

never have been heard of. The difference between what Hall discovered and what was known before him in this regard is the difference between complete knowledge on a subject and so little as to be wholly useless and not to suggest further inquiry. It is impossible, if De Ville had any knowledge that alumina could be dissolved in cryolite, as Hall found, that he should not have made a note of it, for all the experts agree that he observed most carefully, and noted exactly all that he observed.

Another claim in this connection perhaps deserves some notice. In several patents which were taken out in England for the making of aluminum by what is the De Ville process without any variation, the anode, made of a compact mixture of carbon and alumina, is referred to as a "soluble" anode. This is said to show that the patentees knew that alumina would dissolve in the cryolite bath. The expression is used merely to indicate the action of the fluorine gas, released at the anode by the current, in uniting with the aluminum of the alumina in the anode, and regenerating the bath, which of course destroys the anode. It is an electro-chemical solution of the anode, and wholly different from a free solution of alumina in the bath without any aid from electricity. That the term "soluble" has no other meaning in this connection is evident, because an anode of pure aluminum is also called "soluble."

We have read with care every part of this voluminous record of over 1,500 pages, and, while we are not chemists, we have obtained a sufficient understanding of the principles applied in the Hall and De Ville processes to be entirely confident that they are wholly different, and that no skilled chemist and electrician could have developed the Hall process from the De Ville process without a real discovery.

The Bell patent of 1861, the Johnson provisional specifications of 1879, the Johnson specification of 1883, and the Graetzel patent of 1884, which are all recorded in the English patent office, and are produced here by the defendant and relied on as anticipations of Hall's patent, are mere reproductions of the De Ville bath-regenerating process, with various attempts to avoid the difficulties which the process presents in its practical operation. The Graetzel patent—the latest of them—was a failure. This is admitted by the patentee himself, who was a witness in the case. The Johnson specifications were never even proceeded with to the procuring of a patent, and the Bell patent has never been used at all to make aluminum commercially. It is said that one reason why these electrolytic processes, including De Ville's, were not brought into actual use, was that, until within a very few years, there were no dynamos capable of furnishing sufficient electric volume and force to make them practicable for commercial purposes. That the improvements in the machines for producing electricity have greatly facilitated the use of electrolysis as an agent in commercial processes is not to be denied, but the failure of the De Ville process for making aluminum by electrolysis finds a far better reason in the inherent difficulties of the process itself than in the mere expense of electricity. If the De Ville process is operative with the present modes of producing electricity, why does not the defendant adopt it? It is free to any one. The

various futile attempts to relieve the De Ville process of its defects is strong proof that it was and is a failure without regard to the development in the making of electricity.

There are other patents introduced to show anticipation than those which involve the De Ville process, but of these there is only one which, it is seriously contended, discloses the Hall process. This is a French patent of Fuerst, dated August 8, 1884. In this patent the patentee says:

"The process of which I claim the industrial property consists in making the electrolysis of alkaline aluminates, or alkaline earthy aluminates, in the condition of solution or of fusion. For this I take an alkaline aluminate, or earthy alkaline aluminate; that is to say, one of the aluminates of potassium, of sodium, or of barium, etc. Into this body, in solution or fusion, according to the circumstances, I introduce the two poles of an electric current of suitable tension. There is nothing further to do than to receive the aluminum upon the cathodes employed, (negative poles,) where I collect it in order to melt or utilize it alone or in different alloys for all the industrial uses to which it can lend itself. As to the anodes, (positive poles,) these anodes can be, according to my desire, soluble or insoluble, and I reserve to myself the industrial property of each of these two cases. While I employ anodes which are insoluble, or are considered such industrially, I reserve to myself to maintain a constant composition in these electrolytic baths by adding to them, as is needed, oxide of aluminum."

"The electrolytic decomposition produced by the electric current in an alkaline aluminate, or in an alkaline earthy aluminate, can also be produced equally well whether this salt be in a state of purity or whether several aluminates be mixed together, or whether they be mixed with other salts or foreign materials giving rise to double salts or any secondary combinations whatever, provided, let it be understood, that these salts or foreign materials, whatever they may be, will not produce decomposition of the aluminates employed. It is thus that I reserve to myself to introduce into these baths salts of ammonia, alkaline sulphites, alkaline phosphates, alkaline cyanides, alkaline chlorides, etc., the presence of which seems to have the power of improving the practice of this electrolysis."

Later on, Fuerst deposited an addition to his patent, in which he says:

"In this certificate of addition I claim as my industrial property my process for the industrial production of aluminum by electrolysis of alkaline aluminates or alkaline earthy aluminates in solution or igneous fusion. And by 'alkaline aluminates,' I mean every compound into which alumina and alkaline base enter, even if there should enter into that compound one or more of the following bodies, which I shall call 'useful' or 'indifferent' auxiliary bodies: Hydro-cyanic acid, cyanides, cyanates, phosphoric acid, (pyro and meta,) boric acid, silicic acid, hydrofluoric acid,—in the state of acids or salts. For me there is aluminate of alkali as soon as there is in a body alumina and an alkaline base, even in the presence of the auxiliary bodies above mentioned, whatever otherwise be the hypotheses that might be established respecting the numerous molecular groupings which might exist or be supposed to exist."

An alkaline aluminate is either an aluminate of potassa or an aluminate of soda. Aluminate of soda is a compound of alumina and soda, i. e. of the oxides of aluminum and sodium. It is a triple compound of oxygen, aluminum, and sodium. An alkaline earthy aluminate is an aluminate of baryta, strontia, lime, or magnesia, i. e. a compound of alumina with baryta or strontia or the other substances. The three elements of such a compound are oxygen, aluminum, and barytum, or strontium, or the other substances.

The theory of the patent—and it is only a theory, as we shall see—is that if these triple compounds of oxygen, aluminum, and some other metal can only be reduced to a liquid form either by aqueous solution or igneous fusion, the current will decompose the compound by depositing the aluminum at the cathode, and will leave the compound of oxygen and the other metal in the bath. By adding alumina to the bath he proposed to restore the aluminate in the bath. Now, the electrolysis of an aqueous solution of the aluminates to produce aluminum is impossible. This is not denied. One half of Fuerst's patent is demonstrably inoperative. Secondly, so far as the patent calls for the igneous solution of the aluminate of soda, it is also inoperative, because that compound is infusible; and even if it were fusible, the current would precipitate the sodium, and not the aluminum. This is conceded by defendant's experts. Such facts are strong evidence that Fuerst wrote out a theory for the production of aluminum by the current without knowing by experiment whether it would work or not. All the experts in the case agree that he was a very poor chemist. In order, however, to catch future inventors in the toils of his dragnet, he mentions a great many chemical compounds which could be added to his bath of aluminates, and not interfere with its working, and might even aid the electrolysis. It is perfectly obvious that he never tried any of them, and it has not been shown at the bar that one of the innumerable baths proposed by him would, when electrolyzed, produce aluminum. It does appear, however, that if hydrofluoric acid, which is one of the indifferent auxiliary bodies mentioned by Fuerst, be mixed with aluminate of soda so that the mixture shall contain eight times as much acid as aluminate, the acid will entirely decompose and destroy the aluminate, and, after evaporation and fusion, we shall have a bath, not of the aluminate at all, but of the fluorides of aluminum and sodium. If, then, alumina be added, and the current applied, we shall have the Hall process exactly. An experiment of this kind was tried on behalf of defendant, and an account of it is produced in evidence as demonstrating the identity of the Fuerst and Hall processes. It is perfectly evident that no one without a knowledge of the Hall process, and without the deliberate intention of producing Hall's bath, would ever have derived from the Fuerst patent any information leading to such a treatment of the aluminate of soda with the hydrofluoric acid. In the first place, according to Fuerst's specifications, the acid is to be only indifferent or auxiliary. Who would think, therefore, of using eight times as much acid as aluminate in preparing an aluminate bath? Again, one imperative injunction which Fuerst imposes in his specifications was flatly disobeyed in defendant's experiment. He says he has no objection to the introduction of foreign materials as indifferent or auxiliary bodies, "provided, let it be understood, that these salts or foreign materials, whatever they may be, will not produce decomposition of the aluminates employed." The addition of hydrofluoric acid in excess to aluminate of soda completely decomposes and destroys the aluminate, so that the bath which results after evaporation and fusion has nothing like an aluminate in it, but is a bath of fluorides. In view of the necessity for

this flagrant violation of Fuerst's injunction in order to produce the Hall bath, it is absurd to say that the bath can be found described within the four corners of the Fuerst patent. Fuerst does suggest that his bath can be kept constant by adding alumina, but, as his bath is not Hall's bath, he does not thereby come any nearer the Hall patent.

The other patents pleaded as anticipations of Hall's are even less like it than those already considered, and they were not pressed in argument.

It is objected to the validity of the Hall process that it is not operative. The argument is that it has no utility, as described in the patent, for three reasons: "First, because the fusion of the bath is maintained by external heat, and except with internal heat, produced by the current, the process is worthless and inoperative; second, because it contemplates continual interruptions in the process to remove the aluminum already deposited from the cathode, which would make the process too cumbersome and expensive for commercial use; and, third, because it does not provide for sprinkling powdered alumina over the top of the bath, to be gradually stirred down into it, without which the depositing of aluminum cannot go on without interruption.

There is nothing in any of these claims. The patent disclosed a process and suggested an apparatus by which the process could be operated. Said Mr. Justice Grier in *Corning v. Burden*, 15 How. 252, 267:

"A process eo nomine is not made the subject of a patent in our act of congress. It is included under the term 'useful art.' An art may require one or more processes in order to produce a certain result or manufacture. The term 'machine' includes every mechanical device or combination of mechanical powers and devices to perform some function or to produce a certain effect or result. But where the result or effect is produced by chemical action, by the operation or application of some element or power of nature or of one substance to another, such modes, methods, or operations are called 'processes.' A new process is usually the result of a discovery; a machine, of invention."

Mr. Justice Bradley, in *Tilghman v. Proctor*, 102 U. S. 707, 728, in speaking of what was required in the specifications for a patent of a process, said:

"If the mode of applying the process is not obvious, then a description of a particular mode by which it may be applied is sufficient. There is, then, a description of the process, and one practical mode in which it may be applied. Perhaps the process is susceptible of being applied to many modes, and by the use of many forms of apparatus. The inventor is not bound to describe them all in order to secure to himself the exclusive right to the process, if he is really its inventor or discoverer. But he must describe some particular mode or some apparatus by which the process can be applied with at least some beneficial result, in order to show that it is capable of being exhibited and performed in actual experience."

Now, it may be that the changes in the mode of using the Hall process, indicated in the objections of defendant stated above, from that recommended by Hall in his patent, are great improvements, but that does not in the slightest degree affect the validity of the patent if it appear that at the time when the application

was made a new and useful result could be accomplished with the process by the mode which Hall suggested.

It is pressed upon us that after Hall made his discovery he worked on his processes unceasingly for a year or more under the auspices and with the aid of the defendant company, but that with the apparatus described in the patent he was able to accomplish no useful result. It is said that not until he adopted the improvements above named, which are not included in his patent, did his process prove operative. The area of Hall's discovery was a wide one. The chemical substances within the scope of his patent which he might use in carrying it to a successful result were many, and he was in search of that method and those substances within the limits of his discovery which would most easily and economically produce aluminum. It does not at all reflect on the utility of his processes that he should have been a year or more experimenting to determine just exactly what apparatus to adopt. Nor is it surprising that with lack of experience in the practical operation of the process, with no means to try it on a commercial scale, he should meet with difficulties in small experiments which disappeared afterwards. It is no evidence at all, therefore, of the inutility of his method of applying the process that by nine months' experimental work under the auspices of the defendant company he did not satisfy its officers that he had made a valuable discovery. During that time he did satisfy the practical chemists who, immediately upon his leaving the Cowles Company, invested \$20,000 in a plant to produce the aluminum commercially, according to Hall's patent.

The apparatus suggested by Hall consisted of a crucible of iron or steel, lined with carbon, and placed in a furnace. The double fluoride was put in the crucible, which was then subjected to the heat of the furnace until the fluoride was fused. The poles of an electric dynamo were connected with the bath, the negative pole connecting with the carbon lining, and making that the cathode, while the positive pole was connected with a piece of carbon suspended over and extending down into the fused mass. Alumina is added to the bath when fused, and an electric current of from four to six volts deposits aluminum on the bottom of the crucible. When a sufficient quantity has been deposited, the patent says that the melted aluminum may be removed from the bath by suitable means, or the bath may be poured out, and the aluminum picked out. It is said that there are insurmountable difficulties in this apparatus. The carbon lining of the crucible must, on the one hand, be thick, to prevent the fluorides from attacking the steel or iron underneath it, and to prevent the radiation of heat and consequent cooling of the bath; while, on the other hand, it must be thin, to enable the heat of the furnace to get through the sides of the crucible to fuse the bath and maintain the fusion. That there may have been better ways of applying the heat than that suggested is doubtless true; but it does not appear that the mode just described would not make aluminum, and the burden of proof on this point is on the defendant. On the contrary, the

evidence is quite satisfactory that it would do so. The system was used by the complainant company for several weeks after its new plant was put in, and aluminum was made commercially as it had been made experimentally by Hall. The whole new plant was so constructed that heat could be applied exactly as Hall's patent suggests. This is strong evidence that neither Hall nor the men who put in \$20,000 on the faith of his invention inferred from the result of his experiments that the difficulty above stated was a serious one. After several weeks' operation, it was found that the resistance of the bath to the electric current necessary to decompose the alumina produced heat enough to keep the bath in proper fusion without external heat, so the furnace was not used. Hall had said early in his experiments that such a result was likely when the process was carried on in a large way. It is probable that a manufacturer of aluminum according to Hall's patent, who would use external heat only, (if, indeed, it were possible to make aluminum extensively without generating electric heat more than enough to fuse the bath,) could not compete, for economical reasons, with one who discarded external heat, and depended alone on the heat of the current. But that is far from saying that such useful results cannot be obtained from the use of Hall's first apparatus with external heat as to entitle him to an exclusive right to his process, whatever the improvements on his apparatus in applying that process. To hold otherwise would impose upon the patentee of a process, in order that he may enjoy the monopoly, the necessity of stating in his patent not only the process and suitable apparatus for its operation, but also the very best possible apparatus for that purpose. This would be absurd, and quite in conflict with the spirit of Justice Bradley's remarks in *Tilghman v. Proctor*, above quoted.

The same remarks apply to the other criticisms of Hall's first mode of putting his process into practice. More than that, the ladling out of the melted aluminum without emptying the crucible, and the adding of powdered alumina to the bath, are not even improvements upon Hall's first method, but are quite within it. He says that alumina shall be added to the bath. It was to be added for solution. It does not even take knowledge of chemistry to lead one to grind a substance to powder to facilitate its solution, nor does it require any invention or discovery to use a ladle to remove molten aluminum from the bottom of a crucible without emptying the crucible of its other and less weighty contents.

Hall's process is a new discovery. It is a decided step forward in the art of making aluminum. Since it has been put into practical use the price of aluminum has been reduced from \$6 or \$8 a pound to 65 cents. This is a revolution in the art, and has had the effect of extending the uses of aluminum in many directions, not possible when its price was high. An effort has been made to show that this reduction in the price is due to the improvements in the application of electricity to the manufacture of aluminum. That the new inventions in the line of producing electric currents of

great volume and intensity have contributed to render the Hall process an economical one is true, but without the Hall process the manufacture of pure aluminum must have continued to be a purely chemical one. The Cowles brothers made aluminum alloys by the use of electrical furnaces which they have brought to a high state of perfection, doubtless, and that had an effect to reduce the price of aluminum alloys, and perhaps indirectly affected the price of pure aluminum. The fact was that the price of pure aluminum was so high that its uses were few, and the market for it was small. When Hall's process, however, came into the field of commercial manufacture, pure aluminum was largely substituted for aluminum alloys, and, if alloys are now desired for particular purposes, they are generally made from pure aluminum. Hall was a pioneer, and is entitled to the advantages which that fact gives him in the patent law.

One other thing must be alluded to before we close this long discussion of the validity of Hall's patent, and that is the French patent of Heroult. Heroult has a patent granted to him by the French government, dated April 23, 1886. The process he described is substantially one of those described by Hall. He uses a fused bath of cryolite in which alumina is dissolved, and from which, by the electric current, aluminum is deposited at the cathode. His anode is of carbon. Heroult made application for a patent to the United States patent office May 22, 1886. Hall did not make his application until July 9, 1886. An interference was declared in the patent office between Hall and Heroult. Hall adduced evidence to show the commissioner of patents that he made his invention and put it into operation February 23, 1886. The same evidence has been introduced here. It establishes beyond all reasonable doubt by written evidence that Hall did put his process into successful operation on February 23, 1886. The patent office decided the interference proceeding in Hall's favor, and it was clearly right. There was no evidence, there or here, to show that Heroult discovered the process before Hall, and the fact that Heroult's French patent antedates Hall's application does not affect Hall's right to a patent, because by section 4887, Rev. St., an inventor's right to a patent in this country is not debarred by reason of the fact that the invention has previously been patented in some other country, provided that it has not been more than two years in use in the United States. The counsel for defendant do not dispute the correctness of this conclusion, but they rely on the Heroult interference proceedings to attack the validity of that part of the second claim in the Hall patent where he specifies as part of his process the use of a carbonaceous anode. It is conceded by them that Hall had used a carbon anode in his process before filing his application, but the contention is that because in his application he alluded to it as having some disadvantages, and did not include it in his first series of claims, which he afterwards amended, and did not finally include it in his claims until Heroult's patent suggested its value to him, and more than two years after his application, he thereby abandoned the use of a carbon anode to the public. No authority is cited to sustain this ar-

gument. The proceedings in the patent office are for the purpose of reducing the description of the real discovery and the claims to such a form that a patent may properly be granted for them. Until the patentee accepts the patent, he cannot be held impliedly to disclaim anything in his real discovery. If he makes a claim which is rejected, and he accepts the patent without the claim, then he waives the right to a monopoly therein. But we know of no principle by which such a waiver can be implied from defective claims in the proceedings preliminary to the issuance of a patent if the claim is fully set forth in the patent as granted, and admittedly covers only that which the patentee had discovered before he made his application, and which he fully described therein.

And now we come to the question of infringement. The evidence leaves no doubt that the defendant company began their manufacture of pure aluminum in January, 1891, with the aid of one Hobbs, who had been the foreman of the complainant company, and engaged for it in superintending the manufacture of aluminum by the Hall process. By that time the complainant company had adopted several improvements in the apparatus described in the patent for working the process. The defendant copied these improvements, as well as the process, and has sought to escape responsibility by maintaining that without these improvements the process was inoperative, and the patent which did not contain them was invalid. Much the same course is taken as to the defense of infringement. The improvements are said to make the present process a different one from that described in the patent, and therefore the defendant does not infringe. It is needless to say that a court is not inclined to favor such defenses. There is evidence tending to show that the defendant used Hall's preferred bath, but with the admissions in this case it is unnecessary to consider the issue made on that point. It is admitted that the defendant is using a process in which alumina is dissolved in a fused bath of the double fluoride of aluminum and sodium, and in which an electric current is passed through the bath containing the alumina thus dissolved, whereby aluminum is deposited at a carbon cathode and oxygen is released at a carbon anode. It is said, however, that they are not infringing the Hall patent, because the Hall patent does not cover the particular double fluoride of aluminum and sodium which they are using, which is cryolite; and because the Hall process contemplated and called for a fusion of the double fluoride by external means of heating, whereas the defendants are using, to fuse the bath, the heat generated by the resistance of the bath to the electric current. The whole defense of infringement is based on a narrow and wholly impossible construction of the Hall patent.

As has been before stated, this patent is a pioneer patent, and its terms will be liberally construed to cover the patentee's real discovery. *Sessions v. Romadka*, 145 U. S. 29, 12 Sup. Ct. Rep. 799; *Sewing-Mach. Co. v. Lancaster*, 129 U. S. 263, 273, 9 Sup. Ct. Rep. 299. Coming now to consider the claim that the patent does not cover fused cryolite as a bath, it should first be noted that cryolite is a double fluoride of aluminum and sodium, a metal more



electro-positive than aluminum. It is therefore exactly within the words of both claims here in suit. But the contention is that the patentee has disclaimed any right to the exclusive use of cryolite. It is not denied that the patentee had used cryolite as a bath before he made his application, but it is said that he described its use in his first application, and stated, in substance, that it was not so good as a different proportion of the fluorides, and then subsequently omitted reference to it as a bath altogether in his final specifications. This is said to be a disclaimer of cryolite as a bath material. Hall's description of his bath is as follows:

"In the practice of my invention I prepare a bath for the solution of the alumina by fusing together in a suitable crucible, A, the fluoride of aluminum and the fluoride of a metal more electro-positive than aluminum,—as, for example, the fluoride of sodium potassium, etc.—these salts being preferably mingled together in the proportions of eighty-four parts of sodium fluoride and one hundred and sixty-nine parts of aluminum fluoride, represented by the formula  $\text{Na}_3\text{AlF}_6$ . A convenient method of forming the bath consists in adding to the mineral cryolite 338-421 of its weight of aluminum fluoride. The object of thus adding aluminum fluoride is to secure in the bath the proper relative proportions of the fluorides of aluminum and sodium."

And again the patentee says:

"While I consider the proportions of fluorides of sodium and aluminum \* \* \* hereinbefore stated as best adapted for the purposes, such proportions may be varied, within certain limits, without materially affecting the operation or function of the bath, as, in fact, any proportions which may be found suitable may be employed."

The patentee states first the proportion of the aluminum fluoride and sodium fluoride which he prefers for his bath. They are 84 parts of sodium fluoride and 169 parts of aluminum fluoride. Then he proceeds to tell a convenient way for reaching those proportions. Cryolite, as we have said, is an article of commerce. He suggests that the best bath can be made by taking cryolite and adding to it 338-421 of its weight in aluminum fluoride. After this, for the very object of including cryolite, which, as we know, he had used for the purpose, and all other double fluorides of sodium and aluminum which would work, he says that the proportions may be varied. What proportions does he mean? Why, the proportions of the two fluorides, of course. The labored construction that the proportions to be varied are those of the cryolite and the aluminum fluoride is wholly untenable. How may they be varied? Within certain limits. What does that mean? The patentee goes on to state when he says "that any proportions which may be found suitable may be employed." Cryolite is now found suitable, and the patentee had found it suitable when he made his application. Could anything be more unlikely than that Hall or his patent solicitor, after they had been successful in an interference controversy with Heroult, whose only bath was one of cryolite, would have framed his specifications with the intention of not including a cryolite bath in the monopoly he was seeking? We think the patent very aptly drawn to cover the use of every double fluoride of aluminum and sodium which can be made to produce aluminum

when used as a bath in the Hall process. The proportions are immaterial so long as it is a double fluoride of these metals.

Next is the defense based on the use of external heat in Hall's apparatus as described in his patent, and defendant's use of internal heat. Hall's claims do not say what heat shall be used to fuse the bath. The process is described as beginning with a fused bath. The argument is that because Hall in his specification describes an apparatus for the fusion of the bath by external heat, therefore he limits himself to a process in which external heat is used, and confers upon the world at large the right to use his process if only some other mode of applying the heat is employed; and this in the face of the words of the patent: "Nor does this apparatus described herein with more or less particularity form any part of the invention herein." We do not see how the patentee could have used stronger words to avoid the difficulty in which defendant wishes to involve him. Then, too, we have the refined point that the language of the claim itself excludes the possibility of electric heating because it speaks of dissolving alumina in a fused bath of the double fluorides, "and then passing an electric current, by means of a carbonaceous anode, through the fused mass." This language is as applicable to electric heating as to any other. The word "then" is used to indicate that the electrolysis is to follow the solution of the alumina in the fused bath. Now, whether the current or a furnace fire fuses the bath, the current which is passed through the fused mass to perform electrolysis is passed through after the fusion. The decision of the supreme court in the case of *Tilghman v. Proctor*, 102 U. S. 707, is conclusive on this point. There the patent was for a process for the treatment of fats and oils, in which the application of heat was one of the necessary steps. Mr. Justice Bradley, speaking for the court, said:

"Another ground assumed by the defendants to avoid the charge of infringement is that they do not heat the mixed mass in the manner pointed out in *Tilghman's* specification; but, instead of heating the containing vessel by an outside application of heat, they heat the contents by the introduction of superheated steam. But we think that this does not alter the essential character of the process. The heating by steam is clearly an equivalent method to that of heating by an external fire. The patent does not prescribe any particular method of applying the heat, except when using the pipe and coil apparatus described in the specification; and even in the use of this apparatus the outward application of the heat to the pipe is suggested incidentally and as a matter of convenience, rather than as an essential requisite. The patentee showed one method in which the heat could be applied. That was all that was necessary for him to do. If it could be applied in any number of different methods it would not affect the validity of the patent as a patent for a process. The method of heating the mixture by the introduction of steam may be attended by some beneficial results in producing an agitation, or an automatic circulation helpful to the perfection of the admixture of the water and fat; and so far it may be an improvement on heating from without. Suppose this to be so, as before said, the introduction of an improvement gives no title to use the primary invention upon which the improvement is based."

Finally, it is said the defendant does not infringe, because the claim calls for a carbonaceous anode and the defendant uses a

carbon anode. "Carbonaceous" means "pertaining to carbon," or "made of carbon." It includes anodes made partly of carbon and partly of some other substance, but it certainly covers an anode made all of carbon.

A decree will be entered for the complainant, finding that complainant's patent is valid, and that the defendant infringes both the first and second claims thereof, and perpetually enjoining the defendant from further infringement, with the usual reference to a master to determine the damages.

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AREY et al. v. DE LORIEA et al.

(Circuit Court of Appeals, First Circuit. February 28, 1893.)

No. 18.

PATENTS FOR INVENTIONS—ACTION FOR INFRINGEMENT—INSTRUCTIONS.

In an action for the infringement of a patent, to which the defense was want of novelty, the court in its charge read to the jury an extract from the opinion of the court in a case between other parties involving the same patent, in which it was held, upon the law and the facts, that patents put in evidence to show the prior state of the art did not embody the combination claimed by the patent then in litigation; and the same patents were in evidence for the same purpose in the present suit. *Held*, that this was reversible error, even though the court told the jury that they were not to be controlled by this opinion, but were to regard it as a statement of the law merely, and to find the facts for themselves.

In Error to the Circuit Court of the United States for the District of Massachusetts.

This was an action by Joseph F. De Loriea and Griffin Place, as executors of James W. McDonald, against Reuben Arey and George H. Maddock, partners doing business under the name of Arey, Maddock & Locke, for damages for the infringement of letters patent No. 210,797, issued December 10, 1878, to said McDonald, for a machine for unhairing and scouring hides and skins. One of the defenses was want of novelty in the patent, and a number of patents were introduced to show the prior state of the art. The charge objected to was given upon this point. The jury brought in a verdict for plaintiffs, and defendants bring error. Reversed.

Ralph W. Foster, (Joshua H. Millett, on the brief,) for plaintiffs in error.

James Milton Hall, for defendants in error.

Before COLT and PUTNAM, Circuit Judges, and NELSON, District Judge.

NELSON, District Judge. At the trial in the court below the presiding judge read to the jury, as a part of his charge, an extract from the opinion of Judge Colt in *McDonald v. Whitney*, 24 Fed. Rep. 600. To this the defendants excepted. We are of opinion that this action of the court below was erroneous, and that the exception was well taken. The case of *McDonald v. Whitney* was a