als, means "equally good." Tyler v. Boston, 7 Wall. 327. The patentees say, according to complainant's expert, "If you take any sulpho acid of any radical, and treat as we direct you, you will get a color producing black." In fact, very many of these bodies are not equivalents, and will not produce a black color. Whether this statement is true or false, as applied to a particular color, can be ascertained only by experiment. Complainant's expert says, "As far as those bodies are concerned, a chemist would be obliged to experiment in order to find out the fact inquired about." If the experiment succeeds, the patentees claim the body as an equivalent. If it fails, they disclaim it. The law requires that the description in a patent for a chemical discovery should be especially clear and distinct. The rule and the reason are stated by Mr. Justice Grier in Tyler v. Boston, supra, as follows:

"A machine which consists of a combination of devices is the subject of invention, and its effects may be calculated a priori, while a discovery of a new substance by means of chemical combinations of known materials is empirical, and discovered by experiment."

Counsel for defendant has furnished the court with a copy of the opinion of the lord chancellor in Simpson v. Holliday, 13 Wkly. Rep. 577, in which a question similar to that presented herein was decided adversely to the complainant. There a patentee described two separate chemical processes for the production of a certain dye. One process was ineffective. It was claimed, however, that as this ineffective process was so described that a person of ordinary knowledge and observation would reject it, and adopt the other, no one would be misled. But the lord chancellor declared the patent void, and dismissed the bill, saying that while it is true that errors which could not possibly mislead, such as those appearing on the face of a specification, would not vitiate a patent—

"The proposition is not a correct statement of the law, if applied to errors which are discoverable only by experiment and further inquiry. Neither is the proposition true of an erroneous statement in a specification, amounting to a false suggestion, even though the error would be at once observed by a workman possessed of ordinary knowledge of the subject."

Judge Shepley, in Jenkins v. Walker, Holmes, 123, Fed. Cas. No. 7,275, says:

"When the specification of a new composition of matter gives only the names of the substances which are to be mixed together, without stating any relative proportion, undoubtedly it would be the duty of the court to declare the patent void, and the same rule would prevail when it was apparent that the proportions were stated ambiguously or vaguely; for in such cases it would be evident on the face of the specification that no one could use the invention without first ascertaining by experiment the exact proportion of the different ingredients required to produce the result intended to be obtained. The specification must be in such full, clear, and exact terms as to enable any one skilled in the art to which it appertains to compound and use the invention; that is to say, to compound and use it without any experiments of his own." Moody v. Fiske, 2 Mason, 119, Fed. Cas. No. 9,745.

It seems to me that this attempt of the patentees to cover this group of bodies, and thereby to appropriate products not embraced within their discovery, should not be countenanced. Discovery cannot be claimed in advance of experiment. There is no considera-

tion whereon to found the contract for the enjoyment of the monopoly implied by the grant of the patent.

It is further claimed that, if the patent is to be construed to cover the alleged equivalents embraced within the general formula, it is anticipated. The facts bearing on that point, omitting technicalities, are as follows: Of the colors included among the equivalents embraced in the general formula and description, two, namely, diazobenzole-mono-sulpho-acid and diazo-naphthalene-mono-sulpho-acid were commercially sold and used for dyeing black in this country prior to the date of the application for the patent in suit. The former color is a fast violet. When mixed with yellow, it dyes black. The latter is a blue violet, or azo black, and is now known to be naphthol black. The chief answer to this claim of anticipation, with reference to the general formula, is that these colors were made by a secret process in Germany, not discoverable by inspection or analysis, and that the invention was not present in this country, nor published or described, at the date of the patent in suit. The defendant cites the case of Cohn v. Corset Co., 93 U. S. 377, in support of the proposition that a patent for a product may be anticipated by showing or describing the product, without describing the mode of manufacture. There, the complainant had patented a certain form of corset. He did not exhibit or claim the process of making. The anticipating specification, in connection with the known state of the art, was sufficient to enable one skilled in the art to make the patented corset, and for that reason the patent was declared invalid. I fail to see the application of that decision to this case. The consideration received from the disclosure of the discovery to the public is the foundation of the right to the monopoly of the patent. As against an original discoverer, the law recognizes no distinction between the lost art, the abandoned experiment, and the secret process. Whether the conception slumbers buried in the ashes of the past, lies inchoate in the brain of the would-be inventor, or is locked in the breast of its creator, it cannot afterwards be dug up, developed, or set free, to question the title of the complete creation first brought forth into the world of knowledge, and thus, as the first born, the rightful heir to the patent estate. As against an original inventor, anticipation is not shown by prior use of the invention under conditions which fail to disclose its composition or operation. Such knowledge of the invention should be accessible to the public. In Boyd v. Cherry, 50 Fed. 279, 283, Judge McCrary says:

"If the alleged prior use of the process was under such circumstances that the public obtained no knowledge of the mode of its operation, or of the results to be obtained by it, there is no prior use, within the meaning of the patent law. If kept secret by the first inventor until the second has discovered it and given it to the public, the latter will be protected, for it is to him that the public is indebted; it is from him that the public has received value." 3 Rob. Pat. 152.

Irrespective of the legal questions raised by the fact that the composition of these colors was unknown, it appears that these colors are not anticipations, if the scope of the patent is limited to the

special process. While both are embraced within the general formula, neither belongs to the class or body named in said special process, namely, naphthylamine-disulpho acid. It is proved that fast violet is the soda salt of aniline paramono-sulpho acid, while azo black is the sodium salt of beta-naphthyl-sulpho acid. In short, these colors, alleged as anticipations, are mono-sulpho acid products. The color of the patent is a disulpho acid product. Further chemical facts are shown in support of this denial of anticipation, but they are merely cumulative, and need not be stated here. They show, generally, that the starting material named in the special process of the patent is radically different from that of either of said colors. In view of the conclusions reached, the consideration of these matters was unnecessary; but it has seemed desirable, in the peculiar circumstances of this case, to pass upon the various points raised, in order that they may be more readily presented upon appeal.

A further defense, which is directed against the whole patent, is its inaccuracy and insufficiency, by reason of which, it is said, it is practically inoperative. It is claimed that these errors are so misleading as to render the patent void. One branch of this subject has already been considered in connection with the experiments of defendant's expert following the general description, and as to which he testified he obtained as a result, purple, drab, brown, and other colors. Defendant's expert made further experiments, following the corrected instructions of the special process, without obtaining the product of the patent. It is admitted that said product can only be obtained by making certain changes in said special process, namely, by changing the word "nitrate" to "nitrite," in line 28 of the specification, and by adding a direction for a second diazotization of the compound before it acts upon the solution of beta-napthol-alpha-disulphonate of sodium. "Nitrate" of sodium in the patent appeared as "nitrite" of sodium in the original application, but was afterwards altered by the attorneys for the applicants. The mistake does not appear to be material, for the experts for complainant testify that no one skilled in the art would be misled by the mistake. The chief reasons given are that it was well known at the date of the patent that it was necessary to use nitrite of sodium to carry out the diazotization in the manufacture of coal-tar colors, and that the use of the word "nitrate" for "nitrite" was common in the earlier United States azo patents. It is manifest from the whole evidence that this error is immaterial.

The next error is in the omission to describe, or provide for, the second diazotization, whereby the amido-azo compound is converted into a diazo-azo compound. The special process of the patent, up to a certain point (line 33), describes a diazo compound. It is next referred to as a diazo-azo compound. The file wrapper shows that the original application contained directions for a second diazotization, after waiting 12 hours, by the addition of muriatic acid and nitrite of sodium. It does not appear how this or the preceding error occurred. The complainant argues that they were due to the ignorance of the patent solicitors in this country. The defendant con-

tends that, as the patentees manifestly originally understood and correctly stated the process, these errors were intentionally inserted into the specification, in order to mislead. In the absence of any proof other than what appears from the record, it has seemed just to test their materiality by the inquiry whether they were of such a character as to mislead one skilled in the art, and thereby deprive the public of the benefit of the alleged invention. As already stated, it does not appear that the use of the word "nitrate" instead of "nitrite" was in fact misleading. The testimony of complainant's experts has satisfied me that the second error also is immaterial, because they show—First, that the general formula provides for the conversion of the amido-azo compound into the diazo-azo compound; second, that the reference to the compound, in line 34 of the specification, as a diazo-azo compound, would be sufficient to inform any practical coal-tar color manufacturer that a second diazotization was necessary; and, finally, that any one skilled in the art would have understood at once that the necessary second diazotization could be accomplished by merely repeating the first diazotization as directed and explained in the specification. This view is confirmed by the fact that while the learned expert for the defendant attributed a series of the failures in his experiments to the errors caused by following the process of the patent, he did not state that they were such as would mislead a person skilled in the art, and no witness was called to deny the statements of complainant's experts on this point.

A further error occurs in the tests stated in the specification, but, as this chiefly concerns the question of infringement, it will be considered in that connection.

Counsel for defendant claims that the whole patent is invalidated by reason of said general formula and description. I have not been able to adopt this view, for the following reasons:

Said general statement may be fairly considered as a disclosure to the public of the general character and scope of the discovery, inserted merely as a help to a better comprehension of the special process of the patent. As is stated by complainant's expert, a chemist would more readily understand the process and reactions from such a graphical formula than from a general description. A comparison of said statement with the special process, and an examination of the claim, show that the general formula only describes the class of bodies to which naphthyl belongs, and covers only the first step in the reaction. It does not profess to give a resulting color or product. This was the first printed publication of such a coal-tar process and product. While it may be questioned whether the general formula and description, as a matter of law, could be construed, as claimed by complainant's counsel, so as to cover all the bodies included therein, yet, even if this construction be assumed, it does not appear that it was based upon experiment, and it does not purport to be a complete description of the necessary process. When, however, the patentees undertake to describe the complete process, and to claim the resulting product, they confine the application of the process to a single body, and the tests and claim to a single product. It does not appear that a person skilled in the art, upon reading the patent,

would have been misled into supposing that all the compounds covered by the general formula would produce the patented color, or, upon an examination of the whole patent, would have understood that it purported to describe all the bodies included under the general formula. The patentees say that "the present invention relates to a new method for manufacturing blue to violet coloring matters belonging to the azo group." They then say, "We take one of the compounds corresponding to the general formula," etc., and treat and convert it. Then follows the special process for obtaining one of the various "coloring matters belonging to the azo group," namely, naphthol black, with appropriate tests, and a claim limited to the single product of the special process upon the special body "naphthyl."

Furthermore, no principle has been more firmly established and consistently applied, in the federal courts of last resort, than that the patent must be construed in conformity with the self-imposed limitations contained in the claims. Groth v. Supply Co., 9 C. C. A. 507, 61 Fed. 284; McClain v. Ortmayer, 141 U. S. 419, 12 Sup. Ct. 76; Manufacturing Co. v. Weeks, 9 C. C. A. 555, 61 Fed. 405. The application of this principle of construction may be invoked in support of the validity of the patent as well as in denial of infringement. In the case at bar the claim is confined by "the herein-described dyestuff * * * as set forth." The only dyestuff described is the filtered coloring matter, delivered to the trade as a black paste, or in solid form, of the special process. The general statement contains no reference to a product. Manifestly, the claim could not be construed to cover any body other than the naphthyl of the special process, either upon the question of infringement or validity. I am aware that these views do not accord with the broad claims of the complainant's counsel, but the above construction seems to me the only one justified by an interpretation of the whole instrument. The attempt of complainant's counsel and experts to torture this incomplete, unclaimed, general disclosure of the discovery into an unwarranted appropriation of hundreds of bodies, in advance of experiment, has furnished to defendant some of the strongest evidence in support of the arguments against the validity of the patent.

I conclude, therefore, that the multifariousness of the general formula does not invalidate the whole patent, but that said patent may be valid, at least where so limited as to embrace only the product of the special process, definitely stated, and applied to naphthylamine-disulphonate of sodium, as specifically claimed.

Even if the scope of the patent be thus limited, the general formula and description, under the familiar rule of construction, may be resorted to in order to interpret and explain the whole patent. The special process describes in detail the method of making "naphthol black" from the chemical product or salt, naphthylamine-disulphonate of sodium. At the date of the patent in suit the term "naphthylamine-disulphonate of sodium" was known as covering some four or five naphthylamine-disulpho acids. Upon three or these acids, namely, beta-naphthylamine acid R., beta-naphthylamine acid G., and Freund's acid, experiments were made

by the experts on each side. The experts for complainants succeeded in producing the color of the patent in every case. The single expert for defendant entirely failed in one case; in others, the results were inconclusive. All the experts are eminent scientists. All swear they faithfully followed the directions of the patent. Upon this proof the counsel for defendant makes the following claim, namely, that such patents should be so plain, under the statute, as that an ordinary manufacturer of aniline colors, having such ordinary knowledge as existed in this country at the date of the patent, should be enabled by the instructions of that patent to carry out successfully its process. This point is well taken. The following considerations will be confined to such evidence as relates to experiments following the corrected method of the special process:

Dr. Liebmann, the expert for defendant, admits that after he had failed in his experiments, following the directions of the patent, he succeeded in producing from the G. acid the color of the patent by the use of a secret process, not described in the patent, but invented by him. He admits that, at the date of the patent in suit, technically pure G. acid was manufactured, and used in the preparation of dyestuffs. With the Freund's acid he came nearest, except as above, to obtaining the product of the patent. The color was a bluish violet. Dr. Liebmann claims that it did not correspond with the properties described in the patent, and was not produced either by following the instructions of the patent alone, or with the added instructions of the art. He admits, however, that he should probably not have objected to the result if the patent had specified this acid. Dr. Liebmann testifies that the R. acid is the one which a chemist would have naturally selected from those already named as included within the terms of the special process. He states that with this acid he was unable to produce the result of the patent by the use of all care and precautions. The considerations already suggested apply to this evidence. I shall assume the law to be so that if the specification of a patent for a chemical product purports to definitely describe the process of obtaining the product from certain bodies, and a person skilled in the art cannot obtain the result by the use of the method described, upon each one of the bodies included in said description, the patent is invalid. For this reason, among others, the claim that Dr. Liebmann practically produced, or could have produced, the color of the patent from the G. and Freund acids, seems to be immaterial, provided the specification is insufficient as to the R. acid. Dr. Liebmann, for his experiments, used impure naphthylamine-disulpho acids; that is, neither chemically nor technically pure. The experts for complainant used technically pure naphthylamine-disulpho acids. "Technically pure" means pure in the ordinary acceptation of the terms of the art. "Chemically pure" means absolutely pure. The question is, what should or would the ordinary coal-tar chemist have done, in these circumstances? As this inquiry involves a close and difficult question, it will be necessary to examine the evidence at length.

Dr. Liebmann testifies that he procured the correct raw materials, and from them the acids were prepared, partly by himself, and partly by an assistant in his laboratory, according to the literature on the subject. It would only confuse the questions involved to state the chemical processes by which these acids were prepared. It appears that Dr. Liebmann followed the instructions contained in certain standard chemical publications. Having thus prepared them, he did not further identify them; that is, he did not test them to see whether they were pure, or mixed with other substances. He stated that he "examined the raw material, and followed the instructions given, and there was no necessity of further investigation of the identity of this body." It is stipulated that the testimony of complainant's expert, Dr. Schweitzer, is to be considered as having been given also by Dr. Charles F. Chandler and Dr. Henry Morton. Dr. Schweitzer testifies that Dr. Liebmann failed in his experiments, following the special corrected process, because he prepared and used impure naphthylamine-disulpho acids, the impurities in which vitiated his result. Dr. Schweitzer says:

"I myself prepared the naphthylamine-disulpho acids mentioned by Dr. Liebmann, after the directions given by the authorities cited by him, only using the general chemical knowledge of the date of the patent in suit to obtain technically pure acids. And with these acids, in every case, I succeeded without difficulty in obtaining the product of the patent in suit by following the process therein described. It is obvious from Dr. Liebmann's testimony that he took no precautions to obtain his acids in a technically pure form; and since he failed, while I succeeded without difficulty, it seems clear that his failure was due to the modification of the reaction by the impurities contained in his acids."

He states that he has found, by the application of such tests for reaction as would naturally have suggested themselves to any one skilled in the art, that the time allowed by Dr. Liebmann (eight hours) was not sufficient to convert naphthol-disulpho acid R. to naphthylamine-disulpho acid R. Again, as to the preparation of the G. acid, Dr. Schweitzer says:

"Although Dr. Liebmann knew that the calcium salt of this acid was very easily soluble in water, he did not use this convenient property for the separation of this acid from foreign bodies, so as to obtain a practically pure acid for his experiments."

Dr. Schweitzer concludes:

"In the case of the G. acid, as in the case of the acid R., Dr. Liebmann did not use the acid, but a mixture of the acid and other organic substances,—a mixture neither adapted to the process of the patent in suit, nor within its terms."

In the preparation of the Freund acid, Dr. Liebmann followed the directions given in a standard work, but did not follow the specifications of the German patent to Freund for said acid, reprinted in said work. The evidence as to the use of the G. and Freund acids is only material, for reasons already stated, as showing the general character of the experiments testified to by Dr. Liebmann. The Ter-Mer-Dahl acid experiments are not material, as it does not appear that this acid was known at the date of the patent in suit. No question is raised as to the character or use of the other chemicals named in the

special process. Raw materials such as are used in the process of this patent, and in other similar processes in chemical factories, are practically never chemically pure, but for almost all reactions technically pure bodies are used. Dr. Schweitzer, confirmed by Drs. Chandler and Morton, says the acids prepared by him, and separated from the raw product in its entirety, were technically pure bodies. He says:

"The general knowledge taught everybody skilled in the art that there were impurities present in the raw products obtained during the preparation of the naphthylamine-disulpho acid. That these impurities are deleterious to the naphthol-black reaction I only conclude from the result of Dr. Liebmann's and my own experiments. Naturally, the literature at the date of the naphthol-black patent could not give us any information what influence these impurities would have on this new reaction, which was published for the first time. But the patent calls for naphthylamine-disulphonate of sodium, and states that such bodies will give naphthol black. It contains no statement how mixtures will work when subjected to that reaction."

There are no statements in the literature of the art that the processes there given produce impure acids, or that it was necessary to remove any impurities; but Drs. Schweitzer, Chandler, and Morton say that every conscientious chemist would have added such simple operations as would insure a pure product, and that everybody skilled in the art at the time of this patent carried out such operations, when called upon to prepare said acids.

Some stress is laid upon Dr. Schweitzer's statement that he only concluded that the impurities in the raw materials were deleterious to the naphthol-black reaction, from the result of his and Dr. Liebmann's experiments. This is explained, however, by the fact that, having succeeded in the same experiments in which Dr. Liebmann failed, he assumed that the difference in result came from the fact that Dr. Liebmann's materials contained a mixture of acid with foreign organic bodies, which vitiated his reactions. It will be remembered that with the R. acid Dr. Liebmann did not obtain anything like the result of the patent. Assuming that the question of the sufficiency of the specifications is narrowed down to a consideration of the reactions with the R. acid, two points are presented by counsel for defendant:

The first point is supported by the evidence that Dr. Schweitzer used a certain process, described by one Landshoff, in closed vessels, and obtained the product of the patent in suit, but did not use the other Landshoff process, with open vessels. The Landshoff closed-vessel process states that the conversion is carried out by heating under pressure during 24 hours. The Landshoff open-vessel process directs heating for 12 hours. The cross-examination covers a long and elaborate examination of the literature relating to the preparation of the R. acid. It appears therefrom that the patent for the second Landshoff process, not used by Dr. Schweitzer, stated that the acid thereby produced was without bi-products, —meaning, thereby, free from secondary or foreign products or substances. Dr. Schweitzer declined to give an opinion as to whether the product of the second Landshoff process, treated according to the method of the patent, would produce the naphthol

black of the patent, as he had never practiced said process. He did say, however, as follows:

"In my opinion, derived from my experiments when working with pressure, I should say that twelve hours would not be sufficient to convert the whole quantity of naphthol-disulpho acid present into naphthylamine-disulpho acid. The condition of such product of reaction would not answer to the requirements of the patent, which calls for naphthylamine-disulpho acid, and, when taken as a whole, it would, in my opinion, not give the product of the patent in suit."

The second point is that as Dr. Liebmann, following the literature, failed to obtain the patented product, and Dr. Schweitzer only obtained it after repeated experiments and tests for purity, not referred to in the literature, the information contained in the patent is not legally sufficient. To the general considerations on this point the following may be added:

It is forcibly urged by counsel for defendant that the law would only require that a person skilled in the art should take the product stated by Landshoff to be free from bi-products for his experiments, without further tests, and that such processes of purification as are necessary to be carried on during the preparation of the color must be stated in the specification of the patent. These claims are opposed by the following considerations: As to the second Landshoff process, there is no admission or proof that its product would not produce the patented color, other than Dr. Schweitzer's opinion and reasons above stated. This opinion, not founded on experiment, practically questions only the correctness of the Landshoff statement that the open-vessel 12-hour product would be free from bi-products. It does not appear whether Landshoff was or was not mistaken as to the freedom of his product from bi-products. Dr. Liebmann used the open-vessel process. The defendant failed to show by him, or by any other expert, that the product of the Landshoff closed-vessel process would be inoperative. In the absence of such proof, the insufficiency of the patent in suit will not be assumed on that ground.

Drs. Schweitzer, Chandler, and Morton—three eminent experts—agree in repeated declarations that the general knowledge at the date of the patent taught everybody skilled in the art that there were impurities present in the raw product obtained. They say (using Dr. Schweitzer's language) that the general chemical knowledge would teach such person—

"That the product of any of the described processes for the preparation of naphthylamine-disulpho acid would result in mixed products, since it was known that such was generally the case in complex reactions, such as that of the sulphuration of bodies of that kind. Since the patent was the first publication of the napthol-black reaction he would not know what injurious effect the foreign organic bodies of the mixture might have, and therefore, the patent calling for naphthylamine-disulpho acid, and not for naphthylamine-disulpho acid mixed with something else, would, as a matter of course, apply all of the knowledge of the time to prepare as pure sulpho acids as possible. This I did, and in doing so I succeeded, without difficulty, in obtaining the product of the patent after the process therein set forth. Since I employed only the very simplest operations of chemistry, known long before the patent in suit, it is evident that the knowledge of the time was sufficient to produce naphthylamine-disulpho acid fit for the naphthol-black reaction."

They further say that the so-called investigations and experiments were simple operations, which everybody skilled in the art carried out at the date of the patent in suit, when called upon to prepare naphthylamine-disulpho acid.

These witnesses further agree in the statement that it was the common practice in coal-tar factories, at the date of the patent in suit, to test the raw materials to be used in the manufacture of colors, in order to ascertain their character and degree of purity. This latter evidence was objected to on the ground that the witnesses were not shown to be experts on this point. I think it is relevant, to the extent that acquaintance with such matters may be implied from the professional position and general expert knowledge of Drs. Morton and Chandler, and from the experience of Dr. Schweitzer as a consulting chemist in this country, making coal-tar colors a specialty, and as having formerly had charge of coal-tar color factories in Europe.

Upon the question whether such tests to determine the amount of impurities present in raw materials are usually employed by persons skilled in the art, the following further considerations are material: Dr. Schweitzer, in criticising Dr. Liebmann's failure to test or identify his raw materials, says that the common and ordinary test, at the date of the patent, for reactions in the preparation of the acid, was by simple titration with nitrate of sodium, and the use of iodine starch paper as indicator. The defendant has not only not denied this statement, but Dr. Liebmann seems to admit the general use of such test in these operations. Counsel for complainant asked him this question:

"In your cross-examination you have sometimes referred to materials used by you as of so many grammes weight, will you explain what you mean by this phrase, chemically?"

Dr. Liebmann replied:

"The meaning of the expression is plain to any chemist. It expresses the quantity used, as found by titration with nitrate of soda; that is to say, the number of grammes of pure material used, excluding the impurities."

In this connection, the testimony of Howard S. Neiman, a chemical expert, becomes important. Mr. Neiman is the superintendent of the Albany Coal-Tar, Dye & Chemical Company, a corporation of which complainant is secretary and treasurer. Its selling offices are the same as those of complainant. I have therefore considered this evidence, in view of these circumstances. It is not necessary, however, to discuss his testimony as to the samples used, or certain criticisms of his cross-examination, for reasons which will hereafter appear. Mr. Neiman testifies that he carried out the special process of the patent in suit without difficulty, and obtained in every case the result of the patent. His further testimony is as follows:

"At the date of the patent in suit, would or would it not have been in accordance with the ordinary practice of coal-tar color manufacturers, endeavoring for the first time to carry out the process of a new patent, to test their raw materials before proceeding to manufacture, in order to determine that they were the raw materials called for by the patent, and that they were of the requisite degree of purity to answer the requirements of the patent?

"Most certainly it would have been in accordance with the practice of the

day. A person who was endeavoring to follow the process of the patent in suit on a commercial scale would, as a matter of course, satisfy himself positively that the raw materials he was using were identical with the raw materials called for by the patent, and that these raw materials contained no other substances which might endanger the successful operation of the process of the patent. For instance, the patent in suit calls for naphthylamine disulphonate of sodium. At the date of the patent, a manufacturer endeavoring to follow the process described in the patent in suit would have fully and positively identified the substances he was using, in order to prove that it was naphthylamine disulphonate of sodium, and that it contained no other matters which might in any way prejudice the result."

The testimony of these four experts as to what would have been understood by a person skilled in the art, and as to the sufficiency of the specifications, is not denied by a single coal-tar manufacturer or expert.

Counsel for defendant cites the Nickel-Plating Cases in support of the proposition that "if the conditions of a reaction require a chemical body in an unusual condition, either of formation or purity, the patent must point out the necessity for this condition." But nowhere in the record is there any evidence that it was necessary that the naphthylamine-disulpho acid should be in an unusual condition of purity. It need not be chemically pure, but only technically pure; that is, of such purity as is ordinarily found or required in the arts for the purposes for which it is used.

Counsel for defendant claims that complainant's expert had to make experiments in order to determine whether his materials were technically pure, and that, therefore, the patent is void. Assuming, as matter of law, that this patent must so clearly describe the steps in the process as to enable those skilled in the art to manufacture the product without any new experiment, invention, or discovery, the parties are at issue upon the legal effect of the evidence of the practical tests made by the expert for complainant in the course of his investigations. In my opinion, they do not affect the sufficiency of the specifications, because they were not carried on in pursuance of the process stated in the specification, or in the course of the preparation of the product, but were mere simple, ordinary tests to determine whether the starting material was in fact the naphthylamine-disulpho acid of the specification. Furthermore, while, for the purposes of cross-examination, it might have been desirable that the experts should manufacture their own starting materials, it does not even appear that the ordinary coal-tar manufacturer could not have obtained such chemicals in the market, and of the requisite purity. The conclusive answer to defendant's claim is the uncontradicted evidence, not only that these preliminary operations were merely carried on in order to guard against the presence of deleterious impurities, but that they were such as every conscientious chemist, every coal-tar manufacturer, would have added, in undertaking to obtain a patented product by following the process stated. In this connection, I do not refer to the experiments to test the various equivalents. It has already been assumed that the patent would be void if one of the equivalents included under the term "naphthylamine-disulpho acids" failed to furnish the patented product. This discussion proceeds upon the consideration of the results in the case of the R. acid,

chiefly relied on by defendant. It is true that the evidence as to what would have been understood by persons skilled in the art was not introduced until after Dr. Liebmann, defendant's only expert witness, had returned to Germany. But it is not necessary to resort to a learned foreign chemist to meet this evidence. If the patent was not sufficiently definite to enable one skilled in the art to obtain the product, it should have been easy to prove that fact by the evidence of ordinary coal-tar chemists and manufacturers. As the evidence now stands, the claim of insufficiency chiefly rests upon deductions drawn from the failure of the experiments of Dr. Liebmann, unsupported by any evidence that persons skilled in the art could not have obtained the product by following the process of the patent. If the patent was insufficient as to such persons, it was vital to the defendant's case to show it. The court, in a complicated case of this character, ought not to accept mere suggestions as to what the patent might mean to a person skilled in the art, as against the positive testimony of skilled experts, when no evidence has been introduced to contradict it. I conclude that the specifications of the patent in suit are sufficient to enable a person skilled in the art to obtain the product of the patent, using the ordinary knowledge of the class of persons to whom the patent is addressed.

Complainant, by way of proof of infringement, has offered in evidence a can containing coloring matter, and filed the following stipulation:

"It is stipulated and agreed by the solicitors for the parties to this cause that the said can, then containing coloring matter, a portion of which is now therein, was sold by the defendant herein within the United States subsequent to July 20, 1886, and prior to the commencement of this suit."

It will be remembered that although the patent was granted July 20, 1886, it was not assigned to complainant until July 10, 1888. The assignment does not purport to transfer to complainant any right of action for prior infringement. In these circumstances, the complainant must furnish affirmative proof of infringing acts committed subsequent to said assignment. Counsel for defendant claims that this stipulation does not prove a sale of the alleged infringing color since the complainant acquired title to said patent. This point is well taken, and is fatal to the maintenance of the present suit. Moore v. Marsh, 7 Wall. 522; Jones v. Berger, 58 Fed. 1006. The facts stated in the stipulation prepared and relied on by complainant may be perfectly true, and yet not show that he has any grievance. In view, however, of the opposing claims of counsel as to what was actually understood between them, I think the parties should have the right to introduce further proof as to the date of the alleged sales.

The other points made in support of noninfringement are highly technical.

It is said that defendant's color does not correspond with the tests of the patent. These tests are as follows:

"Naphthol black produces on the fiber, in an acidulated bath, dark-blue shades. It is very soluble in water, insoluble in spirit, and dissolves in strong sulphuric acid with green color. Reducing agents destroy the color-forming alpha-naphthylamine besides other products."

Dr. Liebmann says that defendant's color is slightly soluble in ethyl alcohol. Complainant's experts say that it is not soluble in ethyl alcohol. It is not disputed that the reactions both of complainant's and defendant's colors were identical, when tested with either ethyl or methyl alcohol, both being dissolved by the latter. It is suggested that Dr. Liebmann's ethyl alcohol may have been the alcohol of the druggist, containing just enough water to account for the slight solubility of defendant's color. It is not seriously claimed that the word "spirit" referred to methyl alcohol. Dr. Liebmann experimented with ethyl alcohol only. The word "spirit" generally refers to ethyl alcohol. It seems to be sufficiently shown that both complainant's and defendant's colors are "insoluble in spirit."

It is next said that defendant's powder is not "of a black color," as specified in the claim. But this has already been sufficiently explained by the admitted fact that there is no such thing as a black color. It is evident that the word "black" is here used in its ordinary acceptation. This is shown both by the subsequent statement in the claim, "and capable of dyeing shades of dark-blue," and by the language of the specification.

Much stress is laid on the ambiguous statement, "Reducing agents destroy the color-forming alpha-naphthylamine besides other products." I do not know what this sentence means. Dr. Liebmann was not asked, and did not state, its meaning. He assumed, however, and Dr. Schweitzer admits, that without said hyphen it may mean "reducing agents destroy color, forming alpha-naphthylamine," etc. It is not denied that with the hyphen it means if the color be treated by reducing agents the color would be destroyed. The hyphen after "color" is a printer's blunder, and yet, without it, the sentence is almost senseless. It is capable of the further construction that, where reducing agents are applied to the color, they destroy the alpha-naphthylamine and other bodies. In fact, the color is destroyed by reducing agents, but no alpha-naphthylamine is formed. This blunder does not seem vital in this case. Both complainant's and defendant's colors show the same reactions, or are destroyed in the same way when treated with reducing agents. Furthermore, Drs. Schweitzer, Chandler, and Morton testify that at the time of the application for the patent in suit the tests therein given were sufficient to identify the product, irrespective of the process by which it was obtained. This statement is not denied. They further give in detail the results of a series of 34 reduction and reaction tests made by them, by direct comparison of the patented product and defendant's color, made simultaneously with both colors, from which they conclude that the two colors are technically and chemically identical, and that defendant's color is unquestionably the product of the patent in suit. I do not find any material evidence to disprove this claim. That defendant's color does not exhibit the same reactions as that of complainant is only inferrible from the results of the experiments made by Dr. Liebmann, hereinbefore referred to. It does not appear that he experimented with the color made by complainant, or that such experiments, if made, would not have shown the

same results in both cases. Dr. Liebmann says that defendant's color, made by him, is not complainant's color, as made by him, because the results obtained differed from certain tests given in the patent. But this, for the reasons already stated, only means tests made, not upon the color of the patent, but upon the colors of his failures, or differences in tests upon the different construction of the word "spirit" and the term "color-forming alpha-naphthylamine besides other products." He does not say that the naphthol black made and sold by complainant differs from the naphthol black made and sold by defendant. Drs. Schweitzer, Chandler, and Morton say that Dr. Liebmann admits that defendant's color is the product of the patent in suit. The reasons stated involve chemical formulæ which it is not necessary to consider. As the testimony is not controverted, it may be assumed to be true.

Much stress is laid by complainant upon the claim that this patent is entitled to a liberal construction, as a pioneer patent. This claim has not been discussed, because it does not seem to be material to the substantial question in the case. This question is whether the patent sufficiently describes the process and product to enable a person skilled in the art to obtain and identify the product. It has been already stated that the patent first disclosed to the public a process whereby so-called black dye was produced from coal-tar colors; that this process possessed patentable novelty; that the product was of great utility, has gone into general use, and has replaced logwood in some industries; and that its sales have continually increased. These facts may be properly considered in connection with the general principle that a meritorious invention is to be supported, rather than defeated. They are pertinent in the consideration of the mistakes which have crept into the specification, and which should not be permitted to invalidate such a patent, provided they are such as would have been understood and corrected by any one skilled in the art. In this connection only has the pioneer character of the invention been considered and applied.

Let the bill be dismissed, unless the complainant shall, within 60 days from the filing of this opinion, introduce further proof of the date of the sale of the infringing color. The defendant may introduce evidence and be heard on said proof. If infringement be shown thereby, a decree may be entered for an injunction and an accounting.

IMPERIAL CHEMICAL MANUF'G CO. v. STEIN et al.

(Circuit Court, S. D. New York. August 7, 1895.)

1. INFRINGEMENT OF PATENTS—ACQUIESCENCE AND LACHES.

A complainant who purchased his patent a short time before filing the bill will not be refused an injunction, on the ground of acquiescence or laches, where the only evidence thereof is that sales of the infringing article were made for several years by defendants' assignor, and that no objection was made by complainant's assignor.