that the heater of the CS3 machines at Galtex was electrically energized through busbars at the lower and upper ends of the heater from the Fielden control circuit which included the hot-pot. Mr. Scragg agreed that the object of the Fielden control system "is to keep the yarn at a constant and predetermined temperature". Exhibit Z-138 set out certain temperatures suggested for use by the plaintiff's customer at Galtex and by two other Canadian customers. And Mr. Dufort's report, filed as Exhibit 96, gave the temperatures actually used on the CS3 machines in Canada. It is clear that in the plaintiff's process at Galtex the yarn was cooled after its passage under tension through the heated zone. Mr. Scragg agreed that in the CS3 machine the cooling starts immediately after the yarn has passed through the heater and that the effect of the cooling is to stabilize the rearrangement of the molecules in the yarn before it is untwisted. Mr. Dufort agreed that the CS3 machine has a cooling zone and Mr. Seem stated that the cooling zone in the CS3 machines at Galtex extended from the top of the heater to the top of the twist trapper. He also said that in the plaintiff's process at Galtex the yarn was untwisted after it had been cooled, the reverse twisting being of exactly the same number of turns as had been inserted in the original twisting. And it is clear that the processed yarn was finally collected. Thus all the require-

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ments just referred to were comprised in the plaintiff's process at Galtex.

There remains for consideration the following requirement in the claim, namely:

> the tension upon the heated yarn being correlated to said prescribed temperature of the heated yarn to maintain the yarn under tension adequate to preclude substantially any ductility in the cooled yarn.

Counsel for the plaintiff contended that this was not comprised in the plaintiff's process. Indeed, the plaintiff's main defence to the charge of infringement laid against it depended on the contention put forward by counsel that in the plaintiff's process the tension on the heated yarn was not correlated to its prescribed temperature at all and, in any event, not correlated to maintain the yarn under tension adequate to preclude substantially any ductility in the cooled yarn.

I shall deal first with the contention that the tension on the heated yarn was not correlated to its prescribed temperature at all. Counsel based it on the assumption that in the plaintiff's process the factors of tension on the yarn and temperature of the yarn are not independently variable and cannot, therefore, be correlated. In support of it he relied on the opinion of Professor Speakman and the evidence of Mr. Dufort. Professor Speakman stated that the plaintiff's machine works on the principle known as constant feed and not that of constant tension as in the case of the defendant's machine, that there is a fundamental difference between the two methods of treating the yarn, the plaintiff's being processed under constant feed and the defendant's under constant tension, that the plaintiff's constant feed device is not the same as the defendant's constant tension device, that in the plaintiff's machine the tension on the yarn is developed in the heated zone by the action of heat as the result of the tendency of the yarn to contract under its influence, that such tension is dictated by the temperature in the heated zone and not controlled independently of it, whereas in the defendant's machine the tension on the heated yarn is controlled by the tension device independently of the temperature in the heated zone. Consequently, he stated, it would be possible in the defendant's machine to have a low tension on the yarn and a high temperature in the heated zone, whereas this would be impossible in the plaintiff's machine, for if the temperature

was high so was the tension. It was Professor Speakman's opinion that correlation is possible only between independent variables and that, consequently, while correlation between the tension on the heated yarn and the temperature of the yarn is possible in the case of the defendant's machine because the tension and the temperature are controlled separately and independently of one another by different devices, it is not possible in the case of the plaintiff's machine because there is only one variable, namely, the temperature, the tension being dependent on it.

The evidence of Mr. Dufort was to a similar effect. He stated that in the CS3 machine the tension on the yarn is controlled by the overfeed. The yarn can be held to its length by the use of a zero overfeed or allowed to shrink by the use of a two per cent or three per cent overfeed and it does not matter, so far as the length of the yarn is concerned, whether the temperature is put up or down or the rate of linear speed increased or reduced or a change in the denier of the yarn is made, whereas in the defendant's machine if any of these changes are made and it is desired to maintain the length of the yarn the tension on it must be adjusted accordingly by the tension device. It was his opinion that the whole difference between a roller feed machine such as the plaintiff's and a tension control machine such as the defendant's is that on the latter the tension on the yarn must be adjusted to suit the conditions of the temperature and speed of the yarn, whereas on the former this is not necessary.

The contention put forward on the basis of Professor Speakman's opinion and Mr. Dufort's evidence raises a question which is really a matter of semantics, namely, the meaning of the word "correlated" in the context in which it is used in the claim. Webster's New International Dictionary, Second Edition, gives the following definitions of the word "correlate" as a transitive verb, namely:

1. To put in relation with each other, to connect systematically, . . .

2 To establish a mutual or reciprocal relation of; to relate as necessary or universal accompaniments; . . .

3. To establish a one-to-one correspondence of (two sets or series of things); to relate (such sets or series) that to each member of one set or series a corresponding member of the other is assigned.

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and the word "correlated" is given the following as one of its meanings, namely:

> 1. Closely, systematically, or reciprocally related; involving correlation.

In my opinion, the word "correlated" in the context in which it is used in the claim does not have the restricted meaning that Professor Speakman assigned to it and there is no justification for his assumption that in the plaintiff's process the tension on the yarn cannot be correlated to its prescribed temperature on the ground that the factors of tension and temperature are not independently variable. All that is required by the claim is that the tension on the heated yarn should be put in relation with its temperature so that it will be adequate for the accomplishment of the purpose specified in the claim. Thus, the question for determination is not whether there is a difference between the plaintiff's method of processing the yarn and the defendant's but whether in the plaintiff's process the tension on the heated yarn was put in relation with its prescribed temperature so that it was adequate for the accomplishment of the purpose specified in the claim. If it was, then the tension on the heated yarn in the plaintiff's process was correlated to its prescribed temperature within the meaning of the claim and the fact that the relationship was brought about by the use of the plaintiff's constant feed system does not matter. Nor does it matter whether the factors of tension and temperature are independently variable or not.

In my opinion, the evidence established that in the plaintiff's process the tension on the heated yarn was put in relation with its temperature as required by the claim. Mr. Scragg stated that the plaintiff provided overfeeds up to ten per cent and underfeeds up to ten per cent in steps of one per cent and did so for the purpose of enabling its customers to provide different effects for different yarns, and he agreed that a change in the overfeed would result in a change in the tension on the yarn. Mr. Dufort qualified Mr. Scragg's statement by saying that it was the plaintiff's usual practice to provide zero, two per cent and three per cent overfeeds but he admitted that the plaintiff's system of operating lower and upper rollers at differing rates of speed amounted to a tension regulating means. He stated that an operator of the CS3 machine might make changes in the overfeed for various reasons. For example, if it was desired to produce

a yarn with a different bulk from the one ordinarily required he would reduce the overfeed if greater bulk was desired or increase it if less bulk was wanted. Exhibit Z-138 gave overfeed suggestions ranging from zero to five per cent which indicated that the plaintiff contemplated different tension and temperature relationships for different yarns. And Mr. Tomlin said that he had gears that gave overfeeds up to nine per cent and an underfeed of one per cent and had used all of them to produce commercial stretch yarn. Mr. Seem expressed the opinion, in effect, that if an operator followed the suggestions contained in Exhibit Z-138 he would be correlating the tension on the yarn to its temperature and linear speed. Dr. Dudzik stated that in the plaintiff's process the function of the overfeed is to control the tension on the heated yarn and he expressed the same opinion regarding Exhibit Z-138 as Mr. Seem did, saying that if a throwster operates according to the instructions given in Exhibit Z-138 then he is practising correlation as regards temperature, tension and yarn speed. Dr. Dudzik also referred to a report made by Mr. Dufort setting out the processing conditions actually used in certain mills in operating the CS3 machines, including mills in Canada, which report was filed as Exhibit 96, and expressed the opinion that the mills referred to in the report were practising correlation as regards overfeed, temperature and yarn speed. I adopt these opinions as my own, thus disposing of the objection of counsel for the plaintiff that the opinions of Mr. Seem and Dr. Dudzik were inadmissible on the ground that such opinions were a matter for the Court and not for experts. I also refer to the statement of Mr. Dufort that the operator of a CS3 machine who was seeking to produce a yarn of a particular kind for a customer would "play around" with the adjustments of overfeed, temperature and yarn speed until he found the adjustments that would enable him to produce yarn of the desired kind and he would then fix the operating conditions for a commercial run. This indicated that he was seeking to correlate the tension on the yarn to the other processing conditions. There is also the fact that the proper tension on the heated yarn in relation to the conditions of the temperature of the yarn and its linear speed is just as important in the case of the plaintiff's process as in the defendant's. Tension on the yarn will change with changes in the denier, kind and temperature

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of the yarn and if the necessary tension is not obtained there will be a change in the overfeed. There was confirmation of this fact by Mr. Tomlin who stated that at Galtex he had processed 70 denier yarn on the CS3 machines at three per cent overfeed but when he processed 140 denier yarn he used one per cent overfeed. On the evidence, I find that in the plaintiff's process the tension on the heated yarn is correlated to its prescribed temperature within the meaning of the claim, notwithstanding the fact, to use the language of Professor Speakman, that the plaintiff's machine works on the principle known as constant feed and not on that of constant tension as in the case of the defendant's machine.

The requirement that the tension on the heated yarn should be correlated to its prescribed temperature "to maintain the yarn under tension adequate to preclude substantially any ductility in the cooled yarn" was the subject of much dispute between the parties. Basically, it turned on the meaning of the expression "to preclude substantially any ductility in the cooled yarn". Earlier in these reasons I dealt with the meaning of the expression, but in view of the conflicting opinions on the subject of the substantial preclusion of ductility in crimped thermoplastic yarns it is necessary to give further consideration to its meaning as used in the claims in issue.

Counsel for the plaintiff put forward two contentions, the first being that, if the word "ductility" is given its plain and ordinary meaning, the evidence established that substantial preclusion of ductility in crimped thermoplastic yarn is impossible and, consequently, the patents in issue are invalid for failure of the promise of the specification. The second contention was that if the idea of substantial preclusion of ductility in the cooled yarn is related to the idea of retentivity of the crimp in the yarn there is nothing novel in the idea of processing thermoplastic yarns so that they are permanently crimped, since it was established that yarns processed by the use of the step by step method had crimp retentivity.

In support of his first contention counsel had to rely partly on the opinion of Professor Speakman that it is impossible to process nylon yarn so that there will be substantially no ductility in it, that there will always be duc-

tility in it and that the false twist process will increase the ductility, not decrease it. It was his belief that it is impossible to prevent ductility in the yarn by the use of the process defined in the process claims in issue. Indeed, he thought that its use would result in more ductility in the crimped yarn than there had been in the flat yarn that was being processed. And, so far as the plaintiff's process is concerned, he expressed the opinion that any increase in the rate of the overfeed would result in an increase in the ductility of the crimped yarn processed by it.

Counsel also relied on the opinion of Dr. Hoff and certain tests made by him on nylon yarn produced by Southern Silk Mills at Spring City in Tennessee on a CS3 machine which the plaintiff had sold to that Company. Dr. Hoff's conclusion from these tests, which were made on October 19 and 20, 1961, and are set out in a report, filed as Exhibit 113, was that the ductility of the crimped yarn processed on the CS3 machine was greater than that of the flat yarn that had been processed. I should also refer to certain statements made by him, apart from the conclusion that he based on the tests referred to. While he said that ductility is the property of the yarn, apart from any geometric formation in it, he stated that its ductility might be affected by the method by which it was crimped, for the reason that if the treatment by which the crimp was inserted in the yarn caused a modification in its molecular configuration its ductility would be modified accordingly. Dr. Hoff equated ductility with plastic flow. He agreed that, while the application of heat to the yarn had the effect of increasing its ductility, the application of tension on the yarn would offset the effect of the temperature, but he did not believe that there are any conditions that would completely offset its effect and he did not know of any conditions where there would be less ductility in a yarn processed on a Scragg machine than there had been on the flat yarn processed by it.

The conclusion which Dr. Hoff based on the tests which he had made on yarns produced by the use of the CS3 machine at the Southern Silk Mills plant may be disposed of briefly. The tests had involved the use of an Instron machine. Dr. Dudzik, with a view to checking the correctness of Dr. Hoff's conclusion, conducted Instron tests on yarns that were the same as those that Dr. Hoff had used

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and Mr. Dufort conducted tests by way of surrebuttal of the conclusion reached by Dr. Dudzik.

After a review of the evidence and arguments relating to the tests I am of the opinion that the conclusion which Dr. Hoff drew from them should be disregarded. It was proved that the yarns on which his Instron tests were made were not commercially produced yarns. His conclusion, therefore, has no relevancy to the yarns produced by the use of either the plaintiff's or the defendant's process and is valueless. Moreover, the yarns were not processed under the operating conditions set forth in the report, the evidence being that the CS3 machine at the Southern Silk Mills plant was run at an underfeed and not at a two per cent or three per cent overfeed as stated in the report.

There is a further reason for rejecting Dr. Hoff's conclusion. Dr. Dudzik expressed the opinion that the tests made by Dr. Hoff had not been properly conducted and that the calculations based on them were erroneous. He found from the Instron tests that he made that the ductility in the flat yarn was greater than that in the crimped yarn that had been processed from it. This conclusion was diametrically opposite to Dr. Hoff's, but since it was based on tests run on yarn that had not been commercially produced it ought also to be disregarded as having no bearing on the yarns produced according to either the plaintiff's or the defendant's process. And, for a similar reason, the conclusion which Mr. Dufort based on the tests run by him is irrelevant.

It follows that Professor Speakman's opinion, to the extent that it was based on the tests made by Dr. Hoff, and he admitted that it was partly so based, is subject to discount.

Moreover, Dr. Dudzik stated that he did not agree with Professor Speakman's statement that the use of the process defined in the process claims in issue will increase the ductility of the crimped yarn processed by its use. This, Dr. Dudzik, said, was not the case. His statement is also applicable to Dr. Hoff's opinion. He agreed with Professor Speakman that it is impossible to prevent all ductility in crimped yarn. There will always be some ductility left in it and it is not possible to say exactly how much remains in it, but it was his opinion that there is very little ductility

left in crimped yarn. Later he stated that all the crimped yarns that he had seen had little or no ductility in them.

I have no hesitation in saying that I prefer Dr. Dudzik's opinion to the opinions of Professor Speakman and Dr. Hoff, but the determination of the meaning of the expression "to preclude substantially any ductility in the cooled yarn", as it appears in the process claims in issue, does not depend on the preference I have expressed. The patents in issue are not addressed to scientists but to workmen of ordinary skill in the relevant art who would regard the expression in the light of the claim in which it appears.

The claim defines a method of producing evenly and permanently crimped, wavy or fluffed multi-filament thermoplastic yarn having improved and uniform physical characteristics. For the purpose of brevity I shall refer to the method simply as the process and to the yarn simply as permanently crimped yarn. The claim sets out the requirements for the accomplishment of the purpose of the process. It is not correct to describe compliance with each requirement as a step in the process in the sense that it must be made in any particular order. The process is a unitary one calling for compliance with several of the specified requirements in combination with one another at the same time. But compliance with all the requirements is necessary for the accomplishment of the purpose of the process and every requirement must be regarded accordingly. In my opinion, every throwster or other workman of ordinary skill in the art would read the claim in that light. It would, therefore, be obvious to him that the requirement that the tension on the heated yarn should be correlated to its prescribed temperature to maintain the yarn under tension adequate to preclude substantially any ductility in the cooled yarn must have been intended to be related to the purpose of producing a permanently crimped yarn. It should be construed accordingly. There would be no sense in including it in the claim unless it was so related and it would be a misconception of the claim to think of it otherwise.

Analysis of the claim makes it clear that it is essential to the production of permanently crimped yarn that the yarn should be yarn-set. This is a basic requirement. Earlier in these reasons I described yarn setting of the yarn as the

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stabilization of the molecules of the yarn in the helical deformation into which they were re-oriented by the twisting while the yarn was in its plastic state followed by the cooling of the yarn before it was untwisted. To enable the yarn to be yarn-set two requirements must be simultaneously complied with. The yarn must be uniformly heated to the "prescribed temperature", meaning, as already explained, the temperature required in order to enable it to be yarn-set. It is specified in the claim that the yarn should be continually (continuously) twisted from its source of supply and passed at a selected linear speed through a heated zone which is to be restricted and thermally isolated. The zone must be uniformly heated in order to heat the yarn to the temperature required to reorient the molecules of the yarn to its twisted formation and yarn-set it. The range of temperature to be used is stated in the specification. While the yarn is passing through the heated zone under the conditions referred to it must be under uniform tension. It is clear that the application of the prescribed heat to the yarn is not sufficient by itself to enable it to be yarn-set. It must also be subjected to the necessary tension. The molecules of the yarn will be re-oriented to its twisted formation by the effect of the heat on the yarn while it is being twisted and passing through the heated zone, but every throwster or other workman of ordinary skill in the art would know, as Mr. Dufort admitted, that the set in the yarn cannot be maintained unless the yarn while it is being twisted and heated is subjected to tension in order to offset the plasticising effect on the yarn of the high temperature to which it must be subjected. The application of heat to the yarn tends to make it ductile or plastic but the imposition of tension on it tends to counteract the effect of the heat. Consequently, the claim requires not only that the temperature of the yarn should be high enough to enable it to be yarn-set but also that the tension on the heated yarn should be put into such a relation with the necessary temperature that the combined effect of the temperature and the tension will result in the yarn being yarn-set.

Moreover, the specification discloses the desirability of maintaining the spiralled formation of the yarn after it has been cooled and then untwisted. Here I digress for a

moment from analysis of the claim for the purpose of referring to the following statement in the specification:

> By the use of adequate tension while twisting-untwisting we can draw the yarn approximately the same degree as normally drawn by the producers, and by this method *any ductile yarn* is drawn helically due to the simultaneous twisting and drawing and this spiralled formation of the yarn substantially remains after untwisting. Then in the case of yarns having thermal characteristics, such as Dacron for example, which exhibits substantial ductility when heated, the yarn is processed under sufficient high tension during heating to preclude substantially any ductility in the yarn when cooled.

It is in this connection that the requirement under consideration is of particular importance. I have already discussed the meaning of the word "ductility" and the expression "to preclude substantially any ductility in the cooled yarn" and stated that it has been defined in the specification. The statement which I have cited may properly be considered as an indication of how the expression should be construed in view of the inclusion of the requirement in the claim. While it is clear that the combined effect of the temperature of the yarn and the tension on it is necessary in order to enable the yarn to be yarn-set it is significant that the claim requires that the tension on the heated yarn should be so correlated to its prescribed temperature as to *maintain* the yarn under such a tension that it is adequate "to preclude substantially any ductility in the cooled yarn". This indicates that the tension on the yarn is to be maintained, not only while the molecules of the yarn are being re-oriented to its twisted formation while the yarn is being twisted and passing through the heated zone in order to assist in its being yarn-set, but also after the yarn has left the heated zone in order to be cooled before it is untwisted and until it has been untwisted. It is in the light of this need for continued maintenance of the tension on the yarn in the process of the production of permanently crimped yarn that the requirement that the tension should be adequate "to preclude substantially any ductility in the cooled yarn" must be considered. The objective of substantial preclusion of any ductility in the cooled yarn is inseparably related to the objective of production of permanently crimped yarn. Compliance with the requirement cannot serve any other purpose. Consequently, all that is really meant by the requirement is that the tension on the yarn should be so related with its tempera-

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ture that it will be adequate to effect a substantial offset against the tendency of the yarn to become ductile or plastic by reason of the effect of the application of the heat to it. To put it in other words, all that is meant is that the tension on the yarn should be so related with its temperature as to ensure that the spiralled formation of the yarn should remain in it after it has been untwisted so that the crimp in it will be permanent in the sense that it will withstand the stresses and temperatures to which it will be subjected and retain its crimp.

In this view of the meaning of the requirement it is clear that it was comprised in the plaintiff's process. Indeed, if Mr. Scragg's opinion that the CS3 machine produces as equally permanently crimped a yarn as the defendant's machine does is accepted,—and there is no reason why it should not be—it could not be otherwise. If the yarn produced by the use of the plaintiff's process is permanently crimped, as I have found it to be, it is not ductile or plastic, meaning thereby that the crimp in it will not pull out under the ordinary conditions of processing and commercial use to which it will be subjected, from which it follows, as a matter of necessary deduction from the fact of the retentivity of the permanency of the crimp in the yarn, that there has been a preclusion of substantially any ductility in it, meaning thereby that it is not plastic or ductile in the sense explained and as a matter of further deduction that such preclusion has been made possible by the maintenance of an adequate tension on the yarn in relation with its prescribed temperature, for without the maintenance of such adequate tension in relation with the prescribed temperature it would not have been possible to offset the plasticizing effect of the temperature on the yarn and to ensure that its spiralled formation should remain in it after it has been untwisted.

Counsel for the plaintiff submitted that, since the expressions "permanently crimped" and "to preclude substantially any ductility in the cooled yarn" are both used in the process claims in issue, they indicate different properties in the yarn. This is a misconception on his part. The preclusion of substantially any ductility in the cooled yarn is a requirement that must be complied with if the purpose of producing permanently crimped yarn is to be accom-

plished. In my opinion, Mr. Dufort put the matter beyond dispute when he said frankly, at page 4968 of the transcript:

> In respect of Mr. Seem's definition, which is that preclusion of substantially any ductility means that the yarns will stand up to use afterwards without their crimp disappearing, then certainly all yarns made in commerce on the Scragg machine have their ductility precluded by that standard because otherwise they would not be commercial yarns.

In view of the meaning ascribed to the requirement of preclusion of substantially any ductility in the cooled yarn Mr. Dufort's statement is a conclusive answer in the affirmative to the question whether the requirement was comprised in the plaintiff's process.

In my opinion, Mr. Dufort's statement puts an end to the dispute relating to the requirement that there should be a preclusion of substantially any ductility in the cooled yarn, but if any confirmatory answer to the question is necessary it is found in Dr. Dudzik's evidence on the subject. He visited the premises of Galtex Company Limited on November 1 and 2, 1961, and saw the CS3 machines there operating in the commercial production of nylon yarn. Mr. Seem was with him. He took a sample of the yarn from one of the machines, being the sample already referred to and filed as Exhibit Z-143, and ran three tests on it. He first "milked" the yarn, in the manner described by Mr. Seem, to see whether the crimp in it came out. He explained that if it came out easily when this test was used the yarn had no commercial value. The crimp did not come out of the yarn when Dr. Dudzik milked it and he concluded that it appeared to be a good yarn. He then ran a second test on it known as the skein test. This consisted of winding a skein of yarn, hanging a weight calculated on a known formula on it and suspending it with its attached load in water at 180°F for 10 minutes. He explained that if the yarn immediately shrank up to 50 per cent and then got progressively longer the yarn would not be good, but if it maintained its skein length it would maintain the level at which it was set. After leaving the skein in the water for the required length of time Dr. Dudzik took it out of the tank and hung it up to dry. He then measured its skein shrinkage according to a known formula and concluded that the yarn was a commercial yarn. Dr. Dudzik then ran the third test on the yarn in the presence of several persons including Mr. Dufort.

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Four sleeves of two types were knitted. Two sleeves were knitted each with one half from yarn from Exhibit Z-143 and the other half from yarn produced from the defendant's Fluflon machine, Exhibit Z-161, these sleeves being filed as Exhibits Z-207 and Z-208. The other two sleeves were knitted with yarn from Exhibit Z-143 and filed as Exhibits Z-209 and Z-210. Dr. Dudzik then put Exhibits Z-207 and Z-209 in an enamel pot of water at 130-140°F, heated the water up to the boiling point for 40 minutes, let the water boil for another 20 minutes, let it cool to 100°F, squeezed the water out of the sleeves, took them to a laundry and put them in a commercial dryer. The purpose of these operations was to simulate the conditions of processing and commercial use to which yarns would ordinarily be subjected. Dr. Dudzik found little or no difference after this test between the yarn from Exhibit Z-143 and that produced from the defendant's machine. He concluded that the yarn from Exhibit Z-143 had been yarn set and that its ductility had been substantially precluded. It was his opinion that the yarn produced by the use of the plaintiff's process at Galtex was comparable to that produced by the use of the defendant's process.

The evidence of Mr. Seem on this subject was to the same effect as that of Dr. Dudzik. He visited Galtex twice, once on February 18-19, 1960 and again on November 2, 1961. He found that the yarn being processed on the CS3 machines at Galtex was produced with a temperature of 464°F and a three per cent overfeed and that the spindle speed of the machines was 60,000 revolutions per minute. He did a preliminary test of the yarn, filed as Exhibit Z-143, by milking it and it was his opinion that its ductility had been substantially precluded. I have already referred to his tests of the yarn taken on his second visit.

Under the circumstances, I find without hesitation that the requirement in Claim 1 that the tension on the heated yarn should be correlated to its prescribed temperature to maintain the yarn under tension adequate to preclude substantially any ductility in the cooled yarn was comprised in the plaintiff's process at Galtex.

It follows that the plaintiff's process at Galtex fell within the express terms of Claim 1 and the ambit of the invention defined in it.

I should add that there is no substance in the contention of counsel for the plaintiff that if the idea of preclusion of substantially any ductility in the cooled yarn is related to the idea of retentivity of the permanency of the crimp in it there is nothing novel in the idea of processing thermoplastic yarns so that they are permanently crimped. It was never pretended on the defendant's behalf that the idea of the preclusion of "substantially any ductility in the cooled yarn" was novel. Mr. Seem freely admitted that crimped nylon yarn produced by the use of the step by step process was not ductile. Indeed, he had never seen a step by step processed nylon yarn that was ductile. If any yarn was ductile it would be considered non-commercial.

The validity of the process claims in issue does not depend on whether the idea of preclusion of substantially any ductility in the cooled yarn is novel or not. The essence of the invention in issue is that the combination of the requirements set out in the claims results in the production of permanently crimped thermoplastic yarns of the kind specified in the patents by its continuous false twist process that are not only more uniform in character than any yarns produced by any other process but also superior to them in quality and producible at greatly less cost.

Claim 2 differs from Claim 1 in that it includes two additional requirements. These appear from the following statement in the claim:

> correlating the tension in said yarn to said prescribed temperature and linear speed of travel of the yarn to maintain the yarn at a selected uniform tension relative to the contractile force of the yarn resulting from heating and twisting the same to preclude substantially any ductility in the yarn after cooling,

The first additional requirement is that the tension on the yarn should be correlated to the linear speed of travel of the yarn as well as to its prescribed temperature. The evidence established that this requirement was comprised in the plaintiff's process. Mr. Scragg agreed that the operator of the CS3 machine selected the speed of travel of the yarn. Mr. Seem took measurements at Galtex of speed, tension and temperature and concluded that there was correlation of the tension to the linear speed of the yarn. He said that the longer a heated yarn is subjected to a given stress the greater will be the permanent deformation resulting from it. And I have already referred to Dr.

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Dudzik's opinion that the mills referred to in Mr. Dufort's report, filed as Exhibit 96, were practising correlation as regards overfeed, temperature and yarn speed.

The second additional requirement is that the yarn should be maintained at a selected uniform tension relative to the contractile force of the yarn. Mr. Scragg agreed that the input rollers on the CS3 can be set in such a way as to give varying degrees of relaxation on the heated yarn. This was confirmed by Mr. Dufort who said that the amount of shrinkage that is permitted in the use of the CS3 machine is in accordance with the overfeed put on it. This was another way of saying that the tension on the yarn was relative to its contractile force. Mr. Tomlin stated that Galtex Company Limited had gears that enabled the CS3 machines at Galtex to be operated at a one per cent underfeed, at a zero overfeed and at overfeeds of one, two, three, five, six and nine per cent and that they had experimentally used "pretty well all of them to make a stretch yarn". They had used a three per cent overfeed for their commercial production on 70 denier yarn but had processed 140 denier yarn with a one per cent overfeed. Mr. Seem gave evidence, in describing the operation of the CS3 machines at Galtex, that they were capable of being operated with the use of the gears mentioned by Mr. Tomlin with their resulting feeds and stated that the tension on the yarn would be greater than its contractile force if a one per cent underfeed was used, equal to it if the overfeed was zero and less than it if any one of the overfeeds from one to nine per cent was used. Mr. Tomlin gave an illustration of this when he said that when a 140 denier yarn was processed a one per cent overfeed was used instead of the three per cent that was used for the production of a 70 denier yarn for the use of the lower overfeed gave a greater tension in the case of the larger yarn. Thus it was established that the second additional requirement referred to was complied with in the plaintiff's process. Consequently, the plaintiff's process at Galtex was within the ambit of the invention defined in Claim 2.

There are two requirements in Claim 3 that are not included in either Claim 1 or Claim 2. The first of these is expressed as follows:

> controlling the supply of heat energy to said zone compensatively according to the ambient temperature and rate of transfer of heat to the yarn to

thereby maintain said heated zone uniformly at the temperature required to uniformly heat said yarn to said prescribed temperature,

It is clear, of course, that the "zone" referred to is the heated zone and that the "prescribed temperature" referred to is that which is required to enable the yarn to be yarn-set. There was no serious dispute that in the plaintiff's process the supply of heat energy to the heated zone was controlled compensatively according to the ambient temperature. The expression "ambient temperature" means the temperature of the ambient atmosphere. Mr. Scragg said, as already stated, that the Fielden system, described in a manual filed as Exhibit 16, is employed in the plaintiff's standard CS3 machines, including the CS3 machines at Galtex. Exhibit 16 is the same as Exhibit 49C, one of the documents attached as an exhibit to the agreement between the parties and referred to therein as an "instructional brochure". The agreement recites, as already stated, that such an instructional brochure was furnished to Galtex Company Limited when the plaintiff sold the two CS3 machines to it. It also recites, as already stated, that certain nylon and terylene yarn have been processed as described in Exhibit 49C on the said CS3 machines. Exhibit 49C contains the following statement:

The equipment compensates for ambient temperature changes and supply voltage variations.

This statement is conclusive of the matter. It is not limited in its application to ambient temperature changes of a long term order, as counsel for the plaintiff contended. It applies to short term changes as well. The statement is categoric and the plaintiff is bound by it. Moreover, Mr. Seem found as a fact that the Fielden system in the CS3 machines at Galtex did compensate for changes in the ambient temperature and variations in the voltage.

Counsel for the plaintiff contended, however, that the system did not compensate for the rate of transfer of heat to the yarn. This was denied on behalf of the defendant. The argument relating to this issue was involved. Mr. Seem stated that the rate of transfer of heat from the heater to the yarn depends on the temperature of the heater, the length of time that the yarn is in the heater and the temperature of the yarn as it enters the heater, and submitted that the greater the differential between the heat of

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the heater and that of the yarn is the faster is the rate of transfer of the heat. He stated further that the temperature of the heater is affected by changes in the ambient temperature and voltage variations, whereas that of the yarn is affected only by changes in the ambient temperature and he said that by the time the yarn has reached the heater it has assumed the ambient temperature. He deduced from these facts that, since the equipment compensates for ambient temperature changes and supply voltage variations, it compensates according to the rate of transfer of heat to the yarn. In his evidence he confirmed the evidence of Dr. Dudzik, to which I shall refer later, that the variation in the temperature in the heaters of the CS3 machines at Galtex during the period of test was less than 1°C.

Counsel for the defendant argued that since the plaintiff's equipment compensates for ambient temperature changes and voltage variations it follows that as the ambient temperature changes so does the supply of heat energy to the heater and that, consequently, if there is a drop in the ambient temperature there is an increase in the supply of heat energy to the heater to compensate for such drop, which results in an increase in the heat differential between the heater and the yarn with its resultant acceleration in the rate of transfer of heat from the heater to the yarn, and that the converse takes place if there is a rise in the ambient temperature, in which case there is a decrease in the supply of heat energy to the heater, a decrease in the heat differential and a deceleration in the rate of heat transfer. Counsel concluded, accordingly, that the equipment used on the CS3 machines at Galtex compensated for the rate of transfer of heat to the yarn within the meaning of the requirement under consideration.

Counsel for the plaintiff, on the other hand, contended, as I have stated, that the plaintiff's equipment did not compensate for the rate of transfer of heat to the yarn. He based his contention on the assumption that the effect of compensation for changes in the ambient temperature would be to maintain the heater always at the same temperature. From that assumed basis he argued that since, according to Mr. Seem's evidence, the temperature of the yarn varies with changes in the ambient temperature, it is clear, since the heater is always at the same temperature,

that the temperature reached by the yarn must vary with changes in the ambient temperature. On the same assumption he submitted that in the equipment in the plaintiff's CS3 machines there was no compensation for the rate of heat transfer to the yarn.

There are two answers to the contention thus put forward. If the Fielden equipment used in the CS3 machines compensated for ambient temperature changes and supply voltage variations and the heater was maintained at the same temperature and the temperature of the yarn varied according to changes in the ambient temperature, it would follow that there would be variations in the temperature of the yarn produced by the use of the plaintiff's process. But the fact is that there are no such variations. Exhibit 49F contains the following statement:

> The extraordinarily accurate heat control arrangements, precise yarn feed control and perfectly straight yarn path all ensure absolutely constant yarn processing conditions, which are identical from one spindle to the next. The user of our CrimpSpin machine can therefore be assured of yarn production under the most controlled conditions: the hazards of yarn variation are virtually eliminated.

and there is also the statement:

> This system which is unique, ensures that no yarn can leave the machine unless it has been correctly processed.

It follows that the plaintiff's system must, as it compensates for ambient temperature changes and supply voltage variations, also compensate for the rate of transfer of heat to the yarn.

The other answer is that the assumption from which counsel proceeded was not sound. The requirement under consideration must be read as a whole. The purpose of requiring that the supply of heat energy to the heated zone should be controlled compensatively according to the ambient temperature and rate of transfer of heat to the yarn is to maintain the heated zone uniformly at the temperature required to uniformly heat the yarn to its prescribed temperature. It is not essential to the achievement of this purpose to maintain the heater at the same temperature. The purpose of the requirement is that there should be such a control of the supply of heat energy to the heated zone as to ensure, notwithstanding changes in the ambient temperature and the rate of transfer of heat to

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the yarn, that the yarn when it comes out of the heater has been uniformly heated to its prescribed temperature. It is immaterial, therefore, whether in the course of the compensative control referred to the temperature in the heater rises or falls so long as the temperature of the yarn is maintained at the desired "prescribed" level. Counsel for the plaintiff in his final argument realized that this was the true intendment of the requirement under discussion. In my opinion, the requirement was complied with as completely in the plaintiff's process as contemplated in the claim.

The other requirement in the claim, to which I referred, is expressed as follows:

> to maintain the yarn at a selected uniform tension less than the contractile force of the yarn resulting from heating and twisting the same

Counsel for the plaintiff contended that in the plaintiff's process the tension on the yarn would be less than the contractile force if an overfeed was used, in which case the yarn would shrink and there could not be any preclusion of ductility in it. The contention is contrary to the evidence of Dr. Dudzik relating to the tests made by him on yarn from the sample filed as Exhibit Z-143, which was produced at Galtex with the use of a three per cent overfeed. In that case the tension on the yarn was less than the contractile force and the yarn was not ductile or plastic.

Nor was there any substance in the contention that in the plaintiff's process, while there was a selection of overfeed, there was no selection of tension. Mr. Scragg agreed that the operator of a CS3 machine selects the speed of the yarn and the overfeed "and in consequence the tension of the yarn". The selection of the overfeed is tantamount to the selection of the tension.

It follows, accordingly, that the requirements of Claim 3 were complied with in the plaintiff's process and that it came within the ambit of the invention defined in it.

Claim 5 is broader than Claim 3 in that the requirement of control of the tension on the heated yarn is not limited to maintaining it at a tension less than the contractile force of the yarn is but is a control of the tension that is relative to the contractile force and thermal characteristics of the yarn. Consequently, since the CS3 machines at

Galtex were operated with an overfeed and the plaintiff's process came within the ambit of the invention defined in Claim 3, as already found, it also fell within the broader ambit of the invention defined in Claim 5.

Claim 8 is in almost the same terms as Claim 3. One exception is that, instead of the requirement in Claim 3 that the yarn should be maintained at "a selected uniform tension less than the contractile force of the yarn resulting from heating and twisting the same", Claim 8 requires that the yarn should be maintained "at a uniform tension substantially in excess of the contractile force of the yarn resulting from heating and twisting the same". In respect of this requirement counsel for the plaintiff contended that the maintenance of a tension on the heated yarn that was greater than the contractile force could be accomplished by the use of the plaintiff's process only if the CS3 machine was operated at an underfeed which was not the case in practice and that, consequently, the plaintiff's process did not infringe this claim. The contention cannot be accepted. Mr. Scragg stated

> we provide a ten per cent, up to a ten per cent overfeed or a ten per cent, up to a ten per cent underfeed, in steps of one per cent.

and it was admitted that the yarn used by Dr. Hoff in his tests at the Southern Silk Mills plant at Spring City in Tennessee had been produced on a CS3 machine with an underfeed. There is also the evidence of Mr. Tomlin that Galtex Company Limited had gears that gave a one per cent underfeed and that he had used such an underfeed experimentally. It was also established that any operator who wished to obtain the effect that the use of an underfeed would give could obtain the necessary gears from the plaintiff. There is also the requirement in Claim 8, which does not appear in the other process claims in issue, that the yarn should be continually untwisted to the exact extent to which it was twisted. The evidence of Mr. Scragg, Dr. Dudzik and Mr. Seem to the effect that the yarn produced on the CS3 machines was comparable in quality to that produced on the defendant's machine sufficiently establishes that this requirement was met in the plaintiff's process. Consequently, the plaintiff's process came within the ambit of the invention defined in Claim 8.

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In view of the fact that the plaintiff's process as used at Galtex came within the ambit of the invention defined in each of the claims in issue of patent No. 552,104 I find that the plaintiff has infringed the defendant's rights under them.

There remains the question whether the plaintiff has infringed the defendant's rights under Claim 3 of patent No. 552,105. Before I deal specifically with this question, I should refer to the evidence relating to the temperature control system used by the plaintiff in the operation of its CS3 machine.

Earlier in these reasons I referred to Mr. Seem's explanation of how the temperature controls in the defendant's apparatus operated. With the portable bench model which he and Mr. Stoddard invented in July, 1947, they used certain pieces of equipment in addition to the motor, comprising a voltage regulator, a step-down transformer, a rheostat, a calibrated voltmeter and a voltmeter. The voltage regulator was used to make corrections in the voltage coming from the outside power system. The stepdown transformer was used to step the incoming voltage being fed to the heater down from 120 volts to safe voltages of from 24 volts downward. The output of the stepdown transformer went through the rheostat and this enabled Mr. Seem to make a fine adjustment of the voltage going to the heater. This was changed as required in order to correlate changes in the temperature of the heater with tensions in the yarn. There was originally a thermometer in the heater which enabled Mr. Seem to observe the temperature in the heater so that if there was a change in the ambient temperature he could make a hand adjustment of the rheostat in whatever direction was necessary in order to maintain a uniform temperature in the heater. Within a week or two after the receipt of the bench model Mr. Seem used additional equipment for the purpose of making automatic changes in the voltage fed to the heater to meet changes in the ambient temperature. This consisted of a small induction voltage regulator with a temperature sensitive resistor. The thermometer in the heater was taken out and the temperature sensitive resistor inserted in its place. Effective insulation was used and the equipment worked satisfactorily. It compensated automatically for

changes in the ambient temperature. Mr. Seem and Mr. Stoddard found that with the use of this equipment they were able to control the temperature in the heater and keep it uniform within plus or minus one per cent in spite of changes in the ambient temperature. The second voltage meter was used merely for the purpose of determining what voltage was required to produce a given temperature in the heater. Subsequently, there was a change in the location of the temperature sensitive resistor. When the single machine was built it was in one of the heaters but when the eight machines were completed in 1953 or early in 1954 it was put in a central position relative to them so that it could control them all.

The evidence regarding the temperature controls in the plaintiff's CS3 machines is clear. It was admitted that the plaintiff used the Fielden System in its machines. This is described in detail in Exhibit 49C. The equipment is referred to as a "Multipoint Temperature Controller and Automatic Monitor". Exhibit 49C states that it "has been developed to ensure that all the yarn which is being processed on the machine is maintained at a constant and predetermined temperature". Mr. Scragg agreed that this was the object of the system. Exhibit 49C also states that the machine consists of a number of processing zones, that each zone is electrically heated, that the heater is "lagged" to minimize the effect of ambient temperature changes and also ensured that the yarn during processing attains the temperature of the heater itself. Mr. Scragg explained that the term "lagged" means that the heater is thermally insulated or thermally isolated. Exhibit 49C sets out the essential parts of the equipment, namely, thermocouples, heater, hot-pot, A.C. thermostat, transformer, ballast resistor, contactor, calibrate control, error scanner and error indicator. The heater is an insulated container having a heated strip over which the yarn passes and to which a thermocouple is clamped, which provides a small voltage relative to temperature. The thermocouple wires are led from the heaters down the centre of the machine and terminated in a junction box. The hot-pot is an insulated container which houses a heating element, the temperature of which is meaured by a thermometer. The hot-pot con-

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tains a resistance element the resistance of which changes as the temperature changes and a thermocouple similar to the thermocouples within the heaters. The A.C. Thermostat is an electronic unit that provides switching action relative to the change of resistance of the resistance element in the hot-pot. The transformer is employed as a method of reducing the main's supply voltage to a safe working voltage for the bussbars which feed each heater. The error scanner is a motor driven switch which selects each thermocouple in each of the heaters in turn automatically and feeds the voltage to the error indicator which is a self balancing system arranged to provide a visual indication of the difference in voltage between the thermocouple within the hot-pot and the thermocouples within the heaters and relating the voltage to an arbitrary temperature scale. Exhibit 49C states that each heater pad is controlled to very fine temperature limits and describes in detail the manner in which the control action operates. There is a close relationship in the system between the temperature in the heater and the temperature of the hot-pot. Exhibit 49C states that the heaters are all connected to the bussbars in the machine and that they will settle down to a temperature which, although constant may not equal that of the hot-pot, but that to ensure that the temperature of the heaters is the same as that within the hot-pot the output voltage from the thermocouple within the heaters is compared in turn through the scanning switch with the output voltage from the thermocouple within the hot-pot. The function of the scanner is a monitoring one, namely, to connect the thermocouple in each heater in turn with the thermocouple within the hot-pot and display the difference in temperature which may exist on the error indicator. It looks at each heater temperature in turn, compares it with the hot-pot temperature and if the deviation in temperature is more than a pre-determined amount a warning light goes on so that the heater may be trimmed and the deviation eliminated.

Exhibit 49F specifies the heater control of the CS3 machine as follows:

> Temperature controlled by electronic thermostat. Automatic monitoring of individual heaters.

and describes the electronic control of temperature as follows:

> The heater temperature regulation and monitoring system is mounted as a unit at the end of the machine. The temperature level of the heaters is controlled by an electronic thermostat sensitive to the temperature of a master hot-pot mounted at the end of the machine and adjustable to cover a temperature range of 150°C. to 250°C. and to maintain the temperature at an accuracy of ±1°C. A fully automatic scanning system samples the temperature of each individual yarn heater by measuring the output of its thermocouple every 15 minutes. The reference number of the heater being monitored is indicated on a large dial at the end of the machine, and its temperature is shown on a further dial as a deviation from the hot-pot temperature. Should this deviation ever exceed a pre-determined amount, the scanning system stops with the indicator finger at the appropriate heater number and a red light gives the alarm. The heater can then be trimmed manually. The same signal is given in the event of a yarn break.

Then Exhibit 49F states:

> This system which is unique, ensured that no yarn can leave the machine unless it has been correctly processed.

I come now specifically to the question whether the CS3 machines at Galtex were within the ambit of the apparatus invention defined in Claim 3 of patent No. 552,105. It will be convenient in determining this question to set out the elements in the claim and consider whether they were comprised in the CS3 machines at Galtex.

There is no doubt that each of them was an "apparatus for thermally processing thermoplastic yarn". It was admitted in the agreement, filed as Exhibit 49, that certain nylon and terylene yarns were processed on the said machines. The fact that thermoplastic yarn was produced on them was proved by Mr. Tomlin, Mr. Seem and Dr. Dudzik and the production of the sample of yarn filed as Exhibit Z-143. And Mr. Dufort testified that thermoplastic yarn had been produced on CS3 machines in several mills in Canada.

The first element comprised in the apparatus defined in Claim 3 is stated as "a support for a supply of yarn". Mr. Scragg stated that the CS3 machine did have such a support and such support is shown on Exhibits Z-6 and 95.

The next element is set out as follows:

> wind-up means for the processed yarn spaced from said support and operable to draw the yarn continuously at a selected linear speed from the supply to the wind-up means

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There is no dispute that the wind-up means is "spaced from said support" but counsel for the plaintiff contended that the wind-up means in the plaintiff's machine was not operable to draw the yarn continuously at a selected linear speed from the supply to the wind-up means. Two submissions were involved in the contention. One was that since the input rollers in the CS3 machine might operate at a different speed from that of the output rollers there would be differences in the linear speed of the yarn as it passed through the machine and it could not be said that the wind-up means drew the yarn "continuously" at a selected linear speed. The submission is without merit, for the fact that the linear speed of the yarn may change does not detract from the fact that it was selected. The fact that the linear speed of the yarn was selected was proved by Mr. Scragg, Mr. Seem, Dr. Dudzik and Mr. Tomlin. The other submission involved in the contention, namely, that in the CS3 machine the wind-up means is not operable to draw the yarn from the supply to the wind-up means, requires more consideration. Mr. Seem expressed the opinion that the wind-up means in the CS3 machine consists of the output rollers acting together with the take up package, as the same are shown on Exhibit Z-6, but counsel for the plaintiff submitted that even if this is so, the output rollers draw the yarn only from the input rollers and they in turn draw it from the supply and that, consequently, it cannot be said that the wind-up means draws the yarn from the supply. In my opinion, the submission is not well founded. It cannot fairly be said that the input rollers draw the yarn from the supply. It is their function, if an over-feed is used, to control the tension on the yarn and thereby hold it back rather than draw it. But even if the input rollers assist in drawing the yarn from the supply the evidence established that the forces developed at the output rollers and at the take up package co-operate to draw the yarn through the system, including the input rollers, notwithstanding their hold back function. This was the effect of Mr. Scragg's evidence relating to the forces referred to. He also agreed that there is nothing in the CS3 machine other than the take up mechanism that operates to draw the yarn upwardly from the source of supply. In my opinion, the element under discussion was comprised in the CS3 machines at Galtex.

The next element in Claim 3 is stated as follows:

an electrically energized heating device defining a restricted thermally isolated heating zone for passage of the yarn therethrough to heat the yarn to a prescribed temperature.

Counsel contended, as he did in the case of Claim 1 of patent No. 552,104, that in the plaintiff's apparatus there is no restricted heated zone, no thermally isolated heated zone and no prescribed temperature. The answers made to the contentions put forward in the case of Claim 1 are equally applicable to the contentions now put forward and need not be repeated. It was clearly established that the CS3 machines at Galtex had an electrically energized heating device and that it defined a restricted thermally isolated heating zone for the passage of the yarn through it. And it is clear that its purpose was to heat the yarn to a prescribed temperature, meaning thereby the temperature required to enable the yarn to be yarn-set.

And it is clear that the CS3 machines at Galtex contained

a false-twist device operable to twist the yarn before passage thereof through said heated zone and to untwist the yarn after the said passage through the heated zone

There was a dispute regarding the next element in the claim which is stated as follows:

control means operable automatically to regulate the supply of heat energy to said zone compensatively according to the rate of transfer of heat to the yarn to maintain said zone uniformly at the temperature required to heat the yarn to said prescribed temperature

Counsel for the plaintiff gave three reasons for contending that this element was not comprised in the plaintiff's CS3 machine. His first was that it did not have any control means that were operable automatically to regulate the supply of heat energy to the heated zone, the second that the control means in its machine did not operate compensatively according to the rate of transfer of heat to the yarn and the third that its heated zone was not maintained uniformly at the temperature required to heat the yarn to its prescribed temperature.

In my opinion, the temperature control means specified in the claim must not be considered apart from the purpose intended to be served by it, namely, to maintain the heated zone uniformly at the temperature required to heat the

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yarn to its prescribed purpose. It is, therefore, important to consider whether the specified purpose was accomplished by the control means in the plaintiff's machine. If it was not, that is the end of the matter. I shall, therefore, deal with counsel's reasons in their reverse order and consider first whether the specified purpose was accomplished by the control means in the plaintiff's CS3 machine. In my opinion, the evidence is conclusive that it was. The prescribed temperature referred to is that which is required in order to enable the yarn to be yarn-set. The specification of patent No. 552,105 states that "the degree and permanency of the crimp wave or puff is attained by maintaining the treating temperature well up to the melting point of the thermoplastic, i.e., not less than forty per cent below the melting point". It was established that the temperature of the master hot-pot in the CS3 machine was set at such a level as to enable the yarn to be treated at the appropriate temperature so that it might be correctly processed, that is to say, the prescribed temperature. This was implied in Mr. Scragg's agreement that "the operator selects the speed of the yarn and he selects the overfeed and in consequence the tension of the yarn, and he selects indirectly, by means of his hot-pot, the temperature at which in fact the yarn is treated". Exhibit 49C emphasizes that the plaintiff's system ensures that no yarn can leave the machine unless it has been correctly processed. This means that the "prescribed temperature" has been used in processing it. In its description of the electronic control in the plaintiff's system Exhibit 49F states:

> The temperature level of the heaters is controlled by an electronic thermostat sensitive to the temperature of a master hot-pot mounted at the end of the machine and adjustable to cover a temperature range of 150°C to 250°C and to maintain the temperature to an accuracy of ±1°C.

There was a dispute between counsel whether the accuracy of temperature referred to was that of the heater or that of the hot-pot. Counsel for the plaintiff contended that it was the latter. In my opinion, it does not matter which is right, for it is clear that the purpose of the Fielden system is "to ensure that all the yarn which is being processed on the machine is maintained at a constant and predetermined temperature" and this means that the heated zone must be maintained uniformly at the required temperature, in

the sense that the temperature at any given point in the heater is constant. It is not necessary to the uniformity of the temperaure in the heated zone that it should be the same throughout the zone. In this connection I should also refer to the statement in Exhibit 49D:

> The temperature control is designated to cover a range from 150°C. to 250°C., and in conjunction with the automatic scanner the temperature of each heater can be controlled to an accuracy of ±1°C.

While Exhibit 49D refers specifically to the plaintiff's CS1 machine the statement is also applicable to the plaintiff's CS3 machine.

There is also the conclusive evidence of Dr. Dudzik that he measured the temperature of the heater during the two-day period he was there. I set out his statement:

> Well, what I did was to take one of our standard instruments known as a Rubicon tensiometer which is calibrated to measure temperature and tapped it into the controlling thermocouple of the heater and let it stay there for the two days I was there. I made probably 40 to 50 observations of the temperature indicated by that meter and I found that the temperature varied within the range of 464 to 468 degrees Fahrenheit, a difference of four degrees.

His examinations were made at all hours in order to observe whether local mill or city conditions would affect it. Counsel for the plaintiff contended that "the controlling thermocouple of the heater" is, of course, the thermocouple in the hot-pot. I dismiss this contention summarily. There is a thermocouple clamped to each heater as well as the thermocouple in the hot-pot. Dr. Dudzik would know the difference between the heater and the hot-pot. There would be no purpose in his measuring the temperature of the hot-pot and he made no reference to it in his statement. He said specifically that he measured the temperature "of the heater" and found a variation of only 4°F., which indicated a control of temperature in the heater to an accuracy of less than 1°C. It is significant that Dr. Dudzik was not cross-examined on his statement. I accept his evidence without hesitation. On the evidence which I have reviewed I find that the heater in the CS3 machines at Galtex was maintained uniformly at the temperature required to heat the yarn to its prescribed temperature within the meaning of the claim.

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Counsel's contention that the control means in the plaintiff's CS3 machine did not operate compensatively according to the rate of transfer of heat to the yarn is the same as that put forward in connection with Claim 3 of patent No. 552,104 and the answer made to it is applicable in the present case without repetition in it.

This leaves counsel's contention that the plaintiff's machine did not have control means that were operable automatically to regulate the supply of heat energy to the heated zone. He argued that the method of operating the plaintiff's machine was different from that used by the defendant in operating its machine in that in the latter there is a thermal sensing device in one of the pots, meaning, no doubt, the temperature sensitive resistor that was inserted in one of the defendant's heaters in the place of the thermometer that was previously placed in it, and that the use of this device resulted in temperature control means that compensated automatically for changes in the ambient temperature and rate of transfer of heat to the yarn and made it possible to control the temperature in the heater within plus or minus one per cent, whereas in the plaintiff's machine there was no such method of control and no means for it. In the plaintiff's system, he contended, there was a reference pot which did nothing more than supply a fixed rate of heat to each of the heaters and a scanning device which gave a warning signal if there was a deviation in the temperature of any one of the heaters from the hot-pot temperature in excess of a pre-determined amount, in which case the deviation was corrected manually by trimming the deviating heater. The fact that the temperature control means used in the plaintiff's machine is different from that used in the defendant's machine does not take it out of the ambit of the claim. There is no doubt that the plaintiff's CS3 machine does comprise a control means to regulate the supply of heat energy to the heated zone. Mr. Dufort gave a detailed and clear explanation of the operation of the plaintiff's temperature control system and heater monitoring system, which were illustrated in a schematic diagram, filed as Exhibit 97. One system, the temperature control system, controls the voltage and the supply of heat energy to the hot-pot and to the heaters. The thermostat sets the temperature of the hot-pot at the

desired level and controls the supply of heat energy to it to keep it at a constant temperature. Then the temperature of each heater is set to that of the hot-pot by a trimmer just below the heater and the thermostat controls the supply of heat energy to the heaters as well as to the hot-pot. The function of the other system, the monitoring system, is to inspect the temperatures of the heaters and compare them with the temperature of the hot-pot and to give a warning to the operator of the machine if there is an undue deviation between the temperature of a particular heater and that of the hot-pot. If there is such a deviation it is corrected manually by the trimmer and the temperature of the heater is restored to its desired level. Mr. Scragg stated in a letter to British Nylon Spinners that the plaintiff's new machine incorporates complete control of all tensions and temperatures to very fine limits. Exhibit 49C contains the statement that each heater pad is controlled to very fine temperature limits and Exhibit 49F refers to the heat control arrangements in the CS3 machine as being "extraordinarily accurate". There is thus no doubt that the plaintiff's CS3 machine had control means that was operable to regulate the supply of heat energy to the heated zone. Counsel is, therefore, left with his bare contention that, because the monitoring system in the plaintiff's machine contemplates that the heater in which it finds that there has been an undue deviation of temperature from that of the hot-pot will be adjusted manually, the control means in the plaintiff's machine is not operable "automatically" to regulate the supply of heat energy to the heated zone. The contention is a technical one based on too literal a meaning being given to the word "automatically". Any system based on the operation of a thermostat may run into a temporary deviation from its normal course. The fact that provision is made for a warning signal that a deviation has occurred calling for a manual adjustment to correct the deviation does not mean that the system is not operable automatically. The temperature of the heater in the plaintiff's machine is set by the trimmer in the first place and when the monitoring system gives its warning the temperature is set again by the trimmer and the normal course is restored. The thermostat operates to regulate the supply of heat energy and the monitoring

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system operates automatically to give a warning signal if a deviation has occurred so that it can be instantly corrected. In my view, the plaintiff's temperature control system and its monitoring system, illustrated by Exhibit 97, co-operate with one another and constitute control means operable automatically to regulate the supply of heat energy to the heated zone within the meaning of the claim as any addressee of the patent would understand it if he were willing to do so.

In my opinion, the element referred to was comprised in the CS3 machines at Galtex.

The next element relates to the tension means in the patented apparatus and is described as follows:

> tension means operable to maintain the yarn at a uniform tension during passage thereof through said heating device and to the wind-up means.

Counsel for the plaintiff contended that in the plaintiff's CS3 machine there was no tension means operable to maintain the yarn at a uniform tension during passage thereof through said heated device and to the wind-up means. He contended further that the claim required that the tension must be the same throughout the distance from the beginning of the heater to the wind-up means and that this condition was not present in the plaintiff's machine. He submitted that one of the principal differences between the plaintiff's machine and the defendant's apparatus is that in the former the yarn feed is controlled by shafts having rollers which are common to the whole machine which ensures that the contraction rate and yarn speed on all the spindles of the machine are the same, whereas in the defendant's apparatus each yarn position has a tensioner which must be carefully adjusted in accordance with the temperature and the rate of linear speed of the yarn. The fact of this difference does not matter, for the claim is not limited to any particular tension means. Mr. Dufort admitted that the plaintiff's system of rollers is a tension regulating means and Dr. Dudzik stated that the rollers operate as a tension device. Thus there is a tension means in the plaintiff's machine. The contention of counsel that the claim requires that the tension must be the same throughout the machine is similar to that put forward in connection with the expression "uniform tension" in Claim 1 of patent No. 552,104 and the answer to it is similar.

Moreover, it is obvious that as the yarn passes through the heater towards the wind-up means it will pick up additional tension through friction with the parts over which it passes. Any addressee of the patent who was willing to understand it would, therefore, know that the expression "uniform tension", as it appears in the claim, could not have been intended to mean that the tension on the yarn must be the same throughout the machine. He would know, without doubt, that the expression means that the tension on the yarn should be constant at any given point in the system. There is no doubt that in the plaintiff's machine the tension on the yarn as it passed through the heater and to the wind-up means was constant. Mr. Scragg stated that "our new machine incorporates complete control of all tensions . . . to very fine limits . . ." Exhibit 49D says of the plaintiff's CS1 machine that "constant tension values are retained throughout". And Exhibit 49F says that "the precise feed control and perfectly straight yarn path all ensure absolutely constant yarn processing conditions". Mr. Seem stated that the tension on the yarn in the CS3 machines at Galtex would be constant at any given point along the system. In my opinion, the element under discussion was comprised in the CS3 machines at Galtex.

There remains only the final element specified in the claim which is expressed as follows:

> means to regulate the tension means to control the tension of the yarn in correlation to the prescribed temperature and linear speed of travel of the yarn to maintain the latter at a selected uniform tension relative to the contractile force and thermal characteristics of the yarn.

In respect of this element counsel for the plaintiff contended that the provision in the plaintiff's machine for changes in the overfeed in increments of one per cent is not regulation of the tension means, that because the tension in the machine is determined by the temperature for any given overfeed it cannot be said that the tension and the temperature are correlated, that there is no selection of tension and that the tension resulting from the selection of a heater temperature and overfeed is not uniform.

The contentions are not well founded. The gears that enable a change to be made in the overfeed of the machine is a means to regulate the tension means to control the

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tension of the yarn. Mr. Dufort said that the relative speeds of the input and output rollers would affect the tension on the yarn and Dr. Dudzik said that there was means on the CS3 machines at Galtex to change the relative speeds of the lower and upper rolls and that the tension on the yarn could be controlled accordingly. Both Dr. Dudzik and Mr. Seem expressed the opinion, which I adopted as mine, that the plaintiff practised correlation of tension, temperature and linear speed of travel of the yarn. The whole purpose of supplying gears was to enable the user of the machine to control the tension on the yarn in correlation to the prescribed temperature and linear speed of the yarn. Nor is there any doubt that the tension on the yarn was selected. Mr. Scragg made this clear when he agreed that "the operator selects the speed of the yarn and he selects the overfeed and in consequence the tension of the yarn". And it is clear that the tension was uniform in the sense already stated. It was also established, as already stated, that the tension was relative to the contractile force and thermal characteristics of the yarn. Mr. Seem explained how the CS3 machines at Galtex were operated in such a way as to relate the tension on the yarn to its contractile force, for example, the tension would be greater than the contractile force if an underfeed was used, equal to it if the overfeed was zero and less than it if any of the other overfeeds was used. And it is clear that certain overfeeds were used for different kinds and deniers of yarn. In my opinion, the element under consideration was comprised in the CS3 machines at Galtex.

I find, accordingly, that the CS3 machines at Galtex came within the ambit of the invention defined in Claim 3 of patent No. 552,105 and that the plaintiff has infringed the defendant's rights under it.

In view of my finding that the invention defined in the claims in issue was not anticipated and that the plaintiff has infringed the rights of the defendant under them I find that the so-called Gillette defence based on the statement of Lord Moulton in *Gillette Safety Razor Company v. Anglo-American Trading Company Ld.*[1] is not open to the plaintiff.

[1] (1913) 3 R.P.C. 465 at 480.

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It follows from what I have said that the plaintiff's action must be dimissed and the defendant's counterclaim allowed. There will, therefore, be judgment in favor of the defendant against the plaintiff that as between the parties the claims in issue are valid and that the plaintiff has infringed the defendant's rights under them and that the defendant is entitled to the relief sought by it in the counterclaim, except as to damages. If the parties are unable to agree on the amount of the damages or the amount of the profits, if the defendant elects an account of them, there will be a reference to the Registrar or a Deputy Registrar to determine the amount of such damages or profits and judgment in favor of the defendant for the amount found on such reference. The defendant is entitled to the costs of the action and of the counterclaim to be taxed in the usual way.

Judgment accordingly.