

12.

Milliken v. Jones, 77 Ill. 373

Ship. 374, n. 63

for

Milluktn v. Jones, 77 Ill. 373

Andr. 313, n. 1

Error.

Milliken for *Milluktn*.

Explanation.

Andrews cites *four* cases not cited by Shipman.

Andrews alleges that the case does not support the text. The text is to the effect that "it is necessary, as we have seen, to obtain the leave of the court to make use of several matters of defense, the application for leave being addressed to the discretion of the court."

The second paragraph of the syllabus to the case cited reads as follows.

"2. Where a defendant, after filing the general issue, and the continuance of the cause, discovers that he has a substantial defense not admissible under the general issue, he should, at the earliest convenient day, ask for special leave of the court to file an additional plea, so as not to take the plaintiff by surprise or delay the business of the court."

This case will be found digested in Kinney's Illinois Digest, pp. 2228, 2229, 2232.

See Clark's affidavit, 10.

13.

Clay Fire Insurance Company v. Wusterhausen for

Ship. 374, n. 63

Clay Fire and Marine Insurance Company v. Wusterhausen

Andr. 313, n. 1

Error.

"And Marine" omitted.

Explanation.

Shipman, 336, includes "and marine."

Andrews, 293, omits "and marine."

See Clark's affidavit, 12.

14.

Childs v. Wescott

Ship. 411, n. 96

for

Childes v. Wescot

Andr. 350, n. m

Error.

Childs for *Childes*.*Wescott* for *Wescot*.

Explanation.

Cited from the original note of Stephen.

Cited *Childs v. Wescot* in 2 Cro. Eliz. 470.Cited *Childes v. Wescot* in 2 Cro. Eliz. 482.Cited *Child v. Westcot* in 14 Vin. Abr. 479.Cited *Child v. Westcoat* in 23 Vin. Abr. table of cases.Cited *Childes v. Westcot* in Stephen (Heard) 314.Cited *Childs v. Westcot* in Stephen (Heard) table of cases.

See Clark's affidavit, 12.

15.

Wyat v. Alaud, 1 Salk. 324

Ship. 449, n. 1; 450, n. 5

for

Wyat v. Alaud, 1 Salk. 324

Andr. 381, n. e; 382, n. h

Error.

Alaud for *Aland*.

Explanation.

Cited from the original note of Stephen.

Shipman (449) cites *Siblay v. Brown*, 4 Pick. (Mass.) 137.Andrews (381, n. 1) cites *Libbey v. Brown*, 4 Pick. 137.The case should be cited *Sibley v. Brown*, 4 Pick. (Mass.) 132.Shipman (450, n. 5) cites *Sibley v. Brown*.Shipman (450, n. 6) cites *Rex v. Stevens*, 5 East, 255.Andrews (382, n. h) cites *King v. Stevens*.

See Clark's affidavit, 10.

16.

Mauser's Case, 2 Coke, 3

for

Manser's Case, 2 Coke, 3

Ship.	{ 450, n. 7
	{ 451, n. 9
Andr.	388, n. 1

Error.

Explanation.

Mauser for *Manser*.

Cited from the original note of Stephen.

Shipman cites (n. 7, 450) *Dovaston v. Payne*, 2 H. Bl. 530.Andrews (382) cites *Devaston v. Payne*.Correct citation is *Dovaston v. Payne*, 2 H. Bl. 537.

See Clark's affidavit, 11.

17.

Spencer v. Southwick, 9 Johns. 313

for

Spencer v. Southwick, 9 Johns. 314

Ship. 456, n. 24

Andr. 386, n. 1

Error.

313 for 314.

Explanation.

Cited 313 Chitty, 566, n. (f).

Shipman cites *nine* cases not cited by Andrews.

See Clark's affidavit, 13.

18.

Mishner v. Granger, 4 Gilm. (Ill.) 78

for

Misner v. Granger, 4 Gilm. (Ill.) 69

Ship. 456, n. 24

Andr. 386, n. 1

Errors.

78 for 69.

Mishner for *Misner*.

Explanation.

Report commences on page 69.

Opinion commences on page 73.

Discussion of the point of pleading commences on page 72.

Shipman cites *Watriss v. Pierce*, 36 N. H. 236.Andrews does not cite *Watriss v. Pierce*.Shipman cites *ten* cases not cited by Andrews.Andrews cites *seven* cases not cited by Shipman.

See Clark's affidavit, 13.

19.

Spruck v. Forsythe, 40 Ill. 440

for

Spurck v. Forsyth, 40 Ill. 438

Ship. 456, n. 24

Andr. 386, n. 1

Errors.

440 for 438.

Spruck for *Spurck*.*Forsythe* for *Forsyth*.

Explanation.

Report commences on page 438.

Opinion commences on page 439.

Discussion of the point of pleading commences on page 440.

Shipman cites *Watriss v. Pierce*, 36 N. H. 236.Andrews does not cite *Watriss v. Pierce*.Shipman cites *ten* cases not cited by Andrews.Andrews cites *seven* cases not cited by Shipman.

See Clark's affidavit, 13.

20.

Dyett v. Pendleton, 8 Conn. 728

for

Dyett v. Pendleton, 8 Cow. 728

Ship. 456, n. 24

Andr. 386, n. 1

Error.

Conn. for Cow.

Explanation.

Correct citation is 727.

Shipman cites *ten* cases not cited by Andrews.Andrews cites *seven* cases not cited by Shipman.

See Clark's affidavit, 13.

21.

Piercy v. Sabin, 10 Cal. 27
for

Ship. 499, n. 39

Piercy v. Sabin, 10 Cal. 22

Andr. 430, n. 8

Error.

27 for 22.

Explanation.

Report commences on page 22.

Opinion commences on page 23.

Discussion of the pleadings commences on page 27.

Cited 27 in *People v. McCumber*, 72 Am. Dec. 515.Andrews cites *People v. McCumber*, 72 Am. Dec. 515.Andrews (n. 1.) cites *Sade v. Drake*, Hob. 295.Shipman cites *Slade v. Drake*, Hob. 295.Citation should be *Slade v. Drake*.Andrews (n. 1.) cites *Smith v. Yeomans*, 1 Saund. 316.Shipman cites *Smith v. Yeomans*, 1 Saund. 316, 317.Andrews cites *three* cases not cited by Shipman.

See Clark's affidavit, 13.

AMERICAN SULPHITE PULP CO. V. HOWLAND FALLS PULP CO.¹

(Circuit Court of Appeals, First Circuit. April 16, 1897.)

No. 186.

1. PATENTS—PRIOR USE IN FOREIGN COUNTRY—KNOWLEDGE OF INVENTOR.

Where one claiming to have made an independent invention in this country received knowledge, before applying for a patent, of a prior use of the invention in a foreign country, such knowledge will not deprive him of the protection of the patent laws, if, before receiving the information, his idea had been so developed and applied as to constitute invention if expressed in a patent.

2. SAME.

An inventor working independently in this country conceived the idea of a lining for a wood-pulp "digester" composed of a homogeneous, cementitious mixture put on in a plastic state. He had discovered the acid-resisting force of such compositions as against highly-heated bisulphite liquor, consisting of lime, sulphurous acid, and water, and was experimenting with varying degrees of success with cements composed of various ingredients, including hydraulic cement and sand alone, and hydraulic cement with other ingredients, including silicate of soda and sand. With these mixtures he had put the discovery in operative form, so as to stand the test of the conditions of actual use, but had, perhaps, not discovered all the materials or compositions capable of performing the necessary function. While his invention was in this stage, and before application for a patent, he received knowledge of the use of a like invention in Europe. *Held*, that this knowledge did not deprive him of a right to a patent, and that he was entitled to claim, not only the composition with which he had successfully experimented, but also those which he described with sufficient clearness to be understood by persons skilled in the art, and such as would naturally develop, in the growth of the art, without invention. 70 Fed. 986, reversed.

3. SAME—FAILURE TO DISCLOSE INVENTION.

The silence of an inventor for more than a year after his experiments had reached a practical and operative stage *held* not to have prejudiced his right to a patent, where his silence resulted from a reasonable fear of losing control of the invention.

4. SAME—CONSTRUCTION OF CLAIMS—REFERENCE TO SPECIFICATIONS—WOOD-PULP DIGESTERS.

The specifications of a patent for a wood-pulp digester described "a continuous lining or coat, B, of acid-resisting material, applied in a plastic condition," which lining "is of the nature of a cement" composed "of any material or mixture of materials which is acid-resisting, and capable of being made plastic and adhesive." "A convenient material for the purpose

¹ Rehearing pending.

is commercial cement,—preferably, Portland,” etc. “Other cement-like materials or mixtures having similar properties or characteristics may be used, such as the ordinary cement mixtures, sand and Portland cement, sand and tar, and the like.” The claims were for “the improved pulp digester herein described,” having “a continuous lining or coat, B, of cement, as described,” “applied to the interior of the said shell for the purpose set forth.” *Held*, that the use of the word “cement” did not limit the claim to ordinary hydraulic cement, or to the particular cementitious mixtures which the inventor had chemically and commercially isolated as individuals, but that the claims must be construed in connection with the references therein to the specifications as including all cementitious mixtures which ordinarily skilled, practical chemists might be expected to find as answering the described conditions, or such as would naturally develop in the growth of the art without invention. 70 Fed. 986, reversed.

5. SAME.

The Russell reissue, No. 11,282 (original No. 445,235), for improvements in wood-pulp digesters, consisting in lining the same with a continuous coating of cementitious composition, construed, and *held* valid and infringed. 70 Fed. 986, reversed.

Appeal from the Circuit Court of the United States for the District of Maine.

This was a bill in equity by the American Sulphite Pulp Company against the Howland Falls Pulp Company for alleged infringement of reissue patent No. 11,282 (original No. 445,235), for an improvement in wood-pulp digesters. The circuit court dismissed the bill (70 Fed. 986), and the complainant has appealed.

Causten Brown and Alex. P. Browne, for appellant.

John L. S. Roberts, for appellee.

Before COLT, Circuit Judge, and WEBB and ALDRICH, District Judges.

ALDRICH, District Judge. This cause involves the validity of a patent for an invention relating to improvements in the construction of vessels ordinarily called “digesters,” and, as a leading feature of the improved construction, provides for what the complainant calls a “protective lining” for the shells thereof. These digesters are used in the sulphite wood-pulp process, and may be either stationary or rotary, and are constructed with an outer shell of iron. The structures are large and expensive, varying in size (sometimes 15 feet in diameter by 30 in length), and are designed to receive blocks of wood and wood substances to be subjected to the sulphite process; and the metal shell, being corrodible by the acids and gas used in the process of cooking or dissolving the wood fiber, requires an interior protective lining. It is manifest—indeed, it is conceded—that the practical workings of the sulphite process had disclosed a fundamental and imperative necessity for some means of protection against the hazard and explosive dangers incident to the corroding influences and the great pressure, under highly-heated conditions, of bisulphite acid solutions necessarily involved in the process for dissolving the wood substances; and in this connection we cannot do better than quote from the opinion of the circuit court on this phase of the case, where it is said:

“It is very evident that the art to which the patent relates had been for a long time urgent for a practical lining for the iron or steel shells of digesters, which would be reasonably economical, and that the urgency had been so

great as to have become a fundamental necessity. For several years no one had been able to respond; so that, under the circumstances, whoever should solve the whole problem, or should make advances of practical use in that direction, whether by adoption from other arts or otherwise, would have been entitled to be held an inventor, both by the common judgment and by the courts. Mitscherlich accomplished this in part, but he always had a lead lining in direct juxtaposition with the shell, and his interior material was not continuous. The Russell device displaced the lead, and furnished a continuous and homogeneous lining."

The prior state of the art, the anticipatory character of American and foreign patents, questions of fraud in reissue in respect to the patent in suit, questions as to prior public use in the United States and in foreign countries, and finally the question whether the problem presented to the patentee involved patentable novelty, are not raised by the assignment of errors, and are not before us. These questions were all resolved in favor of the patent in suit by the circuit court, and thus our investigations are narrowed to the question whether George Fred Russell's conception and discovery in August, 1889, at the time he received information from Cologne, were so far reduced to operation and practical use, or, in other words, had so far generated an idea of practically operative means, as to become a discovery or an invention entitled to patentable protection; and, if the problem of invention is determined favorably to the patent, then the question as to the validity and meaning of the claims and specification, and the question of infringement, will require our consideration. The claims are stated in the reissue patent as follows:

"I claim: (1) The improved pulp digester herein described, having an outer shell, A, and a continuous lining or coat, B, of cement, as described, applied to the interior of the said shell, for the purpose set forth. (2) The improved pulp digester herein described, having an outer shell, A, a continuous lining or coat, B, of cement, substantially as described, applied to the interior of the said shell, and an interior lining of tiles, C, all substantially as set forth."

The complainant contends for a broad construction of his claims, and that his device and process, under reasonable construction—

"Consists in an improved pulp digester, in which the metal shell, corrodible by the acid solution employed, is protected against its attacks by a continuous coat or lining of cement of proper thickness applied upon the interior of the shell; the term 'cement' including any material or mixture of materials which resists the acid solution under high heat and pressure, and which is capable of being made plastic and adhesive to the digester shell, and so compact as, in practice, to prevent the acid solution from reaching the iron shell in consequence of the high steam pressure used in the process."

On the other hand, the defendant in error stands here, as in the court below, upon the defense that, while Russell was experimenting in that direction, he had made no advance in the art at the time he received information from Cologne that Wenzel, an Austrian, was successfully lining digesters with hydraulic cement and sand. The defendant does not urge that the Russell claims should be limited to hydraulic cement, and it may be here remarked that the learned counsel on both sides agree, in argument, that the construction limiting Russell's claims to hydraulic cement is impossible, and cannot stand. The scope of the claims, however, will be considered later. The position of counsel in argument is given in this connection for the purpose of better understanding the questions which we are to consider.

The patentee claims a broad discovery, to become operative by applying, without joints or seams, plastic materials in the nature of cement, which he says he had sufficiently described, while the defendant, admitting that Russell had conceived the idea of a homogeneous protective lining, insists that he had made no invention, that he had not advanced beyond the field of experiment, had not discovered the material necessary to reduce his conception to practice, and that his claims, covering all materials or mixtures of materials which will serve as a one-piece or continuous lining, are void. There would seem to be no doubt, upon the evidence, that Wilhelm Wenzel had conceived the idea of a continuous digester lining, and that he was using a composition of cement and sand successfully for that purpose, before Russell's discovery. Wenzel covered his device as early as May, 1888, by a secret Austro-Hungarian patent for an acid-resisting protective material, and on August 15, 1889, secured a Swedish patent covering the same device, which was not, however, published until November, 1889. On the 30th of July, 1889, Mr. Springer, who was connected with the Russell Paper Company, and then traveling abroad, sent a communication to William A. Russell from Cologne, in which he said, in speaking of digesters:

"I have found a cement lining which, if it turns out to be what it now appears, is the best thing yet. It is simply a cement and is put on as one would plaster a wall."

This information was conveyed to the patentee, Russell, early in August in the same year. It therefore becomes necessary to ascertain how far Russell had progressed in his discovery and invention, and whether he had so far advanced the art at the time he received knowledge of the Springer letter from Cologne as to entitle him to protection as an inventor. The circuit court approached this phase of the case with the observation that while Russell "must have had before that time a clear and positive conception of the substance of what was afterwards patented," where the "substantial question," as in the case at bar, "is whether the patentee, Russell, invented at all, we do not deem it in fact necessary that the complainant should prove that the alleged invention was put into a practical, concrete, or visible form before the patentee received the information contained in Springer's letter." Holding this view, the circuit court, under its construction limiting the claims to hydraulic cement, found and held that Russell had not solved the problem of invention, and dismissed the bill. We are inclined to consider the question of invention here presented upon lines perhaps less favorable to the patentee than those drawn by the circuit court, and to determine his rights with reference to the rules which would govern questions of patentability. Therefore, had his advance in the art at the time he received information of the Wenzel experiments reached such a stage as would entitle it to protection as involving invention, if expressed in letters patent? If so, the information from Cologne would not deprive him of the fruits of his discovery. At least, a higher advance in the art is not required to protect him against information of this character than would be required to protect his discovery, as an invention described in a patent, under the rules regulating patentability and nonpatent-

ability. So it becomes necessary to inquire as to what Russell had done at the time he received information of the experiments and developments by Wenzel, and this, as all agree, could not have been earlier than the first week in August, 1889. Now, what was Russell's conception, and what had he done to demonstrate the practicability of his discovery before August, 1889? Had he conceived the idea of such a structural lining before he received information from Cologne, and had he so far demonstrated the practicability of his conception by devising and employing ideas and means for adapting it to the required use as to entitle him to the position of inventor? Or did he borrow the discovery from Wenzel? By this test the patent must stand or fall. It is clearly established by the uncontroverted evidence that Russell, nearly a year prior to the Cologne letter, having observed the imperfect workings and the dangerous conditions incident to a lining composed of different materials with leaded and cemented joints, conceived the idea of a seamless, homogeneous lining, to be composed of materials from which brick, tile, and artificial stone are made, which should be acid-resisting, and so far adhesive that it would attach to the shell and become a part of the structural formation, and so far cohesive, expansive, and resilient as to respond to the expansive and retractive force of the iron shell when subjected to the varying conditions of heat and cold, as was necessary in the process of cooking and curing the wood. This was unquestionably a step in the direction of invention, and one which contemplated an important and useful advance in the art. Having conceived the idea of such a structural lining so adhering to the shell as to become a part of the main structure, he entered the field of experiment for the purpose of discovering the forces in nature which would respond to the required purposes, and be equal to the test to which the structural lining, in practical operation, would be subjected. The invention did not start with a discovery of a force in nature, or a particular ingredient, but with the idea of a homogeneous structural lining, and the search for material was for the discovery of means for reducing the inventive idea to practical utility; and in this line he had little digesters constructed, similar to those used in the actual process; made something like 50 experiments and tests with briquetts, pipe retorts, and little digesters, with various compositions in the nature of cement, including compositions of sand, pitch, and tar, tar and sand with cement and without, tar and sand with clay and asbestos, sand and silicate of soda and cement, and others of sand and cement alone,—some of the compositions standing the test imperfectly, others fairly well, but sand and cement being the most satisfactory. Having conceived the idea of a homogeneous lining, and having demonstrated the adaptation and utility of cementitious, adhesive material or mixtures in plastic form for such purposes under digester conditions, should he have stopped on hearing of the Wenzel experiments, or was he entitled to perfect the art in a commercial sense, and secure the fruits of his conception and invention by letters patent? At the time the information came from Cologne, his homogeneous lining, to be composed of acid-resisting, adhesive, and cohesive mixtures in the nature of cement, was a foregone conclusion. That was his invention. That advanced the art. It had oc-

curred to Russell, while experimenting for suitable cement materials to take the place of lead in the joints of the linings, that, if he could succeed in finding a suitable cement for such purposes, he could make the whole lining of the same material; and months before the Cologne letter, while reasoning from the fact that, if, as was known, artificial stone, brick, and tile would withstand the digester conditions of heat, pressure, and acid, the materials from which they were made would stand the same test, he had conceived the idea of a homogeneous lining whereby the artificial stone and brick, with dangerous cemented and leaded joints, were to be supplanted by a continuous wall composed of cementitious ingredients or materials from which artificial stone, brick, and tile were made, applied in a plastic state. It should be observed at this point that the sulphite process cannot be conducted in an open vessel, for the reason that the bisulphite liquor cannot be raised under such conditions to the required high degree of temperature without losing the sulphurous gas which is the sole or principal agent in effecting the required change; and, while continuous, homogeneous linings were known in the arts, no method had been suggested or devised for adapting such conditions to digesters used in the sulphite process. This conception, therefore, of a one-piece structural lining for such purposes, was new; and Russell's experiments had already demonstrated the fact, contrary to the belief of the scientific world, that cement mixtures, which were known not to resist the effects of cold sulphite liquor, would stand the test of such liquors under conditions of high heat and pressure. He had discovered that the thick inner coating of cementitious mixtures, adhering to and protecting the outer shell somewhat from intensity of heat and expansion, possessed sufficient expansibility and contractibility to withstand the maximum expansion and contraction of the iron under such changed and protected conditions. He had discovered that his continuous lining composed of cementitious material applied in a plastic state, when hardened, would stand against the hot sulphite liquor; that it adhered to and protected the iron from the corroding influences of the acids; that its cohesive, expanding, and resilient qualities would withstand the strains resulting from the expansion and contraction of the iron shell under the protective conditions incident to the thick homogeneous wall or lining, when subjected to the degree of heat and pressure necessarily employed in the sulphite process. He had discovered a new property or force in matter (Poillon v. Schmidt, 6 Blatchf. 299, Fed. Cas. No. 11,241; Smith v. Ely, 5 McLean, 76, Fed. Cas. No. 13,043; Parker v. Hulme, 1 Fish. Pat. Cas. 44, Fed. Cas. No. 10,740; LeRoy v. Tatham, 14 How. 156, 175; Collar Co. v. White, 2 Ban. & A. 60, Fed. Cas. No. 14,396; Ansonia Brass & Copper Co. v. Electrical Supply Co., 144 U. S. 11, 12 Sup. Ct. 601; Rob. Pat. § 101), and had made practical application of such newly-discovered force to an object. His operative mode was to apply the matter containing the newly-discovered force in plastic form to his object, and his object was a homogeneous lining covering the inner metal walls of the digester shell.

Having conceived the idea of a cementitious lining, and having newly discovered the acid-resisting force of cementitious compositions as against highly-heated bisulphite liquor consisting of lime, sulphur-

ous acid, and water, he was experimenting in the field of cementitious matter, including hydraulic cement and sand alone, and hydraulic cement with other ingredients, including silicate of soda and sand. He had discovered the fact of this force (Telephone Cases, 126 U. S. 1, 534, 536, 8 Sup. Ct. 778), and had applied it to the inner walls of shells under conditions substantially like the conditions existing in the practical sulphite process, and had tested its adhesive, cohesive, and acid-resisting power, and, although not necessary in order to secure a patent for his conception, his discovery, and his process (Telephone Cases), was experimenting with various materials in the nature of cement, all of which would do the work more or less successfully, for the purpose of "bringing his art to the highest degree of perfection" in the mechanical and commercial sense. At the time in question, Russell had conceived and put in form a continuous lining more distinctively homogeneous than that of the metal bathtub (Steel-Clad Bath Co. v. Mayor, 77 Fed. 736); for in his conception and practice the lining material, applied in a plastic form, in the hardening process, under heat and pressure, closely adhered to, and became a part of, the outer structure or shell itself. He had discovered acid-resisting forces in matter under new conditions. He had made successful experiments, and put in operative form his newly-discovered force in ingredients and in compositions which stood the test of digester conditions. He had not, perhaps, discovered all the materials, or all the matter, or all the compositions which contained this force, and which were capable of performing the necessary function, but as to such as he had discovered and put in operative form, and such as he could describe with reasonable clearness, he was entitled to protection, and these include sand, silicate of soda, and cement, sand, pitch, and tar, and hydraulic cement and sand as well. Some of these compositions stood the test better, made better linings, and did the work more successfully, than others; and as to such as he used, such as he described, and such as those skilled in the art could understand, he is entitled to protection. At this time he had advanced the art in the sulphite-process line not in a slight degree, but in a high degree. He was an inventor not in a narrow sense, but in a broad sense, and as such was entitled to a patent covering his homogeneous structural lining, his adaptation of the forces in matter which he had discovered, and the cementitious compositions in the nature of cement with which he had successfully experimented, and which he had adapted to the required conditions and use, as well as those which he described with sufficient clearness to be understood by persons skilled in the art, and such as would naturally develop, in the growth of the art, without invention. We look at this as an invention of an improved structure, with a devised and described process for creating it and putting it in operation in connection with a new and pressing emergency, and not for any particular ingredient or composition. It is true, the ingredients must possess certain described characteristics; but after all the ingredients are only a part of the invention involved in the construction of the inner part of the shell, and, in order to answer the prescribed purpose, they must possess certain described plastic, adhesive, cohesive, and acid-resisting characteristics. The required characteristics being described, the kind

and quality may be found by the ordinary mechanic skilled in the art, and applied according to the method described, namely, in plastic conditions, with a trowel.

It would seem that Russell at this time had practically solved the problem presented, and that his discovery, demonstrations, and prescribed process present a meritorious and useful invention; and, in our view, Wenzel's unpublished and unknown discoveries in Austria should not deprive him of the benefits of his own independent and original discovery and experiments in this country. Upon the question whether Russell had so far completed his discovery and accomplished his purpose when he received information from Cologne as to entitle him to a patent, and before passing to other questions in the case, let us look for a moment at the development of his conception in connection with his newly-discovered fact or force in matter under heat, pressure, and acid conditions, and his actual adaptation of means and process to the required purpose, in the light of the reasoning of Mr. Chief Justice Waite in the Telephone Cases, 126 U. S. 1, 532, 8 Sup. Ct. 778. There Bell was the first to discover the fact that, by gradually changing the intensity of a continuous electric current so as to make it correspond to the changes in the density of the air caused by the sound of the voice, vocal sounds could be transmitted and reproduced at a distance, but he had not advanced so far as to actually transmit spoken words so that they could be distinctly heard at the receiving end of the line. Bell had discovered the fact that a force in nature (the electric force), under changed conditions, would produce a new and unknown result,—that of reproducing vocal sounds at a distance from the speaker, although words had not been transmitted. Upon the question of the patentability of his discovery, and his imperfect art, Mr. Chief Justice Waite said:

"But it is insisted that the claim cannot be sustained, because, when the patent was issued, Bell had not in fact completed his discovery. While it is conceded that he was acting on the right principle, and had adopted the true theory, it is claimed that the discovery lacked that practical development which was necessary to make it patentable. In the language of counsel, 'there was still work to be done, and work calling for the exercise of the utmost ingenuity, and calling for the very highest degree of practical invention.' It is quite true that when Bell applied for his patent he had never actually transmitted telegraphically spoken words so that they could be distinctly heard and understood at the receiving end of his line, but in his specification he did describe accurately, and with admirable clearness, his process (that is to say, the exact electrical condition that must be created to accomplish his purpose); and he also described, with sufficient precision to enable one of ordinary skill in such matters to make it, a form of apparatus which, if used in the way pointed out, would produce the required effect,—receive the words, and carry them to and deliver them at the appointed place. The particular instrument which he had, and which he used in his experiments, did not, under the circumstances in which it was tried, reproduce the words spoken so that they could be clearly understood; but the proof is abundant, and of the most convincing character, that other instruments, carefully constructed, and made exactly in accordance with the specification, without any additions whatever, have operated, and will operate, successfully. A good mechanic of proper skill in matters of the kind can take the patent, and, by following the specification strictly, can, without more, construct an apparatus which, when used in the way pointed out, will do all that it is claimed the method or process will do. Some witnesses have testified that they were unable to do it. This shows that they, with the particular apparatus they had and the skill they employed

in its use, were not successful; not that others, with another apparatus, perhaps more carefully constructed or more skillfully applied, would necessarily fail. As was said in *Loom Co. v. Higgins*, 105 U. S. 580, 586, 'when the question is whether a thing can be done or not, it is always easy to find persons ready to show how not to do it.' If one succeeds, that is enough, no matter how many others fail. The opposite results will show that in the one case the apparatus used was properly made, carefully adjusted, with a knowledge of what was required, and skillfully used, and that in the others it was not. The law does not require that a discoverer or inventor, in order to get a patent for a process, must have succeeded in bringing his art to the highest degree of perfection. It is enough if he describes his method with sufficient clearness and precision to enable those skilled in the matter to understand what the process is, and if he points out some practicable way of putting it into operation. This Bell did."

And this Russell did in respect to his conception and process. And, as to the Bell patent, it may be further observed in this connection that Bell was in doubt whether the magneto or the variable resistance methods were the better for conducting the force, but thought the magneto method was; and as to this the chief justice says (page 538, 126 U. S., and page 784, 8 Sup. Ct.):

"Indeed, he said, in express terms, he preferred it, but that does not exclude the use of the other, if it turns out to be the most desirable way of using the process under any circumstances."

And again he says (page 539, 126 U. S., and page 785, 8 Sup. Ct.):

"Surely a patent for such a discovery is not to be confined to the mere means he improvised to prove the reality of his conception."

Under the reasoning of this case, it would seem clear that Russell's patent should not be declared void because he was in doubt as to which of the compositions would prove the most satisfactory in a commercial sense, or because he had not practically and finally tested and chemically isolated all the matter or material containing the required cohesive, adhesive, and acid-resisting qualities.

As has been said, the information from Cologne reached the patentee in August, 1889; and the fact that he remained silent as to his discovery until about the time of his application for a patent, in October, 1890, requires our attention. The record shows that the patentee was in the employ of the Russell Paper Company, in which his father was treasurer and his uncle president, during the period covering the supposed acts of invention, as well as during the later period in which his application was pending in the patent office, and that certain experiments were made by the paper company during that time, in which the patentee took part without disclosing the discoveries and experiments involved in his invention. If there were a controversy upon the evidence as to what the patentee had actually done in the line of the art, or if the conditions were such as to require him to speak, this evidence would have weight. But the evidence discloses no controversy in respect to the first proposition, and the only question fairly raised is whether his conception and discovery amount to invention,—whether he had carried it forward to a practical demonstration by developing the idea of means. As to the second proposition, his father and uncle were prominent officers in the company, and active and influential in the management of its business. The

company of which they were officers was a member of a syndicate (to which it was responsible) composed of several large companies, where the purpose was to secure and control inventions useful in the sulphite process. According to the testimony of the patentee, he feared that he might lose control of his discovery by disclosing it, and was in doubt about the proper course to pursue, but finally decided to say nothing until his rights were secured by the action of the patent office. Silence under conditions requiring a man to disclose would raise suspicion, but here the evidence as to the experiments is undisputed and undoubted. There is no question between this patentee and another person claiming the invention. There is no question about the Wenzel discovery, and no question about the time at which knowledge of that came to young Russell. The only question is whether he had gone far enough to entitle him to protection at the time he acquired knowledge of what Wenzel was doing. It would seem that in remaining silent he was simply acting the part of precaution, and whether wisely or not is probably immaterial, as we think there was nothing in his conduct, under the circumstances, which in any way affects the credibility of his story.

The inventor, having advanced the art in a certain line, as he believed, in order to secure his rights stated his claims, and described his invention and the operative means for putting it into practice; and we now come to a consideration of the questions relating to the scope and validity of his patent, construing it with reference to his claims, description, and specification, as set forth in his application of October 18, 1890, and the reissue patent No. 11,282, dated November 16, 1892. In the circuit court, as has been said, a result was reached limiting the claims to a coat or lining of hydraulic cement. In discussing the question as to the scope of the claims, that court said:

"The whole substance of the patent is in the first claim. This consists of only two elements,—the shell and the continuous lining or coat of cement. Its language is so unequivocal that its construction needs no aid from secondary rules, and is not enlarged nor limited by the redundant, and, in some particulars, somewhat obscure, language of the specification, whether of the original patent or of the reissue, except in one particular."

And again, in referring to the word "cement" as used in the claim, it was said:

"But this word has the ordinary commercial meaning of hydraulic cement, and also a larger, and perhaps more accepted, sense. It cannot, in this patent, be given the latter without substantially giving the patentee the whole art, and much more than he can claim to have actually invented or discovered. Therefore we are compelled to limit the word which he has himself chosen to its ordinary commercial sense. An examination of the file wrapper leads to the same results, but we need not enlarge on this. The word 'cement' having various significations, its precise definition for this purpose must thus be determined. With that exception, we need only say that we are not to construe what does not need to be construed, and that the simple phraseology of this claim can neither be added to nor taken from by what appears in the specification, by what occurred in connection with the reissue, or by any alleged implied disclaimer arising in relation thereto. We know of no mystery relating to ascertaining the legal meaning of claims in patents; and we apply to this case the fundamental rules by which is read every instrument whose language is clear in itself."

It would thus seem that the court below construed the claims without reference to the description of the invention, and the method and process of putting it into operative form, which the specification contained. In connection with this limited interpretation, we feel bound to observe that counsel on neither side, either in brief or in argument in this court, maintain this position, but, on the contrary, expressly renounce it as one not possible, and of which the claims are not susceptible. In our view, this question of construction should not be determined upon lines so technically and closely drawn. We look upon this invention as one in which a description or specification is given in accordance with the requirements of section 4888 of the Revised Statutes, of the manner and process of "making, constructing, compounding and using" in order "to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected to make, construct, compound, and use the same," and where the claims and the specifications are to be read together, not for the purpose of enlarging the invention stated in the claims, but "for the purpose of better understanding the meaning of the claim" (*Howe Mach. Co. v. National Needle Co.*, 134 U. S. 388, 394, 10 Sup. Ct. 570), the limit and extent of the invention, and the object of the inventor, and the construction, method, and process, as understood by him (*Vance v. Campbell*, 1 Fish. Pat. Cas. 483, Fed. Cas. No. 16,837; *Wilson v. Coon*, 18 Blatchf. 532, 6 Fed. 611; *Gottfried v. Brewing Co.*, 5 Ban. & A. 4, 36, Fed. Cas. No. 5,633; *Brass Co. v. Miller*, 9 Blatchf. 77, 97, Fed. Cas. No. 17,254; *Seymour v. Osborne*, 11 Wall. 516, 547; *Rob. Pat. § 750*; *Curt. Pat. [4th Ed.] §§ 225, 227*). In the case last cited (*Seymour v. Osborne*), Mr. Justice Clifford said:

"Where the claim immediately follows the description of the invention, it may be construed in connection with the explanations contained in the specifications; and, where it contains words referring back to the specifications, it cannot properly be construed in any other way."

Mr. Curtis, in his explanation of the purposes of the claims and specifications, and the relations which they sustain to each other, observed (section 227) that "the claim is not intended to be any description of the means by which the invention is to be performed, but is introduced for the security of the patentee," and that one object of the specification "is to make known the manner of constructing the machine, if the invention is of a machine." And Mr. Chief Justice Fuller, in *Howe Mach. Co. v. National Needle Co.*, 134 U. S. 394, 10 Sup. Ct. 572, says:

"Doubtless a claim is to be construed in connection with the explanation contained in the specification, and it may be so drawn as, in effect, to make the specification an essential part of it."

Now, let us see what Russell stated in his claims, and the means which he described in his specification to which he referred for reducing his invention to form and practice. The inventor, in his claims, which immediately follow his description of the invention, says: "I claim (1) the improved pulp digester herein described, having an outer shell, A" (thereby referring to his diagram and to his specification), "and a continuous lining or coat, B, of cement, as described" (again referring to his specification), "applied to the interior of the said shell

for the purpose set forth" (thus again referring to the specification). The inventor, in his second claim, which is substantially the same as the first, refers to his "continuous lining or coat, B, of cement, substantially as described." Now, what is the effect of this? Doubtless, it is to limit his claim to a pulp digester with a lining of cement. It does not cover structures with linings of other material, but limits itself to a cement-lined structure with an outer shell, described in the specification as a metal shell, and a lining described in the specification as of cement mixtures. In other words, he limits his patent to a cement-lined structure, and, by express and necessary reference to his specification and diagram, describes the material, the process, and the operative means for constructing the improved pulp digester as a whole; and, while his reference to the specification may not enlarge or extend the invention claimed, it may and must be examined in order to understand the manner of making and constructing the shell, and compounding the cement materials necessary to reduce his conception to use. This reference to, and a consideration of, the specification, definitely exclude the idea that the conception and the operative means are limited to hydraulic cement, or any one particular cementitious ingredient. Answering one part of the requirements of section 4888, he "particularly points out and distinctly claims" his invention as an improved digester, with an outer metal shell combined with an interior continuous cement lining; and then, further answering another part of the requirements of section 4888, he proceeds to "file in the patent office a written description of the same, and of the manner and process of making, constructing, compounding, and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same." In this description which the statute requires, he says:

"My invention relates to improvements in the construction of the vessels, ordinarily called 'digesters,' in which wood pulp is manufactured by what is known as the 'sulphite process.' Its object is to improve the construction of these digesters, so as to prevent their injury by the solution employed. * * * The shell of the digester is marked A, and within it are shown linings, B and C, the construction whereof I will now proceed to describe: A represents the outer shell of the digester. It is ordinarily constructed of metal,—such as iron, steel, or brass,—which is liable to be injuriously affected by the acid solution employed. Upon the interior of the shell of the digester, I form a continuous lining or coat, B, of acid-resisting material, applied in a plastic condition. This lining or coat is of the nature of a cement, and may be composed of any material or mixture of materials which is acid-resisting, and capable of being made plastic and adhesive to the shell of the digester, and so compact as to prevent the acid solution from reaching the iron shell in consequence of the high steam pressure required in practice. A convenient material for the purpose is commercial cement, preferably Portland, made plastic with water, and applied with any suitable implement upon the interior of the digester shell, so as to form a continuous covering therefor. Other cement-like materials or mixtures having similar properties or characteristics may be used, such as the ordinary cement mixtures, sand and Portland cement, sand and tar, and the like."

He then proceeds to describe the necessary thickness and compactness of the lining under different conditions. Thus, it would seem to be clear that the inventor intended to cover acid-resisting cementi-

tious mixtures, which could be applied in plastic condition, which would adhere to the outer shell, become a part of it, and so compactly form and harden under the pressure and process of application which he described as to prevent the acid from reaching the iron; and while describing commercial cement as a convenient material, and while he expressed a preference for Portland cement made plastic with water, as to other cementitious mixtures he left the acid-resisting and adhesive qualities to be ascertained by the practical chemist, or other "person skilled in the art or science to which it" appertained. This is manifestly the purpose of the inventor, and the argument strenuously made against it is that it is so broad a claim of the art, and so indefinite and vague, as to be inoperative and void; and this presents, perhaps, the most serious question in the case. We will look at this question first in connection with the principle enunciated and elaborated in the Telephone Cases, 126 U. S. 1, 8 Sup. Ct. 778. Let it be observed at the outset that this invention is not for a structure alone, but for a structural improvement which involves a process of making the improved structure, and the process is the idea of means; and the idea of means, in turn, involves what might perhaps be called a sub-invention, or subdiscovery, whereby a newly-discovered force in matter is adapted to a useful purpose, in becoming the means of making the broad, inventive idea of a homogeneous, adhesive structural lining operative and useful, or, in other words, through which cementitious materials, which would not stand cold bisulphite conditions, are adapted to the required purpose of resisting hot bisulphite conditions under steam pressure. But, however this may be, the idea of a continuous structural lining, and the process for making it, are to be considered together. In the case to which we last referred, the chief justice says (page 536, 126 U. S., and page 783, 8 Sup. Ct.):

"The law does not require that a discoverer or inventor, in order to get a patent for a process, must have succeeded in bringing his art to the highest degree of perfection. It is enough if he describes his method with sufficient clearness and precision to enable those skilled in the matter to understand what the process is, and if he points out some practicable way of putting it into operation."

This we think Russell did. He said, in effect:

"I have conceived the idea that the old linings of brick and tile with cemented and leaded joints, which do not stand under pressure and acid conditions, may be displaced, and we may have a homogeneous lining formed of the materials of which such bodies are made. We will let it harden as one piece, adhering to the outer shell as a continuous lining; and, if the brick and tile will stand the pressure and acid conditions, this will. I have experimented in the field of cementitious material, and I have found several mixtures that will answer the purpose which I have described, and I have found, by subjecting them to the sulphite liquor conditions, that they will answer the purpose. I have said that the materials must be capable of being made plastic and adhesive to the shell, and must be acid-resisting; and this means acid-resisting under digester conditions, which means highly-heated bisulphite conditions. I have said that other cement-like materials or mixtures, having similar properties or characteristics, may be used, such as the ordinary cement mixtures, sand and Portland cement, sand and tar, and the like; and this explanation of my discovery, and this explanation of the conditions which are necessary to make the test, will enable any practical chemist or skilled person to discover the required qualities."

Now, considering this feature of the case upon the evidence, outside of the description of discoveries and of the necessary qualities in matter contained in his specification, Russell says repeatedly that his experiments demonstrated that mixtures of cement, generally speaking, did stand the test; and it may be observed that the expert evidence in the case abundantly shows that there exists in cementitious mixtures generally, when formed of acid-resisting materials, a common hot bisulphite resistant quality. It is not necessary to comment at length upon the testimony of the chemists and technologists, and it seems quite sufficient to refer to the statement of Dr. Carmichael as to the chemical action in the sulphite process. He says:

"The remarkable fact appears that, while bisulphite liquors attack hydraulic cement quite freely at ordinary temperatures, they have no action whatever at the high temperature at which the sulphite process is conducted." Again: "It is a curious fact, which the employment of the Russell lining has brought out, that, even if original defects exist in the Russell lining, they become filled in use." Again: "All cement linings are more or less porous when first applied, but in use soon fill up with sulphate and sulphite of lime. They then become practically impervious to liquor, and afford complete protection to the shell beneath. Such liquor as may work through a crack is quickly rendered harmless through reaction with the lime salts composing the cement."

As said by Mr. Justice Strong in *Smith v. Vulcanite Co.*, 93 U. S. 486, 495, "to find a material, with a mode of using it, * * * had been an object long and earnestly sought." Russell discovered that cement materials generally, which possess the quality of being made plastic, when applied in that condition, as a thick, one-piece lining to an iron shell to be used in the process of disintegrating wood substances, generally speaking, had the quality of adhering to the shell, of resisting the hot acid, and of performing the function of protecting the iron from the highly-heated conditions to which it would otherwise be subjected, and that the expansive and resilient qualities of such materials were equal to the expansion and contraction of the shell with the temperature of the iron so reduced. The evidence demonstrates—and quite likely Russell understood—that some cement mixtures, commercially speaking, were more desirable than others; and the word "cement," used in the claims, must be understood, when considered in connection with the statutory description, as referring generally to cementitious mixtures having the qualities which he described. As to those which he expressly named, like commercial cement, preferably Portland, made plastic with water, and as to the ordinary cement mixtures,—sand and Portland cement, and sand and tar,—there can, of course, be no doubt in the mind of any person possessing ordinary skill in the art as to what he intended; and as to his general expression, "any material or mixture of materials which is acid-resisting, and capable of being made plastic and adhesive to the shell of the digester, and so compact as to prevent the acid solution from reaching the iron," he described the conditions which, in the hands of persons skilled in the art, would develop, whether in a given mixture the required property and qualities do or do not exist. He discovered that in such cementitious materials as could be made plastic, and were adhesive, cohesive, and self-hardening, the required properties, in a degree, existed as a quality common to them all. This