

Case No. 14,158.

TREADWELL v. PARROTT.

{5 Blatchf. 369;¹ 3 Fish. Pat. Cas. 124; 23 Leg. Int. 404; Merw. Pat. Inv. 319.}

Circuit Court, S. D. New York.

Dec 7, 1866.

PATENTS—STATE OF ART—INVENTION—NOVELTY.

1. The invention described and claimed in letters patent granted to Daniel Treadwell, December 11th, 1835, and reissued February 4th, 1862, for an “improvement in the manufacture of cannon,” explained.
2. The prior application to a wrought iron gun, or to a barrel composed of a combination of wrought and cast iron, of wrought iron hoops, in a given way, to strengthen the barrel, will not defeat a subsequent patent for the application of such hoops, in the same way, to a cast iron gun.
3. An intelligent mechanic is chargeable with a knowledge of the state of the art in relation to a subject on which he is called to exercise his skill.
4. What is the business of a mechanic, as distinguished from that of an inventor, defined.
5. The said patent to Treadwell is void for want of novelty.

{This was a bill in equity by Daniel Treadwell against Robert P. Parrott, filed to restrain the defendant from infringing letters patent [No. 13,927] for “improvement in the manufacture of cannon,” granted to complainant December 11, 1855, and reissued February 4, 1862 [No. 1,272]. The claims of the original and reissued patents, together with a description of the invention of the patentee, and of the prior devices, will be found in the opinion of the court.}²

Benjamin B. Curtis and Charles M. Keller, for plaintiff.

George Gifford and Samuel D. Cozzens, for defendant.

NELSON, Circuit Justice. The specification of the original patent describes very particularly 155 the mode of construction of the cannon. The patentee first casts the cannon, having at its largest part a diameter about twice as great as the calibre. It is then bored, and the outside is turned. A screw is cut on the body. Hoops or rings are then formed of wrought iron, and a female screw is cut on the inside, to fit the threads cut on the body, and the hoops are finished with their interior diameters about 1/1000 part less than the diameter of the male screw to be encircled. The hoop is then heated, to expand it sufficiently to turn it on to its place. An indefinite number of hoops or rings may be thus put on the body of the gun, and also other hoops formed in the same way over the first series. The claim in the original patent is as follows: "I do not claim a patent for using hoops generally in making cannon, as the earliest cannon known were formed in part by hoops brazed upon them. But my invention consists in constructing cannon with hoops screwed and shrunk upon a body in which the calibre is formed in the manner herein described."

The description of the mode of constructing the cannon, in the specification of the reissued patent, is the same, in hæc verba, as in the original, the difference consisting only in the explanation given of the principles which led to the construction. In the reissued patent, the invention is claimed as follows: "First. In making a cannon consisting of a body, (in which the calibre is formed,) the walls of which are of one piece, surrounded by rings, hoops, or tubes, in one or more layers, placed upon said body under great strain, by which said body is compressed and the natural equilibrium of the molecules, or particles, of which it is composed, disturbed by their being brought nearer together; and this is accomplished in the manner herein set forth, namely, by making the hoops smaller than the part which they are to

surround, and then expanding them by heat and suffering them to shrink or contract after having been put in their places. Second. I also claim the method of securing the hoops to the body of the gun, and the several layers of hoops to each other, by screw threads, when they shrink to their places, as above described.”

In explanation of the principles that led to the invention, the patentee refers to the Barlow law, as it is called, in which Barlow showed, that hollow cylinders of the same materials do not increase in strength in the ratio of increase in thickness, but that the ratio of increase in strength is such, that, when they become of considerable thickness, the strength falls enormously below that given by the ratio of thickness. The cause of the diminution in the power of resistance, it is observed by Barlow, may be stated as follows: “Suppose such a cylinder to be made up of a great number of thin rings or hoops, placed one within the other and exactly fitting, so that the particles of each hoop shall be in equilibrium with each other, then, the resistance of these rings, compared one with the other, to any distending force, will be inversely as the squares of their diameters.” “Now, to obviate,” the patentee observes, “the great causes of weakness arising from the conditions before stated, and to obtain, as far as may be, the strength of wrought iron instead of that of cast iron, for cannon, I have invented the following mode of construction.” He then repeats the mode of construction already stated, and adds: “This compression (the compression of the body of the gun by the hoops) must be made such, that when the gun is subjected to the greatest force, the body of the gun and the several layers of rings will be distended to the fracturing point at the same time, and thus all take a portion of the strain up to its bearing capacity.” He observes: “There may, at first view, seem to be a great practical difficulty in making the hoops of the exact size required to produce the necessary compression;

but wrought iron and all malleable bodies are capable of being extended, without fracture, much beyond their power of elasticity. They may, therefore, be greatly elongated without being weakened. Hence we have only to form the hoops small in excess, and they will accommodate themselves under the strain without the least injury. It will be found best, in practice, therefore, to make the difference between the diameters of the hoops and the parts they surround considerably more than one-thousandth part of a diameter." The result he arrives at is, that "a gun thus made will be nearly four times as strong as a cast iron gun of the same weight, wrought iron being taken at only twice the strength of cast iron." Whether this result, to the extent claimed, is well founded or not, is a fact which it is not important either to admit or deny; but I entertain no doubt that the improvement thus made on the cast iron gun is very considerable, and entitles the inventor, whoever he may be, to the protection of the fruits of his invention.

Some question has been made as to the practicability of the contrivance for securing the benefit of the rings or hoops on the gun by means of screws, but I do not deem it material to examine it. If the case turned on it, I should incline, on the proofs, to uphold the patent notwithstanding the objection. Nor do I entertain any serious doubt, that, upon a fair and liberal construction of the specification and claims, which construction I am always disposed to give to these instruments, in behalf of a very useful and meritorious class of citizens, the improvement of the patentee was intended to be confined to cast iron guns. A gun of this material is mentioned in the specifications of the original and reissued patents, and no other.

In my view of the case, the only material and difficult question is, whether or not the 156 patentee is the original and first inventor of the improvement. I

have paused upon this question some time, and given to it all the attention and examination consistent with other cases; and, after the best consideration, have been compelled to the conclusion that he is not. I shall, as briefly as practicable, state the grounds of this conclusion.

The improvement of a cast iron gun, by combining with it a wrought iron envelope, was discussed by a French officer (Thiery) as early as 1834, and is found in a publication of that date. After speaking of the liability of cast iron guns to burst, and the evils attendant, he observes: "We have thought that the combination of wrought iron and cast iron, which has contributed so much to the powers of steam-engines, would also present happy effects in the construction of cannon. It is in this view that we have proposed the trial of a cannon of cast iron with an envelope of wrought iron, adding to the resistance of the piece of ordnance, and preserving, in explosions, from the danger of fragments." Again, after speaking of the importance of using cast iron for the body of the gun, he observes: "This metal, having but very little elasticity, resists the explosion of the powder principally by virtue of its resistance to extension. This resistance once overcome, the cast iron would not evidently find any assistance against rupture from a surrounding body more elastic, and which yields beyond the limit at which its cohesion is destroyed. All that one can hope for, from an elastic envelope compressing the cast iron, is, that it augments, by the compression, the resistance to extension of this hard, rigid, brittle metal; but, not that it should cause it to participate in elastic properties which are not in its nature." He further states: "The means which naturally first offer for hooping a cannon of cast iron with wrought iron, would be to cover it with a series of hoops placed upon it while hot, side by side, and which would thus adhere to this piece of ordnance

with the whole force of the contraction—a force which might become excessive by carrying the temperature of the hoop of wrought iron to a very high degree.” This officer recurred to the subject again in 1840, and constructed a gun according to his suggestions in the previous paper. “Before placing the hoops,” he observes, “nicks are made from distance to distance upon the exterior surface of the cannon, to cause the hoops, which are placed afterwards, after having heated them to the temperature found necessary to obtain a suitable dilation, to adhere strongly to it. The hoops, in cooling, exert, by contraction, upon the cannon a powerful compression, which cannot fail to add to the strength of the cast iron, and guarantees the connection of the system of the envelope of wrought iron.” Thiery constructed a gun in 1834, as well as in 1840, according to his principles and theory. The body, however, of both was not purely of cast iron, longitudinal strips of wrought iron being immersed in the metal, in the casting of the cast iron body.

I have referred to these publications, not as evidence that a gun had been constructed like the plaintiff's, prior to his invention, but mainly as evidence of the manner and effect of hooping cast iron cannon with wrought iron bands, and of the state of the art, in the manufacture of cast iron cannon with wrought iron hoops. And it will be seen, that it was well known, as early as 1834 and 1840, that the hooping of the body of cast iron guns with wrought iron bands, very much after the manner of the patentee, had the effect to add to the resistance of the cylinders of cast iron against the explosion of powder; that the compression of the cast iron metal by the contraction of the heated hoops or bands, increased very much the strength of this resistance; and that the smallness of the diameter of the hoop, compared with the exterior diameters of the barrel, was governed by the principle of the law of expansion of wrought iron.

I agree that, although the use of wrought iron hoops in the way stated, for strengthening the barrel of a gun, had been known as early as 1834 or 1840, yet, if the patentee was the first to apply the device to a cast iron gun, he must be regarded as the original inventor, and entitled to a patent; and that the application of it to a wrought iron gun, or to a barrel composed of a combination of cast and wrought iron, prior in point of time, would not, of itself, be any objection. Hence I lay out of the case the Thiery gun, as a defence to this patent; but the state of the art, as found in this publication, is important in another branch of the case. The same may be said of the Chambers gun, of wrought iron.

We come now to the Frith gun, the patent of which was granted in England, in 1843. This was a cast iron barrel. It is stated in the specification: "That portion of the cannon called the first reinforce, (except the part forming breech A,) the second reinforce, the trunnions, the chase and the muzzle, marked F F F F, is cast in one piece. The first reinforce, from F to G, is hooped with strong wrought iron or steel bands, driven on while hot, so that the contraction thereof in cooling will produce firm adhesion. Thus that part of the cannon most acted upon by explosion and heat is materially strengthened." It will be seen that the device described in hooping the first reinforce is like that of the plaintiff's, except in giving the proportion of difference between the interior diameter of the hoop and the exterior diameter of the barrel—the former to be 1/1000 part of the diameter less than the latter. Frith gives no minimum or maximum difference. I, of course, lay out of the device the plaintiff's screws, as I have not been inclined to hold him to form.

One question, in this branch of the case, is, whether, in the existing state of the art, the 157 information given in the description would enable an intelligent mechanic to make the proper difference.

We have seen, that the difference must be such, or so great, that, when the hoop is driven on while hot, the contraction, by cooling, will produce firm adhesion, and so as materially to strengthen that part of the cannon against explosion and heat. An intelligent mechanic is, I think, chargeable with a knowledge of the state of the art in relation to the subject upon which he is called to exercise his skill; and, hence, we may assume that he would know the extent to which wrought iron bands may be distended by heat without weakening their power of elasticity; and, with this knowledge, it is apparent, he would be qualified to carry into effect, in a scientific way, the purpose and object of the patentee. This, to me, obvious proposition, is confirmed by the answer of the plaintiff's very intelligent expert to the eightieth cross-interrogatory: "Judging from my knowledge of the state of the art," he observes, "as it has been previously practised, a machanic, if directed to shrink hoops upon a body, would probably forge the hoops with a greater difference of diameter than $1/1000$ part He would then heat it hot, put it upon its place, probably by driving, and while hot hammer it up to the body, to make it fit." This is also affirmed more in detail by all the experts on the part of the defendant, whose attention was called to the subject.

The state of the art was familiar to Chambers in 1819. He observes, that he determines "the diameters of the interior of the rings as compared with that of the exterior of the tube, on the principle of the law of expansion of wrought iron." In another place he observes: "The edge f of the ring a is of such interior diameter that it will not, when cold, pass over the ridge o on the band a; but, when heated to the proper temperature, it will come into place, and then the contraction of the metal brings f into firm contact with 1, and g into contact with o, leaving the barrel at all parts firmly griped by the rings, but not so straining

the latter as to diminish essentially the tenacity of the ring when cold.”

In this connection, we may refer to the evidence of the plaintiff on this subject. He says, that he “was led to this quantity ($1/1000$ part of its diameter,) as iron strained $1/1000$ part of its length may be considered as having reached about the limits of its elasticity. If strained more than that, it produces merely a permanent elongation.”

Another question in this branch of the case should be noticed. It is stated by the experts for the defendant and not denied, that the thickness of the walls of the Frith gun, as shown in the drawings, corresponds very nearly with the thickness of the plaintiff's, and the same as to the thickness of the hoops. Now, assuming that these rings are placed on the barrel of the Frith gun in the way I have described, and, according to the then state of the art, it would seem necessarily to follow, that there would be a corresponding compression of the metal of the barrel, and distension of the hoop, with those of the plaintiff. The improvement, in each gun, as to the additional strength given, would seem to be identical. Indeed, the plaintiff's expert, already referred to, in his answer to the twenty-second interrogatory, if I understand him, admits that “hoops of the size shown, (as Frith's,) placed upon a body of the thickness represented in the drawing, would, if properly applied, produce the effect of compression and distension contemplated in the complainant's patent”—that is, he observes, if the surfaces were accurately fitted and placed upon the body after it was bored. The witness had before stated that he did not consider the boring before the placing of the hoops vital. Now, whether Frith had a knowledge of the Barlow law or not, if his construction of the gun met the difficulties there described and overcame them in the same way as the plaintiff's, it

is manifest that the absence of this knowledge cannot affect the question.

In this connection, I may refer to another opinion expressed by this expert, in his answer to the sixty-sixth cross-interrogatory. The question is: "Do you understand the complainant's structure to be limited, as respects the difference of diameters of cast iron body and hoop, to a difference of 1/1000 of the diameter of the body, or more, or less?" Answer: "I do not understand it to be limited to the difference in diameter of body and hoop, of 1/1000. Any difference of diameter that would produce the beneficial result contemplated, would, I think, be within the description given, whether more or less." It seems to me that this is a sound view of the patent, and that the invention cannot be allowed to turn on the precise amount of difference stated; otherwise, an invasion of the patent would be easy and unavoidable. This view, however, shows, that the statement of the difference in the patent is not necessary or material, and will not bind the patentee, if made. All that is essential or useful is a reference to the principle or law of the expansibility of wrought iron, and the extent to which it may be carried by heat, without weakening its tenacity or elasticity. This would be sufficient to enable the Intelligent mechanic to construct the improvement and protect the invention from invasion or infringement.

A good deal has been said by the experts in the proofs, and by counsel in the argument, in respect to the absence of any direction, in the specification of the Frith patent, as to the finish of the work to be done, such as turning or polishing the outer surface of the barrel, and the inner surface of the rings or hoops. I do not think this criticism entitled to much consideration. It is the business of the mechanic, not of the inventor. If it be 158 necessary that this work should be done, in order to make a proper fit of the hoops to the barrel, it may well be left to the intelligent

mechanic, and to the duty that devolves on him to execute his job in a workmanlike manner, and so as to produce the effect intended by the inventor, if within his skill. The inventor is not necessarily a mechanic, and is oftentimes very much dependent upon the skill of the latter, to adapt his invention to practical use.

Upon the whole, without pursuing the case further, I am compelled to the conclusion, that, in view of the state of the art at the time, the improvement in the construction of the cast iron gun with wrought iron hoops or rings, claimed by the plaintiff, will be found in the description given in the Frith patent; and, upon this ground, a decree must be entered for the defendant, dismissing the bill.

¹ [Reported by Hon. Samuel Blatchford, District Judge, and by Samuel S. Fisher, Esq., and here compiled and reprinted by permission. The syllabus and opinion are from 5 Blatchf. 369, and the statement is from 3 Fish. Pat. Cas. 124. Merw. Pat. Inv. 319, contains only a partial report.]

² [From 3 Fish. Pat. Cas. 124.]

This volume of American Law was transcribed for use
on the Internet

through a contribution from [Google](#). 