

ment upon the complainant's patent; but I have no doubt that the omission of strengthening ribs renders the defendants' device non-infringing. The reference to the descriptive portion of the patent and the drawings shows that the sides receive, at intervals, raised ribs to correspond with the ribs at the end of the casket; that these ribs, distributed at intervals, perform an important function, namely, to stiffen the top of the casket so as to more securely hold the vertical band, I, rigidly in position. Now, the omission of this feature of the defendants' casket is a departure in an important particular—at least, in a particular regarded as important by the patentee—from the combination of elements constituting the claim. The defendants' casket, in fact, is not made up of all of the elements of the complainant's claim, nor do they employ mechanical equivalents to supply the omission. The bill must therefore be dismissed for noninfringement.

UNITED STATES MITIS CO. v. CARNEGIE STEEL CO.

(Circuit Court, W. D. Pennsylvania. July 30, 1898.)

1. PATENTS—PROCESSES—MISTAKEN THEORY EMBODIED IN SPECIFICATION.

If the patentee of a process fully describes the invention itself and its practical results, and gives sufficient directions for putting it into practical use, the validity of the patent is not affected by the fact that he has also expressed, in the specification, an erroneous scientific theory as to the action of one of the substances employed in the process.

2. SAME—INTERPRETATION—INFRINGEMENT.

A patent for an improvement in the process "of manufacturing castings from wrought iron and steel," by adding a slight amount of aluminium to the molten metal, stated in the specifications that "the iron or steel is melted in crucibles or metal-smelting furnaces of any suitable description." *Held*, that this did not confine the patent to a remelting process, starting with the wrought iron or steel in a solid state, but that it applied as well to molten metal taken direct from the smelting furnace and used in casting.

3. SAME.

In a claim for a described process "of manufacturing castings" from wrought iron or steel by adding a small quantity of aluminium to the molten metal, *held*, that "castings" was not limited to articles to which ultimate form is given in the mold, but included also steel ingots, which are subject to further treatment, involving change of form.

4. SAME.

In a patent for a process of manufacturing iron or steel castings, the claim stated the process as consisting "in the admixture with the molten iron or steel of aluminium in about the proportions specified, and then casting." The specification stated that the aluminium should be added "preferably just before the pouring is commenced." *Held*, that the claim was infringed by putting the aluminium in the mold itself after it was about one-third full, and then pouring in the rest of the metal.

5. SAME.

The patent specified the proportion of aluminium to be added as preferably from $\frac{1}{5}$ to $\frac{1}{10}$ of 1 per cent., and never exceeding 1 per cent., and further stated that "even a much smaller percentage has an appreciable influence." *Held*, that the patent was infringed by using $\frac{55}{10000}$ of 1 per cent., where the results designed by the patent were thereby secured.

6. SAME.

The Wittenstrom patent, No. 333,373, for an improvement in the process of manufacturing castings from wrought iron and steel, construed, and *held* to cover an invention of a primary character; and also *held* infringed.

Charles E. Mitchell and Joseph C. Fraley, for complainant.
Bakewell & Bakewell and John R. Bennett, for defendant.

ACHESON, Circuit Judge. The bill charges the defendant with the infringement of letters patent No. 333,373, for an improvement in "the process of manufacturing castings from wrought iron and steel by adding aluminium," dated December 29, 1885, and issued to Thorsten Nordenfelt, assignee of Carl Gustav Wittenstrom, the inventor. The specification of the patent begins by pointing out that "one of the great difficulties in making castings from steel is to get a product which is solid, sound, homogeneous, or free from blisters or cavities." It refers to recent improvements in the art of steel casting effected by adding to the metal ferro-manganese and other compounds containing carbon, silicon, and manganese, but states that, while "these admixtures make the product somewhat more solid, they deteriorate the quality in other respects, as the product gets harder and more brittle, or red-short." The specification sets out the inventor's discovery, upon which is based his described process, thus:

"I have found that castings of wrought iron or mild steel may be obtained solid without changing the intrinsic quality of the metal by the addition of the metal aluminium either alone or in the shape of an alloy, such addition to be made after the iron or steel has been melted, and preferably just before the pouring is commenced."

Then follows this statement:

"The melting point of aluminium is about 800° Fahrenheit, and the effect of such addition is to lower the melting point of the mixture, and thereby render it more fluid (as it at once becomes superheated), so that the gases in the metal pass away easily, the metal runs freely into the mold, and a more perfect product is obtained. I use no fluxes whatever."

In respect to proportions, the specification states:

"I have found that the use of a minute quantity, never exceeding one per cent. by weight, preferably from one-fifth to one-tenth of one per cent., by weight, of metallic aluminium, added to the molten iron, has the desired influence, and even a very much smaller percentage has an appreciable influence, and the proportions stated may be departed from to some extent."

The specification contains this further statement:

"The iron or steel is melted in crucibles or metal smelting furnaces of any suitable description, and the addition of the aluminium or alloy of iron and aluminium is made to the metal after it is molten, and preferably about when it is to be poured. It is convenient to provide a plug in the corner of the crucible, which is removed when the metal is completely melted. A tube is inserted into the aperture, and the aluminium to be added is passed down the tube. The tube is removed. The molten metal is then preferably stirred, and the plug replaced, and the metal is ready for pouring as soon as it is quiet."

Then follows this disclaimer:

"I am aware that heretofore it has been demonstrated (see Percy's Metallurgy of Iron and Steel, p. 182, and the Quarterly Journal of Arts and Sciences for 1820, p. 320) that by the addition to steel of about one-fourth of

one per cent. of aluminium there could be obtained a product retaining its malleability, and resembling 'Wootz steel.' Such product, however, was obtained by melting the aluminium and steel together, which would not only cause a waste of the aluminium, but would render the final proportions of the two metals uncertain. Moreover, the addition of the aluminium before the iron or steel is melted would not have the effect of superheating the metal at the time the casting is effected, which is an important object of my invention. I do not, therefore, wish to be understood as claiming every way of treating wrought iron or steel having aluminium added to it. Neither do I wish to be understood as claiming a process of treating wrought iron or steel having added to it aluminium, in which the aluminium and the iron or steel are fused together."

The specification then states that a superheated state of the metal is essential for the practical performance of casting into several molds, and that by adding the aluminium to the wrought iron or steel, and fusing them together, a superheating would result in injury, as the metal would become red-short, or take up gases; "whereas, by first melting the iron or steel and then adding the aluminium before pouring, the 'superheating' (if it may be so-called) produced by a sudden lowering of the melting point does not injure the metal."

The patent contains a single claim, in the words:

"The hereinbefore described process of manufacturing castings from wrought iron or steel, consisting in the admixture with the molten iron or steel of aluminium in about the proportions specified, and then casting, substantially as and for the purpose set forth."

From the contents of the specification, as well as from the terms of the claim itself, it is plain that this patent is not for any metal-making process. The invention does not at all relate to the production or refining of metal. The improvement is wholly in the process of manufacturing castings from the two named metals, wrought iron and steel. The patented process begins after the metal to be operated upon has been produced and brought to a molten condition. The evil in the prior art which the inventor sought to remedy was the difficulty of obtaining good castings from wrought iron or steel without deteriorating the intrinsic character of the metal itself. This was the desideratum to which Wittenstrom attained. His invention consisted in the process of making castings from wrought iron or steel by the addition of a minute quantity of aluminium to the molten metal "at the time the casting is effected," and as an incident of the operation, whereby, and without changing the intrinsic quality of the metal, superior castings are obtained,—castings which are sound inside and externally symmetrical.

Such being the nature of the Wittenstrom invention, I reach the conclusion that it was not anticipated or suggested by any of the prior patents in evidence. Nor can it fairly be said that anything to be found in those patents, or in any prior publications, detracts aught from the importance of Wittenstrom's discovery, or the undoubted merits of his process based on that discovery. The evidence is quite convincing that his invention was of a primary character. Therefore the patent should be liberally construed so as to secure to the patentee and his assignees the fruits of the actual invention in full measure, if this can be done consistently with the terms of the specification and claim.

The specification unnecessarily contains a scientific theory with respect to the action of the aluminium. It was the supposition of the inventor that the aluminium acted to lower the melting point of the mixture, and thereby render it more fluid. This is not now the generally accepted explanation of the phenomenon which follows the addition of the aluminium to the molten metal. The prevalent opinion among metallurgists is that the aluminium acts here as a deoxidizing agent. It matters not, however, that the patentee may have been mistaken in stating the rationale of his process. He fully described the invention itself, and its practical results, and gave sufficient directions for putting it into practical use, and the law requires nothing more.

The alleged infringement by the defendant of the Wittenstrom patent consists of its use of aluminium in the casting of steel ingots. In this connection the defendant has pursued two practices, which, with reference to the contemplated commercial uses of the product, are designated in this record as the "armor-plate process" and the "ingot process." In both cases the steel was made by the open-hearth method, in a metal-smelting furnace, in which the steel is melted in very large quantities, and then is tapped from the furnace into a large casting ladle, which conveys the molten metal from the furnace to the molds. In practicing the armor-plate process,—that is, in casting ingots to be rolled or forged into armor plate,—the defendant added to the molten steel when in the casting ladle, and just before the metal was poured into the molds, about a quarter of 1 per cent. of aluminium. This practice was carried on for about three or four months in the years 1893 and 1894, and the number of tons of armor plate made from ingots so cast was 2,769. Subsequently, in casting steel ingots not intended to be used for armor plate, the defendant adopted and pursued this practice, namely, when about one-third of the ingot mold was filled with molten steel poured from the casting ladle a minute quantity of aluminium was thrown into the mold itself, and the molten steel required to fill up the mold was then poured from the ladle. The quantity of aluminium thus used in the mold, the defendant's witnesses testify, was substantially $\frac{55}{10000}$ of 1 per cent., or two ounces to the ton. This is the present practice of the defendant in casting steel ingots. These ingots are about 5,000 pounds weight; are rectangular in cross section; are 16 by 18 inches across, and 65 inches in height. They are cast on their ends. The armor-plate ingots were larger.

E. F. Wood, the defendant's assistant superintendent, testifying in its behalf, and describing its present practice, stated that in "pouring the steel from the ladles into the molds, when a small amount has been poured in, say five hundred to a thousand pounds on an ingot weighing about two gross tons, aluminium in small pieces is thrown in, in the proportion of about two ounces to the ton"; and, being asked the purpose thereby intended to be accomplished and in fact accomplished, answered thus:

"The object of this addition is to quiet the steel, and do away with the foaming frothy consistency usually found in this grade of very soft steel, so as to enable the mold to be promptly filled, and secure a good sound-top in-

got. When pouring this steel without the addition of aluminium, on stopping pouring when the mold is seemingly full, the steel will settle back from twelve to eighteen inches, leaving a shell of half an inch to an inch thick around the sides of the ingot mold. When aluminium in the small proportions used is added as above described, the steel remains at nearly the same level in the mold, showing the reaction similar to properly made open-hearth steel of a higher carbon, and the top of the ingot gradually closes up by building out from the sides, giving a nearly flat top to the ingot, slightly convex rather than concave."

This witness stated that the saving in material from wastage effected by thus securing a sound-top ingot was from 2½ to 5 per cent.

Mr. Laureau, one of the defendant's experts, speaking of the defendant's practice, and what was accomplished thereby, testified as follows:

"When the fluid steel is poured from the ladle into the molds, it has a tendency to be wild, and to rise in the mold, until it may threaten to run out. In order to relieve this tendency to rise, which in some cases might make the ingots very porous, the defendant uses a very minute quantity of aluminium, the quantity amounting to fifty-two ten thousandths of one per cent. This small quantity of aluminium is sufficient to quiet the steel to such an extent that a good ingot is poured."

This witness explained that by "a good ingot" he did not mean one which is free from blow-holes; "for," he added, "it is a well-known fact that absolutely solid ingots, showing no blow-holes whatever, are likely to crack in the rolls unless treated with such care that it would be impossible to produce a finished article from them under commercial conditions."

Mr. Hunt, another expert of the defendant, speaking of the "remarkable results" he had witnessed at the defendant's works from the addition of minute quantities of aluminium to the molten steel in the ingot molds, testified thus:

"The resulting solidified ingots show, where the aluminium had been added, a sound, square-topped surface to the metal, which would require comparatively little waste in crop-ends, while in the case of the similar steel, to which the aluminium had not been added, the tops of the ingots would, in each case, be irregular, ragged, and with such an amount of unsound material at the top as would occasion a very considerable amount more of crop-ends to be put into scrap."

Under the evidence it is not to be doubted that by the addition of a minute quantity of aluminium to the molten steel in the ingot mold during the operation of casting, while the steel is being poured from the casting ladle into the mold, and when the mold is about one-third filled, the defendant obviates serious defects which otherwise would exist in the product, and thus obtains ingots which are sound and symmetrical, and free from hurtful blow-holes, without changing the intrinsic quality of the metal.

The plaintiff alleges that each of the practices the defendant has pursued infringes the patent in suit. The defendant strenuously denies that either is an infringement. The great stress of the controversy is just here. The defendant's experts express the opinion that the Wittenstrom method is a remelting process, starting with the wrought iron or steel of commerce in a solid state, and therefore that the treatment with aluminium of molten steel in that condition,

as the direct result of its manufacture or production, is not within the patent. But I discover no good reason whatever for imposing such limitation upon the patentee. The problem of manufacturing sound castings from wrought iron or steel is precisely the same, whether the molten metal is produced in the one way or the other. It would be a remarkable rendering of the patent to hold that, in order to practice the invention, it is necessary to let the molten steel from the smelting furnace get solid, and then be remelted. Certainly the suggested limitation is not expressed in the specification or claim. The language used is broad enough to cover molten wrought iron or steel, however the molten condition is brought about. Had the specification named crucibles only, this would not necessarily have limited the claim, for the evidence is that mild steel in large quantities has been commercially made in crucibles. But in fact the patent couples with crucibles "smelting furnaces of any suitable description." The patent proposes to deal with molten wrought iron and steel in the operation of casting, in whatever manner the molten condition of the metal is effected. Such was the inventor's practice from the beginning. Nothing in the proceedings in the patent office requires that the claim be restricted to remelted metal, nor does the prior art necessitate such limitation.

The defendant insists that ingots such as it makes are not castings, within the claim of this patent. It is not denied that the word "castings" is broad enough to include ingots cast from steel. The assertion is that the castings of the patent are articles to which ultimate form is given in the mold. The argument in support of this narrow view is not satisfactory. The ingot, indeed, is not cast in final shape, but is subject to further treatment, involving change of form, and it is also true that the ingot mold is without intricacies. Yet it does not follow that ingots are not susceptible of the treatment prescribed by the patent, and are not thereby improved in the manner contemplated by the patent. The proofs are convincing that the Wittenstrom process is applicable to the casting of steel ingots. No one, I think, can read the testimony of the defendant's own witnesses, extracts from which are quoted above, without perceiving that by the addition of minute quantities of aluminium to the molten steel, in the act of casting ingots, the beneficial results of the patent are obtained. Certainly a symmetrical and sound top is secured. By the defendant's practice blow-holes may not be entirely eliminated from the body of the ingot, but they are reduced to the extent desired. These advantageous results are effected without any change in the inherent character of the metal. Whether, then, regard be had to the mere terms of the claim or to the nature and purpose of the process, the reasonable conclusion is that ingots cast from steel are within the scope of the patent. It may be proper here to note that Wittenstrom's actual practice from the first, and also his Swedish patent, which was issued contemporaneously with his American application, show that he always contemplated the use of his process in casting steel ingots.

The defendant contends that the addition of the aluminium to the metal in the mold as practiced by it is not within the claim of the

patent. In effect, the proposition is that it is essential to the practice of the Wittenstrom process that the aluminium be added to the metal before the pouring begins. The patent, however, does not so prescribe. With respect to the time of the addition there is a limitation in this, namely, that it must not take place until the metal has become molten. The aluminium is to be added after the iron or steel reaches a molten condition, but the exact moment of time thereafter when the addition must be made is not defined. Upon this point the specification states, in one place, "preferably just before the pouring is commenced"; and in another place, "preferably about when it is to be poured." The claim states the process as "consisting in the admixture with the molten iron or steel of aluminium in about the proportions specified, and then casting." Now, the term "casting," as here used, means the shaping and solidifying of the metal in the mold. The invention concerns this operation. The patented process is practiced, to all intents and purposes, if the aluminium is added to the molten metal in time to pervade it and exert the desired influence. If this result is accomplished by the addition of the aluminium to the molten metal in the mold, the substance of the invention is enjoyed. But, even if the words "and then casting" were construed as having a restrictive force as to the order of events, still the defendant's practice surely would fall within the claim as so interpreted, for at least two-thirds of the molten metal is poured into the mold after the addition of the aluminium.

The defendant company further maintains that its present practice is not within the claim because the quantity of aluminium it employs is so very small. The defendant uses two ounces of aluminium to a ton of metal, or one-eighteenth part of the smallest preferred percentage named in the patent. Does the smallness of the amount so used take the defendant out of the patent, in view of all the circumstances? Would it be fair to this inventor to interpret his patent so narrowly? It is evident that the object of the invention is the production of superior castings from wrought iron or steel, and this purpose is achieved by a final addition of a minute quantity of aluminium to the molten metal as an incident to the operation of casting. Thus (in the words of the patent) "a more perfect product is obtained." This result is the aim and end of the Wittenstrom process. The patent should be read with its declared purpose constantly in view. The invention is meritorious and primary. It falls within the principle thus expressed in *Klein v. Russell*, 19 Wall. 433, 466: "The court should proceed in a liberal spirit, so as to sustain the patent and the construction claimed by the patentee himself, if this can be done consistently with the language which he has employed."

Now, as we have seen, the language of the specification in regard to proportions is this: "I have found that the use of a minute quantity, never exceeding one per cent. by weight, preferably from one-fifth to one-tenth of one per cent. by weight, of metallic aluminium added to the molten iron has the desired influence, and even a very much smaller percentage has an appreciable influence, and the proportions stated may be departed from to some extent." The claim concludes thus, "in about the proportions specified, and then casting, substan-

tially as and for the purpose set forth." The patent, it will be perceived, names a limit in the maximum side. The quantity of aluminium is never to exceed 1 per cent. On the other hand, no minimum limit is named. The patentee declares his preferred proportions to be from one-fifth to one-tenth of 1 per cent. Yet the lowest preferable quantity mentioned, namely, one-tenth of 1 per cent., is not fixed as the minimum quantity to be used. It is announced that "a very much smaller percentage has an appreciable influence." An "appreciable influence" in what? Undoubtedly, in the securing of "a more perfect product." The words "desired influence" and "appreciable influence," as used in the specification, refer, not to any mere manifestations attending the process, or supposed to attend it, but to final results. If, then, the quantity of aluminium used, however much less than one-tenth of 1 per cent. it may be, is sufficient to produce in the castings the improvement contemplated by the patent in an appreciable and substantial degree, the purpose of the invention is attained and the described process is practiced. Judged by the test of beneficial results manifested in the product, it seems clear that the defendant's practice involves the use of Wittenstrom's invention. The defendant uses aluminium in quantities sufficient to subserve its particular requirements, applies it substantially at the time and in the manner directed by the patent, and thereby obtains the good results specified in the patent to a substantial extent.

The case of *Roberts v. Roter*, 5 Fish. Pat. Cas. 295, Fed. Cas. No. 11,912, is here a pertinent citation. There the plaintiff's patent was for a method of increasing the flow of oil in oil wells by exploding a torpedo at the bottom of the well, which was to be filled with water before the explosion, so as to confine its effect to the immediate vicinity of the torpedo. The defendant did not fill his well, but used a relatively short column of fluid. The court held that the patent could not thus be evaded, and Judge McKennan said:

"If the effect is produced by filling the well only half full, or by means of a shorter column of water, all is done that the patentee's process requires. Any one, therefore, who produces the result contemplated by the patentee, by such use only of the described means as is essential to that end, uses his process and is an infringer."

The defendant alleges that in its ingot practice the addition of the aluminium to the molten metal is not followed by increased, but by diminished, fluidity; which indicates, it is argued, that the defendant's process is substantially different from that of the patent. Were the lack of increased fluidity established, this would not negative infringement; but it is not satisfactorily shown. Even Mr. Wood, who of all the defendant's witnesses is best qualified by practical experience to speak upon this point, declines to express a positive judgment. He thinks the molten steel under the defendant's treatment is rendered very slightly less fluid, but adds: "This is a matter of personal observation and opinion, which I cannot express quantitatively or prove."

It is said that the defendant discovered, as the outcome of long-continued experiments and investigations, the efficacy of about two ounces of aluminium to a ton of steel. But it is very significant that

Mr. Talbot, the manager of the Pencoyd Steel Works, as he testifies, acting spontaneously and without previous experimentation, introduced at those works the practice of using the same quantity of aluminium—two ounces to the ton—in casting steel ingots. Other manufacturers of steel ingots have used four ounces of aluminium to a ton of steel; and Mr. Hunt, the defendant's expert, testifies that whether two ounces or four ounces be used the two processes are substantially the same and the results not different.

Little need be said respecting the Niven McConnell patent. It was applied for during the pendency of this suit, and after much of the testimony therein had been taken, by an employé of the defendant company, who was acting in its interest. Evidently it was granted upon the faith of statements of fact contained in an *ex parte* affidavit made by the applicant. Under the circumstances, it is entitled to very little weight, if any whatever. Certainly, no controlling effect is to be given to it. If sustainable at all, it must be regarded as for a mere improvement upon Wittenstrom, and subordinate to the patent in suit.

The suggestion that the use of aluminium while the defendant was engaged in the practice of the so-called "armor-plate process" was merely experimental cannot be accepted. That was a commercial use, extending over a period of several months, and involved a very large product. It was a use in the course of business and for profit.

I am of the opinion that each of the two practices which the defendant has pursued is an infringement of the patent in suit. Let a decree be drawn in favor of the plaintiff.

THE ADULA.

(District Court, S. D. Georgia, E. D. August 13, 1898.)

1. PRIZE—HEARING ON EVIDENCE IN PREPARATORIO.

At the first hearing in prize proceedings, only the evidence afforded by the examination of the captured crew, taken on standing interrogatories, the ship's papers, and other evidence of a documentary character, found upon the ship by the captors, is to be considered.

2. SAME—SHIP OF NEUTRAL CHARTERED TO ENEMY.

When a vessel owned by a subject of a neutral power is chartered to a subject of the enemy, with full power to control her voyages and employ her in illicit trade, she is to be treated, when found attempting to violate the blockade, as if she were enemy's property.

3. SAME—EVIDENCE IN PREPARATORIO—SUBSEQUENT CONTRADICTION.

Where the charterer of a vessel taken as prize stated in his testimony in preparatorio that he was a loyal subject of the enemy's government, he cannot thereafter be permitted to contradict the same by showing that he had cast in his lot with insurgents against that government.

4. SAME—VIOLATION OF BLOCKADE—INTENT.

Sailing from a neutral port with intent to enter a blockaded port, with knowledge of the existence of the blockade, subjects the vessel and generally its cargo to capture and condemnation; nor does it matter that the vessel is merely in ballast, and her purpose was ostensibly to take away persons who desired to escape the hardships of the blockade.

b. SAME.

Neutral ships, though not ostensibly destined to a blockaded port, cannot innocently place themselves in a situation which would enable them