

Statement of the Case.

on the subject of our appellate jurisdiction, without changing the phraseology which had received judicial construction. The court should not now unsettle a rule so long established and recognized.

Motion granted.

EAMES *v.* ANDREWS.APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR
THE DISTRICT OF CONNECTICUT.

Argued January 6, 7, 1887. — Decided May 23, 1887.

The reissued letters-patent, No. 4372, issued to Nelson W. Green, May 9, 1871, for an improved method of constructing artesian wells, are for the process of drawing water from the earth by means of a well driven in the manner described in the patent, and are for the same invention described and claimed in the original letters-patent issued to Green, January 14, 1868. It is a reasonable inference from the language employed in the original description that the tube, in the act of being driven into the earth to and into a water-bearing stratum, would form an air-tight connection with the surrounding earth, and that the pump should be attached to it by an air-tight connection. The changes made in the amended specification did not enlarge the scope of the patent, or describe a different invention; but only supplied a deficiency in the original description, by describing with more particularity and exactness the means to be employed to produce the desired result. The omission in the second claim of the words, "where no rock is to be penetrated," which are found in the first claim, did not change the obvious meaning of the original claim.

The reissued letters-patent, No. 4372, to Nelson W. Green, were not for the same subject as the letters-patent issued to James Suggett, March 29, 1864; or those issued to John Goode in England in 1823; nor was the invention patented in them anticipated in any publication referred to in the opinion of the court within the rule as to previous publications laid down in *Seymour v. Osborne*, 11 Wall. 516; *Cohn v. United States Corset Co.*, 93 U. S. 366; and *Downton v. Yeager Milling Co.*, 108 U. S. 466.

The evidence shows a clear case of infringement on the part of the defendant in error.

BILL in equity to restrain an infringement of letters-patent for a driven well. Decree for a perpetual injunction, from which respondent appealed. The case is stated in the opinion of the court.

Opinion of the Court.

Mr. C. R. Ingersoll for appellant.

Mr. A. Q. Keasbey for appellees. *Mr. J. C. Clayton* filed a brief for same.

MR. JUSTICE MATTHEWS delivered the opinion of the court.

This is an appeal from the decree of the Circuit Court of the United States for the District of Connecticut upon a bill in equity filed by the appellees to restrain the alleged infringement of reissued letters-patent No. 4372, issued to Nelson W. Green, on May 9, 1871, for an improved method of constructing artesian wells. The original letters-patent, No. 73,425, were issued to the patentee January 14, 1868. The defences relied on were that the defendants did not infringe; that the patent was void for want of novelty in the invention; and that the reissued patent was void because it was not for the same invention as that described and claimed in the original patent. The controversy relates to what is commonly known as the "driven well patent."

As one of the defences is, that the reissued patent is void, as covering more than was described and claimed in the original patent, it becomes necessary to compare the two, and for that purpose they are here printed in parallel columns, the drawings being the same in both:

Specification forming part of Letters-Patent No. 73,425, dated January 14, 1868.

ORIGINAL.

Be it known that I, Nelson W. Green, of Cortland, in the county of Cortland, and state of New York, have invented a new and useful improvement in the manner of sinking and constructing artesian or driven

Specification forming part of Letters-Patent No. 73,425, dated January 14, 1868; Reissue No. 4372, dated May 9, 1871.

REISSUE.

Be it known that I, Nelson W. Green, of Amherst, in the county of Hampshire, and state of Massachusetts, have invented a new and improved method of constructing artesian wells; and I do hereby

Opinion of the Court.

wells where no rock is to declare that the following is a be penetrated, and of raising full, clear and exact descrip-

Fig. 1.

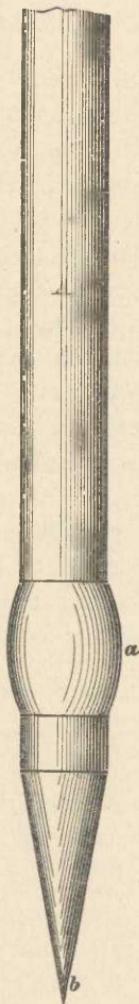


Fig. 2.



water therefrom; and I do hereby declare the following to be a full, clear, and exact description of the same, refer-

tion of the same, reference being had to the accompanying drawings, forming part of this specification.

Opinion of the Court.

ence being had to the accompanying drawings, making a part of this specification, in which—

Fig. 1 represents a portion of the rod which is driven or forced into the ground to form the opening or hole for the insertion of the tube that forms the casing or lining of the well and the avenue through which the water is raised to or above the surface of the ground, and Fig. 2 represents a portion of the tube.

My invention consists in driving or forcing an iron or a wooden rod with a steel or iron point into the earth until it is projected to or into the water, and then withdrawing the said rod and inserting in its place a tube of metal or wood to the same depth, through which and from which the water may be drawn by any of the usual well-known forms of pumps.

My invention is particularly intended for the construction of artesian wells in places where no rock is to be penetrated.

The methods of constructing wells previous to this invention were what have been known as "sinking" and "boring," in both of which the hole or opening constituting the well was produced by taking away a portion of the earth or rock through which it was made.

This invention consists in producing the well by driving or forcing down an instrument into the ground until it reaches the water, the hole or opening being thus made by a mere displacement of the earth, which is packed around the instrument and not removed upward from the hole, as it is in boring.

The instrument to be employed in producing such a well, which, to distinguish it from "sunk" or "bored" wells, may be termed a "driven" well, may be any that is capable of sustaining the blows or pressure necessary to drive it into the earth; but I prefer to

Opinion of the Court.

employ a pointed rod, which, after having been driven or forced down until it reaches the water, I withdraw and replace by a tube made airtight throughout its length, except at or near its lower end, where I make openings or perforations for the admission of water, and through and from which the water may be drawn by any well-known or suitable form of pump.

In certain soils the use of a rod preparatory to the insertion of a tube is unnecessary, as the tube itself, through which the water is to be drawn, may be the instrument which produces the well by the act of driving it into the ground to the requisite depth.

To enable others to make and use my invention, I will proceed to describe it with reference to the drawings, in which—

Figure 1 represents a portion of the pointed rod above mentioned, and Fig. 2 a portion of the tube which forms the casing or lining of the well.

The driving-rod A I construct of wood or iron, or other metal, or of parts of

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

The driving-rod A I construct of wood or iron, or other metal, or of parts of

Opinou of the Court.

each, with a sharp point, *b*, of steel, or otherwise, to penetrate the earth, and a slight swell, *a*, a short distance above the point, to make the hole slightly larger than the general diameter of the rod. This rod I drive, by a falling weight or other power, into the earth until its point passes sufficiently far into the water to procure the desired supply. I then withdraw the rod and insert in its place the iron or wooden tube *B*, which may be slightly contracted at its lower end to insure its easy passage to its place. In general, this tube *B* I make of iron, and of a thickness that will bear a force applied at its upper extremity sufficient to drive or force it to its place; and where a large or continuous flow of water is desired, I perforate this lower end of the tube to admit the water more freely to the inside.

The perforations *c* may be about one-half of an inch in diameter, less or more, and from one to one and a half inches apart; and the perforations may extend, from the bottom of the tube upward, from one to two feet. The diameter of the tube should be somewhat smaller than the

each, with a sharp point, *b*, of steel or otherwise, to penetrate the earth, and a slight swell, *a*, a short distance above the point, to make the hole slightly larger than the general diameter of the rod. This rod I drive, by a falling weight or other power, into the earth until its point passes sufficiently far into the water to procure the desired supply. I then withdraw the rod and insert in its place the air-tight iron or wooden tube *B*, which may be slightly contracted at its lower end to insure its easy passage to its place. In general, this tube *B* I make of iron, and of a thickness that will bear a force applied at its upper extremity sufficient to drive or force it to its place; and where a large or continuous flow of water is desired I perforate this tube near its lower end to admit the water more freely to the inside.

The perforations *c* may be about one-half of an inch in diameter, less or more, and from one to one and a half inches apart, and the perforations may extend, from the bottom of the tube upward, from one to two feet. The diameter of the tube should be somewhat smaller than the

Opinion of the Court.

diameter of the swell α on the drill end of the driving-rod A.

In localities where the water is near the surface of the ground, and the well is for temporary use only, as in the case of a moving army, or for temporary camps, lighter and thinner material than iron may be used for making the tubes—as, for instance, zinc, tin, copper, or sheet metal of other kind, or even wood, may be used. The rod may be of any suitable and practical size that can be readily driven or forced into the ground, and may be from one to three inches in diameter.

Any suitable well-known pump may be applied to raise the water up through the tube to the surface or above it.

I am aware of James Suggett's patent of March 29, 1864, and I disclaim all secured to him therein.

Having thus fully described my invention, what I claim and desire to secure by letters-patent is—

diameter of the swell α on the drill end of the driving-rod A.

In localities where the water is near the surface of the ground, and the well is for temporary use only, as in the case of a moving army or for temporary camps, lighter and thinner materials than iron may be used for making the tubes—as, for instance, zinc, tin, copper, or sheet metal of other kind, or even wood, may be used.

The rod may be of any suitable and practical size that can be readily driven or forced into the ground, and may be from one to three inches in diameter.

In some cases the water will flow out from the top of the tube without the aid of a pump. In other cases the aid of a pump to draw the water from the well may be necessary. In the latter cases I attach to the tube, by an airtight connection, any known form of pump.

What I claim as my invention, and desire to secure by letters-patent, is—

Opinion of the Court.

The herein-described process of sinking wells where no rock is to be penetrated, viz.: by driving or forcing down a rod to and into the water under ground, and withdrawing it and inserting a tube in its place to draw the water through, substantially as herein described.

The process of constructing wells by driving or forcing an instrument into the ground until it is projected into the water without removing the earth upward, as it is in boring, substantially as herein described.

The attempts judicially to enforce the rights claimed under this patent have met with determined resistance, and given rise to extensive litigation, in the course of which the original and reissued patents have been subjected to great scrutiny and criticism. The first reported case is that of *Andrews v. Carman*, 13 Blatchford, 307, decided by Judge Benedict in 1876. That has been followed by *Andrews v. Wright*, before Judges Dillon and Nelson, 13 Off. Gaz. 969; *Hine v. Wahl*, before Judge Gresham; *Andrews v. Cross*, before Mr. Justice Blatchford, then Circuit Judge, 19 Blatchford, 294; *Green v. French*, before Judge Nixon, 11 Fed. Rep. 591; *Andrews v. Creegan*, before Judge Wheeler, 19 Blatchford, 113; *Andrews v. Long*, before Judge McCrary, 2 McCrary, 577; the present case before Judge Shipman, 15 Fed. Rep. 109; and *Andrews v. Cone*, and *Andrews v. Hovey*, heard before Judges Love, Shiras, and Nelson, 5 McCrary, 181. The case of *Hine v. Wahl* was argued in this court on appeal at October Term, 1882, the decree below being affirmed by a divided court. The patent has been sustained against all defences made in the cases just mentioned, except in those of *Andrews v. Cone* and *Andrews v. Hovey*, 5 McCrary, 181, which are now pending on appeal in this court.

The extent of this litigation attests at least the utility of the process supposed to be described in the patent, as it shows and measures the extent of the public demand for its use. This is further shown by the statement of one of the complainants in the present cause when examined as a witness, who says

Opinion of the Court.

that large numbers of wells constructed according to the process described in the patent are in use in the New England States, New York, Pennsylvania, and most of the Western States, as well as in New Jersey, and probably in every state in the Union; and that from estimates made by agents, well-drivers, and others having an opportunity of knowledge in the matter, it is believed that the number of driven wells throughout the United States is somewhere between five hundred thousand and a million.

The wells in general use prior to the date of this patent were of two kinds: 1st, the open, common, dug well, usually walled or boarded or otherwise lined, from which the water which collected in the well was usually lifted by means of a bucket and windlass, or by a pump; and 2d, artesian wells, bored frequently to a great depth by means of drills, chisels, augers, and other such tools, whereby the opening was made into the earth to the water supply. In both kinds the process used was to make an excavation, removing the material through the opening. It was usual in making artesian bored wells to drive down a wooden or iron pipe, open at both ends, having a sharp edge around the circumference of its lower extremity, the earth being taken out from within it. As the driving proceeds, and after it reaches the rock, chisels, drills, and other tools are used to disintegrate the rock, which is taken to the surface through the tube so driven. In the latter case, the tube is inserted into the hole bored for the purpose of preventing the caving in of the sides of the opening. Through that tube the water is drawn, if necessary, by a pump, or otherwise flows in consequence of pressure from the head.

The manner in which the water is obtained and supplied, by means of these two descriptions of wells, is thus stated, as we suppose correctly, by an expert witness in this case. He says:

“Water is supplied to open dug wells only by the force of gravity, and, when the water is pumped from them by the ordinary suction pump, the pressure of the atmosphere is the same on the surface of the water in the well as it is upon the water in the earth surrounding it, and the result is, that

Opinion of the Court.

the water in the well itself, being in free space, is more readily forced by the pressure of the atmosphere into the suction pipe of the pump than the surrounding water, which is retarded by friction through the earth, and in consequence the continued operation of the pump soon exhausts the water in the well, which supply can only be replenished by the action of gravity, the pressure of the atmosphere to retard its flow into the well being equal to and counterbalancing the pressure exerted by the atmosphere upon the surface of the water in the earth, and the operation of the pump has no effect upon the water in the surrounding earth to force it into the well; hence the supply to the open dug well is due to and produced only by the action of gravity.

"In the artesian well the same principles govern in regard to the means of supply, when they are not flowing wells, but in consequence of such wells being usually inserted down into rock or like substance until they meet with open fissures in the rock, through which water flows more freely and readily than it does through ordinary compacted earth, sand, &c., which form the water-bearing strata above the rock, a much larger quantity of water is obtained therefrom in proportion to their diameter than is usually obtained from the dug well, unless, as in some cases, the dug wells are carried down into a rock stratum and strike a similar seam in the rock. When artesian wells are flowing wells, the generally received opinion is, that their supply of water comes from a water-bearing stratum lying beneath a stratum practically impervious to water, but which lower stratum extends beyond and crops out at the surface of the earth at a greater or less distance from the well itself, (often many miles away,) and at a considerably higher elevation than the surface of the earth at the well."

The same witness describes the invention, which he supposes to be embodied in the driven well and covered by the patent in suit, as follows:

"I understand the invention to be founded upon the discovery by Colonel Green, that if a pipe which is air-tight throughout its length, except at its upper end and at or near its lower end, where are openings for the admission of water, be inserted

Opinion of the Court.

into the earth, down and into a water-bearing stratum, the pipe within the water-bearing stratum being surrounded and in close contact with the earth, and having a pump of any ordinary construction attached by an air-tight connection to its upper end, thus forming a well, air-tight from its upper end, into and below the surface of the water in the earth, that upon operating the pump so attached and removing the pressure of the atmosphere from the well, the pressure of the atmosphere through the earth upon the surface of the water within the earth would force the water into the body of the well with a velocity due to the pressure of the atmosphere, and that the supply of the water to the well directly from the earth surrounding it would be continuous and lasting, so long as water was contained in the stratum of earth with which the lower end of the pipe was in communication, and that the water contained in that stratum could be made directly tributary to the well without regard to the distance to which said water-bearing stratum might extend. In other words, that unlike the previously known open wells, either dug or bored, into which the water from the surrounding earth was forced by the action of gravity alone, he could control the delivery of water to a well by this pressure of the atmosphere, which he discovered acted as effectually, through the earth, to force water from the earth into a well from which the pressure of the atmosphere had been removed, as if no earth existed above the surface of the water.

"To utilize this discovery he proposed a method of making a well by simply driving a tube down through the earth into a water-bearing stratum, by which means he secured a close contact of the lower end of his tube with the earth of the water-bearing stratum."

The differences between the wells previously in common use and the driven wells are stated by the same witness as follows:

"The distinguishing characteristics of a driven well, as it differs from the dug well, is, that when the pressure is relieved from the interior of the tube which itself forms the body of the well, not only does the force of gravity act to supply it

Opinion of the Court.

with water directly from the earth, but there being no intervening body of water between the wall of the well itself and the earth surrounding it, upon which the atmosphere can act directly and with greater effect to force it into the well (as it can and does in the open well), the water is supplied directly to it from the earth surrounding it in a direct inverse ratio to its distance from the well, and the friction of the water through the earth being directly as the square of its velocity, as the distance from the well increases the water moves very much slower than it does immediately next to the well itself; but the area of the source of supply being increased exactly in the ratio of the square of its distance from the well, and the friction being increased exactly as the square of the velocity (in any given stratum), the one exactly counterbalancing the other, it follows that, from natural laws, the surface of the water in the earth surrounding the well is and must be maintained practically at a given level; whereas, in the open well, supplied by gravity only, the water in the earth inclines from the natural surface of the stratum in the earth to the bottom of the well, the angle of that decline decreasing as the supply is taken from the well, and, unless pumping is stopped and time allowed for a resupply, the lowering of the water in the earth extends to a continually increasing distance and a longer time is required to obtain the original quantity in the well, while the supply to the driven well is continuous and steady and practically inexhaustible, the supply in a given time being proportioned in any given soil to the size of the pipe forming the well, having openings proportionate to its size, different wells varying in the supply according to the nature of the soil in which they are inserted, but remaining virtually constant at all times in the same soil. It is not claimed, nor is it a fact, that water can be pumped from a driven well, in any given stratum, with greater ease than from an open well sunk into the same stratum, but the great advantages are that a much larger and more extended supply of water is controlled, and, in consequence of the passage of the water through the earth, under the pressure of the atmosphere, a constant filtration is secured, thus securing both a greater supply and better water. And

Opinion of the Court.

where large and continuous supplies are obtained by unintermittent pumping, for days and weeks at a time, experience has shown that the quantity of water has gradually but perceptibly improved, as in the case of the wells at Belleville, heretofore mentioned, where an amount of water is emptied largely exceeding the rainfall upon the entire territory not shut out from the valley by outcropping rocks upon three sides and open to salt water upon the fourth, and no practical diminution of the height of the water is observed.

“One peculiar characteristic of a driven well, as distinguished from the bored artesian well, is that the driven well is for use in soil where no rock is to be penetrated, and where the pressure of the atmosphere is free to act upon the surface of the water in the earth surrounding it; while the artesian well is usually, if not always, bored into a rock stratum, and is supplied with water through fissures in the rock instead of through the earth itself surrounding the entrance or opening to the well.”

In describing the mode of constructing a driven well under the patent, the same witness states that the pipes in general use, which are driven into the ground, have openings for the admission of water into them near the lower end, usually extending up around the sides of the pipe from fifteen inches, sometimes, up to several feet. These holes are about three-eighths of an inch square, over which upon raised rings is placed a screen of perforated brass, having openings of a size giving from one hundred and fifty to three hundred to the square inch. When the pump is first applied to such a pipe, a small amount of mud or sand is at first usually brought up, coming from a greater or less distance from the outside of the tube, but not leaving an open space around the perforations, as these are not large enough to admit of but the smaller particles near the tube. It leaves interstices between the coarser particles in it, and through which the water flows, and which are constantly filled with water. The swell on the point of a driven well tube, shown in the drawing and marked *a*, is made larger in diameter than the tube itself, or the coupling to the tube, for the reason, as stated, that there is a certain elasticity in the soil, which,

Opinion of the Court.

after driving a certain sized instrument into it, causes the hole to contract after the point passes, and it was thus found necessary to make the point somewhat larger than even the couplings of the pipe, for the purpose of partially relieving the pipe and couplings from the great friction resulting from their passage through the hole thus contracted. After reaching a water-bearing stratum of the earth, the earth at once settles around the point and tube, even more rapidly and effectually than it does above the water stratum, and the hole made by driving an instrument into a water-bearing stratum and withdrawing it will remain intact but a very short time, unless that stratum is composed of gravel and similar substances, thus leaving the entrance to the pipe in close contact with the earth and effectually protecting the entrance from the admission of air or free water standing between the pipe and the earth surrounding it. The effect, therefore, of this feature of the tube is more effectually to make air-tight the point or lower part of the tube.

The scientific theory stated by the expert witness on behalf of the complainants, as an explanation of the principle according to which the patented process operates in furnishing a supply of water by means of a driven well, is not contradicted or qualified by any opposing testimony, and, so far as we can know, is not inconsistent with accepted scientific knowledge. The general introduction and use of driven wells since the date of the patent, both in this country and abroad, strongly corroborates the supposition that their construction and operation is based upon the application of some natural force not previously known or used. It appears from the evidence in this cause, that the process of making driven wells was subjected to experimental tests by the best authorities in England, and found so successful that it was used to great advantage in the supply of water to British troops in the Abyssinian expedition under General Napier, in 1867.

In view of these premises, Judge Benedict, in *Andrews v. Carman*, 13 Blatchford, 307, 311, construed the patent in suit according to the following extracts from his opinion in that case: "The difference between the new process under consideration and the old is, that the pressure of the atmosphere,

Opinion of the Court.

which, in the ordinary well, operates at the sides and bottom of the well pit to maintain an equally distributed atmospheric pressure upon the water, whereby the flow of water into the well is made dependent upon the force of gravity, in the new process is removed from within the well pit, and ceases there to operate against the inward flow of water, so that the pressure of the atmosphere operates with its full power to force the water in the earth from the earth into the well pit, and without any opposition caused by meeting, in its flow, the pressure of the atmosphere at the sides or bottom of the pit. This process involves a new idea, which was put to practical use when the method was devised of fitting tightly in the earth, by the act of driving without removing the earth upwards, a tube, open at both ends, but otherwise air-tight, and extending down to a water-bearing stratum, to which is attached a pump, a vacuum in the well pit, and at the same time in the water-bearing stratum of the earth, being necessarily created by the operation of a pump attached to a pipe so driven.

* * * * *

“The novelty of the process under consideration does not lie in a mechanical device for sinking the shaft or raising the water to the surface, but in the method whereby water, by the use of artificial power, is made to move with increased rapidity from the earth into the shaft, whence it results, that a tube but a few inches in diameter, driven down tightly to a water-bearing stratum of the earth, affords an abundant supply of water to a pump attached thereto, and constitutes a practical and productive well. Such an invention is without the field of mechanical contrivance. It consists in the new application of a power of nature, by which new application a new and useful result is attained. There is no new product, but an old product — water — is obtained from the earth in a new and advantageous manner.

* * * * *

“In the specification we find stated more clearly the distinguishing feature of the process, wherein it differs from any process before adopted for procuring a supply of water from the earth; for the specification says that an instrument is to

Opinion of the Court.

be driven into the ground until it reaches water, having the earth tightly packed around it. It is by means of this packing of the earth tightly around the tube that the force developed by the creating of the vacuum in the well pit is brought to bear directly upon the water lying in the water-bearing stratum, to force it into the well pit; and this driven tube forms the well pit of the new invention, for, as stated, it is to be a tube made airtight throughout its length, except at its lower end, where are to be perforations for the admission of water, and through and from which the water may be drawn by a pump. The specification also mentions the vacuum, and points out where it is to be created, for a vacuum must of necessity be formed in the well pit and in the water-bearing stratum, by operating a pump attached to such a tube, so driven into the earth.

* * * * *

"I therefore understand this patent to be a patent for a process, and that the element of novelty in this process consists in the driving of a tube tightly into the earth, without removing the earth upwards, to serve as a well pit, and attaching thereto a pump, which process puts to practical use the new principle of forcing the water in the water-bearing strata of the earth from the earth into a well pit, by the use of artificial power applied to create a vacuum, in the manner described."

Assuming this construction of the patent to be correct, it is, however, now contended on behalf of the appellant that the reissue is void because the invention described in it is not contained in the original patent.

It is to be observed that the scientific theory and principle, the application of which is supposed to constitute the invention of Colonel Green, are not set forth either in the original or reissued patents. This feature was commented upon by Mr. Justice Blatchford in *Andrews v. Cross*, 19 Blatchford, 294, 305, as follows: "It may be that the inventor did not know what the scientific principle was, or that, knowing it, he omitted, from accident or design, to set it forth. That does not vitiate the patent. He sets forth the process or mode of operation which ends in the result, and the means for working out the process or mode of operation. The principle referred

Opinion of the Court.

to is only the why and the wherefore. That is not required to be set forth. Under § 26 of the act of July 8, 1870, 16 Stat. 201, under which this reissue was granted, the specification contains a description of the invention and of 'the manner and process of making, constructing, compounding, and using it,' in such terms as to enable any person skilled in the art to which it appertains to make, construct, compound, and use it; and, even regarding the case as one of a machine, the specification explains the principle of the machine, within the meaning of that section, although the scientific or physical principle on which the process acts when the pump is used with the air-tight tube, is not explained. An inventor may be ignorant of the scientific principle, or he may think he knows it and yet be uncertain, or he may be confident as to what it is, and others may think differently. All this is immaterial, if by the specification the thing to be done is so set forth that it can be reproduced."

The particulars relied on to establish the proposition that the reissued patent describes a different invention from that contained in the original are as follows: 1st. It is said that it is essential to the success of the process that the end of the tube should form an air-tight connection with the surrounding earth; that the tube itself should be air-tight, and attached to a pump with an air-tight connection; which elements are set out in the reissued patent, and are not contained in the original.

Upon this point, speaking of the original patent, Judge Shiras, in the Circuit Court for the Southern District of Iowa, in *Andrews v. Hovey*, 5 McCrary, at page 195, said: "He describes a driving-rod, having a swell thereon, which is to be driven into the ground and then withdrawn, and a tube of a diameter somewhat smaller than the diameter of the swell of the drill-rod is to be inserted in the hole thus made. In no part of the description is it said, either expressly or by fair implication, that the tube, when inserted, must fit so closely into the opening made by the rod that no air can pass down on the outside of the tube to the water, nor is it stated that the pump must be attached by an air-tight connection to the

Opinion of the Court.

top of the tube. A person can follow with exactness all the instructions therein given, and yet it would not necessarily follow that he had excluded the air from the lining of the well, or from the water-bearing stratum at the place where the tube penetrated the same. In other words, the description of the means to be employed, as set forth in these specifications, does not show that one of the results arrived at is to render the lining of the well air-tight, and to have attached thereto a pump by an air-tight connection. The description of the means to be employed can be carried out in practice without making an air-tight lining or tube, and hence without forming a vacuum around the bottom of the tube or in it. This being true, it follows that it cannot, from the description of the means employed, be inferred that Colonel Green then intended to claim, as part of his discovery or invention, the application of the principle that by creating a vacuum in and about the tube, the same having been made air-tight, the flow of water would be largely increased. He did not claim it in express words, and the description of his invention, and the means to be used in carrying the same into practical use, fail to show that such was the main or even a necessary part of his invention."

To this view there are two sufficient answers.

1st. We think it is a reasonable inference, from the language employed in the specification of the original patent, that the tube, in the act of being driven into the earth, to and into a water-bearing stratum, would form an air-tight connection with the surrounding earth, and that the pump should be attached by an air-tight connection. This inference reasonably follows from the fact, shown in the evidence, that the mere act of driving the tube, as distinguished from boring, usually results in making an air-tight connection with the surrounding earth. The necessary effect of driving the tube is to displace the earth laterally by compressing it; and the elasticity of the earth is such as to cause it to cling and contract around the tube so as to exclude the air, so that any one following the directions in the specification of the original patent would in fact usually so drive the tube as to make the necessary air-

Opinion of the Court.

tight connection, whether he consciously intended to do so or not. As the object of applying a pump to the upper orifice of the tube was to draw the water flowing into its lower end, it would equally follow, as a matter of common knowledge, both that the tube itself should be air-tight, and that it should be attached to the pump with an air-tight connection, because a vacuum in the tube is necessary to raise the water in all cases where it does not flow out in consequence of the superior height of its source, and the consequent pressure of the head.

The precise objection to the reissued specification is, that it states that the tube which is to replace the driven rod is "made air-tight throughout its length," and also that in cases where the aid of a pump to draw the water from the well may be necessary, the patentee attaches "to the tube by an air-tight connection any known form of pump;" and that the original specification does not state that the tube is made air-tight throughout its length, nor that the pump is to be attached to the tube by an air-tight connection, but only states that "any suitable well-known pump may be applied to raise the water up through the tube to the surface or above it."

It appears, however, in evidence, that the patentee, when applying for his reissue, with the text of the specification reading as it does now, applied to have granted to him a second claim in these words: "I also claim, in combination with a tube driven well, an attachment of a pump to the tube by an air-tight connection substantially as herein set forth;" that the Patent Office rejected this second claim, assigning its reasons in these words: "The second clause is for a pump attached to a tube by an air-tight connection. This is indispensable to the operation of a pump, and a universal right. Whenever a supply of water is found, a pump may be applied without new invention;" that, in a subsequent communication by the Patent Office to the patentee, the office, in speaking of this proposed second claim, said: "This device is of universal use in artesian well tubes and other connections, and is a necessity in the relation of pumps to well tubes;" and that the patentee afterwards withdrew the proposed second claim.

As the air-tight connection was indispensable to the opera-

Opinion of the Court.

tion of a pump, it was implied of necessity in the original specification, as much so as if it had been expressed, and there was no enlargement of the invention in stating the fact in the reissued specification.

In view of all this, it is also fairly to be implied, from the entire language of the original specification, that the tube was intended to be air-tight throughout its length. As that specification states that the water is to be raised up through the tube to the surface by the pump, and as an air-tight connection at the junction of the pump with the tube was "indispensable to the operation of the pump," so it was equally a necessity to the perfect operation of the apparatus that the tube should be air-tight throughout its length, these facts being both of them common knowledge in the art.

2d. But even if this were not so, the case would be simply that of a specification defective for not containing a full and perfect description of the process intended to be patented. It presents the very case of the right secured to a patentee by § 53 of the act of July 8, 1870, which provides, "that whenever any patent is inoperative or invalid by reason of a defective or insufficient specification, . . . if the error has arisen by inadvertence, accident, or mistake, and without any fraudulent or deceptive intention, the Commissioner shall, on the surrender of such patent and the payment of the duty required by law, cause a new patent for the same invention, and in accordance with the corrected specification, to be issued to the patentee," &c.

If the amended specification does not enlarge the scope of the patent by extending the claim so as to cover more than was embraced in the original, and thus cause the patent to include an invention not within the original, the rights of the public are not thereby narrowed, and the case is within the remedy intended by the statute. Those cases in which this court has held reissues to be invalid were of a different character, and were cases where by the reissued patent the scope of the original was so enlarged as to cover and claim as a new invention that which was either not in the original specification, as a part of the invention described, or, if described, was, by

Opinion of the Court.

not being claimed, virtually abandoned and dedicated to public use.

Such is not the present case. Here the amended specification does not enlarge the scope of the original invention as described in the original specification. It simply, in this respect, supplies a deficiency, by describing with more particularity and exactness the means to be employed to produce the desired result. It is thus said, in the specification of the re-issued patent, that "this invention consists in producing the well by driving or forcing down an instrument into the ground, until it reaches the water, the hole or opening being thus made by a mere displacement of the earth, which is packed around the instrument, and not removed upward from the hole as it is in boring;" and "I prefer to employ a pointed rod, which, after having been driven or forced down until it reaches the water, I withdraw, and replace by a tube made air-tight throughout its length, except at or near its lower end, where I make openings or perforations for the admission of water, and through and from which the water may be drawn by any well-known or suitable form of pump;" and "In certain soils the use of a rod preparatory to the insertion of a tube is unnecessary, as the tube itself, through which the water is to be drawn, may be the instrument which produces the well by the act of driving it into the ground to the requisite depth;" and "In some cases the water will flow out from the top of the tube without the aid of a pump. In other cases, the aid of a pump to draw the water from the well may be necessary. In the latter cases, I attach to the tube, by an air-tight connection, any known form of pump."

There is nothing in these additions and amendments which either was not virtually contained by reasonable implication in the original description, or, if new, amounted to more than specific and exact directions to supplement those contained in the original. The invention is not differently described, and is not described so as to be a different invention, nor is the claim enlarged.

In the second place, however, under this head, a material alteration from the original, in the amended specification, is

Opinion of the Court.

said to have been made in the following respect: The original specification starts out with a declaration that the patentee has "invented a new and useful improvement in the manner of sinking and constructing artesian or driven wells, where no rock is to be penetrated, and of raising water therefrom;" and the claim is stated to be "the herein described process of sinking wells where no rock is to be penetrated," &c. In the specification of the reissued patent, he says: "My invention is particularly intended for the construction of artesian wells in places where no rock is to be penetrated;" and the claim is for "the process of constructing wells by driving or forcing an instrument into the ground until it is projected into the water, without removing the earth upward, as it is in boring, substantially as herein described;" from which, it will be observed, are omitted the words "where no rock is to be penetrated."

It is, therefore, contended, that the effect of this amendment to the specification and claim is to enlarge the scope of the patent, so as to cover by the reissued patent the process of constructing driven wells, whether rock is to be penetrated or not, while the original patent was expressly limited to cases where no rock was to be penetrated. We do not, however, so understand either the reason or the effect of these amendments. It is perfectly evident, from the nature and description of the invention, that a driven well cannot be made where, through its whole course, the formation is rock, or where the supply of water to be utilized is found in the fissure of a rock formation. This is so for the reason that the tube cannot be driven through rock. Rock must be bored by drills, augurs, chisels, and other similar instruments for perforating it and withdrawing the comminuted particles. So, where the supply of water which must be utilized consists of a flowing stream, or a pool, found in a rock formation, the point of the driven rod or tube cannot be inserted by driving, as described in the patent, so as to form the air-tight connection necessary to the successful operation of the principle on which the process of the patent depends. Therefore, it follows from the amended specification and the claim of the reissued patent, by the necessity of the case, as expressly declared in the original, that a driven well cannot be constructed in a rock formation.

Opinion of the Court.

On the other hand, it does not follow, either from the amended or the original patent, that a driven well, according to the process described, may not be constructed and operated, notwithstanding in its construction some rock has to be penetrated. There may be a layer of rock on the surface; when this is removed or cut through, a driven well may then be constructed in the space thus uncovered from the obstruction. So, if a stratum of rock is met in the course of driving the rod or tube, that layer may be penetrated, not by driving the rod or tube through it, but by other usual means of boring and drilling. After it is passed, the rod or tube having been inserted in the opening made through the rock, may then be driven in the usual manner through the remainder of its course until it reaches a water-bearing stratum of earth, as if no rock had been met in its passage.

The object and purpose of the amendments to the specification obviously were to meet a possible construction of the original, whereby the patentee would be precluded from the use of his process where it was evidently intended to be applied, simply because one or more strata of rock had to be penetrated in the process of driving. Such, in our opinion, is not the meaning of the original patent. Its true meaning is, that, so far as it may be necessary to penetrate a rock in the course of constructing a well, the process of driving cannot be used to overcome the obstacle presented by the rock, but that otherwise the tube may be driven until it reaches the proper supply of water, and then operate as a driven well. The only effect of the amendments contained in the new specification and claim is to make that intention clear. So far as, in the course of constructing a well, rock must be penetrated, the driven well process cannot be used in the perforation of the rock, but in every other part of its course it may be applied. Such, in our judgment, is the legal effect of both the original and the reissued patents.

In our opinion, therefore, the grounds on which it is sought to invalidate the reissued patent, as being for a different invention from that described in the original, cannot be sustained.

Opinion of the Court.

This conclusion is not in conflict with anything said in *Russell v. Dodge*, 93 U. S. 460, 463. Mr. Justice Field, in delivering the opinion of the court in that case, referring to the provisions of the statutes in reference to reissues, said: "According to these provisions a reissue could only be had where the original patent was inoperative or invalid, by reason of a defective or insufficient description or specification, or where the claim of the patentee exceeded his right; and then only in case the error committed had arisen from the causes stated. And as a reissue could only be granted for the same invention embraced by the original patent, the specification could not be substantially changed, either by the addition of new matter or the omission of important particulars, so as to enlarge the scope of the invention as originally claimed. A defective specification could be rendered more definite and certain so as to embrace the claim made, or the claim could be so modified as to correspond with the specification; but, except under special circumstances, such as occurred in the case of *Lockwood v. Morey*, 8 Wall. 230, where the inventor was induced to limit his claim by the mistake of the Commissioner of Patents, this was the extent to which the operation of the original patent could be changed by the reissue. The object of the law was to enable patentees to remedy accidental mistakes, and the law was perverted when any other end was secured by the reissue." And this is in harmony with all that has since been said by this court on the subject of reissued patents.

It is further contended on the part of the appellant that the reissued patent in suit is void for want of novelty:

1. Under this head, it is first alleged that it is anticipated by a patent granted to James Suggett, March 29, 1864. In the specification of the original patent of Green, of January 14, 1868, he says: "I am aware of James Suggett's patent of March 29, 1864, and I disclaim all secured to him therein." The reissued patent omits that disclaimer. After the application for the reissued patent, as appears by the contents of the file wrapper, an interference was declared, to which the parties were Byron Mudge, for a reissue of his patent for a mode of

Opinion of the Court.

constructing wells, and the above named patent of James Suggett, for putting down and operating bored wells, and the application of Colonel Green. The matter was carried by appeal from the decision of the Commissioner of Patents to the Supreme Court of the District of Columbia. The judgment of that court was, that Suggett was entitled to priority of invention in regard to what was claimed by him in his patent, and that Colonel Green was also entitled to have a patent issued to him according to his amended specification. The decision of the judge of the Supreme Court of the District of Columbia says: "I am clearly of opinion that Green first put into practice the conception of making a driven well, and is entitled, therefore, to his patent for the broad claim of sinking wells by driving down the pump or rod without removing the dirt upward, and that Suggett was entitled to a patent for the perforated pipe and point for sinking wells, and I therefore affirm the decision of the Commissioner." Suggett's patent, on the face of his specification, is for a "new and improved method of putting down and operating bored wells," and all that his claim covers is the apparatus consisting of the perforated pipe with a pointed end, constructed as a drill, and united with a pump. The subjects of the two patents are quite different, and do not necessarily conflict, even on the supposition that Suggett's patent is in force, although, as testified in this case, it has been judicially declared to be invalid for want of novelty.

2. An anticipation of the driven-well patent is also alleged by reason of an English patent granted to John Goode, August 20, 1823. That patent, however, like that of Suggett's, does not profess to be a patent for a process of raising water from the earth by means of wells of any particular construction or mode of operation, but merely for "certain tools of various formation for the purpose of boring the earth, and certain apparatus for the purpose of raising water," which the patentee says "constitute my certain improvements as aforesaid."

3. It is further contended that the driven-well patent is anticipated by having been previously described in numerous printed publications. Of these there were introduced in evi-

Opinion of the Court.

dence in this cause by the appellant those enumerated in the following list :

1. An extract from vol. 4, "Repertory of Patent Inventions," published in London in 1827, by T. & G. Underwood, p. 113, which, however, merely contains a detailed description of the machinery, tools, and apparatus for boring the earth, described in John Goode's patent of August 20, 1823.
2. Extract from "Dictionary of Arts, Manufactures, and Mines," by Andrew Ure, published in New York in 1847, by D. Appleton & Co., p. 63, under the head of "Artesian Wells."
3. Extract from p. 388 of "MacKenzie's 5000 Receipts in All the Useful and Domestic Arts," first published in 1840.
4. Extract from "Rees' Cyclopædia," vol. 40, published at Philadelphia by Samuel F. Bradford, about 1819, title "Well in Rural Economy."
5. Extract from "Journal of the Franklin Institute," third series, published at Philadelphia, by the Franklin Institute, in 1844, vol. 7, p. 128.
6. Extract from "Brande's Encyclopædia, or Dictionary of Science, Literature, and Art," published by Harper Bros., New York, in 1843, vol. 3, page 1333, under article "Well."
7. Extract from "Rees' Cyclopædia," vol. 33, title "Spring Draining Pump."
8. Extract from "London Encyclopædia," published by Thomas Tegg, London, 1829, vol. 22, p. 593.
9. Extract from "Mechanics' Magazine," published by Knight & Lacey, London, 1824, vol. 2, pp. 15 and 16.
10. Extract from "Harper's New Monthly Magazine," September, 1851, p. 540.
11. Extract from "De L'Art du Fontenier Sondeur et des Puits Artésiens," published in Paris, France, in 1822, p. 99, § 79.
12. Extract from "Bulletin du Musée de l'Industrie," published by De Mot et Cie, Bruxelles, 1846, tome 10, p. 163.
13. Extract from "Héricart de Thury, Jaillissement des Eaux," published by Bachelier, Paris, France, 1829, pp. 274, 275.
14. Extract from "F. Arago, Oeuvres," tome 6, by Gide et J. Baudry, Paris, and Leipzig, by J. O. Weigel, 1856, p. 457.

Opinion of the Court.

15. Extract from "F. Garnier, *Traité sur les Puits Artésiens*," published by Bachelier, Paris, France, 1826, p. 207.

16. Extract from the "Encyclopædia of Domestic Economy," published in New York in 1849 by Harper Bros., p. 848.

The rule governing defences alleging the invalidity of the patent by reason of prior printed publications was stated by Mr. Justice Clifford in *Seymour v. Osborne*, 11 Wall. 516, 555, in this language: "Patented inventions cannot be superseded by the mere introduction of a foreign publication of the kind, though of prior date, unless the description and drawings contain and exhibit a substantial representation of the patented improvement, in such full, clear, and exact terms as to enable any person skilled in the art or science to which it appertains, to make, construct, and practice the invention to the same practical extent as they would be enabled to do if the information was derived from a prior patent. Mere vague and general representations will not support such a defence, as the knowledge supposed to be derived from the publication must be sufficient to enable those skilled in the art or science to understand the nature and operation of the invention, and to carry it into practical use. Whatever may be the particular circumstances under which the publication takes place, the account published, to be of any effect to support such a defence, must be an account of a complete and operative invention, capable of being put into practical operation."

The same rule was repeated by Mr. Justice Strong in the opinion of the court in *Cohn v. United States Corset Co.*, 93 U. S. 366, 370, as follows: "It must be admitted that, unless the earlier printed and published description does exhibit the later patented invention in such a full and intelligible manner as to enable persons skilled in the art to which the invention is related to comprehend it without assistance from the patent, or to make it, or repeat the process claimed, it is insufficient to invalidate the patent." This rule was affirmed in *Downton v. Yeager Milling Co.*, 108 U. S. 466, 471.

The application of this rule to the publications relied upon in the present case shows that none of them can properly be said to anticipate the invention of the driven well. It would

Opinion of the Court.

serve no useful purpose specially to notice in this opinion all the publications mentioned in the record; a few, as samples most relied on, will be considered.

The first is the extract from McKenzie's 5000 Receipts. It appears, from the file wrapper in the matter of the reissued letters-patent in suit, that the application was rejected at first by the examiner in the Patent Office on reference to this extract, which is as follows: "To raise water in all situations. The finest springs may be found by boring, which is performed in the simplest manner by the mere use of an iron rod forced into the earth by a windlass. The workmen in a few days get to a genuine spring of pure water, fit for every purpose. After the water is found, they merely put the tin pipes down the aperture, and it preserves a fine stream which sometimes rises from four to five feet high." It is quite obvious that this has no relation whatever to the process of obtaining water by means of driven wells. It is nothing more than a simple process of finding water in the usual way, as in the case of an ordinary dug or bored well, such as have been immemorially used.

The same observation equally applies to the extract from Rees' Cyclopaedia, under the title of "Wells in Rural Economy," which is as follows: "The most ingenious of these is that proposed by a French philosopher, who has advised that the ground should be perforated to a sufficient depth by means of an auger or borer; a cylindrical wooden pipe being then placed in the hole and driven downward with a mallet, and the boring continued, that the pipe may be forced down to a greater depth, so as to reach the water or spring. In proportion as the borer becomes filled with earth it should be drawn up and cleared, when by adding fresh portions of pipe, the boring may be carried to much extent under ground, so that water may in most cases be thus reached and obtained. It is stated that wells made in this manner are superior to those constructed in the common method, not only in point of cheapness, but also by affording a more certain and abundant supply of water, while no accident can possibly happen to the workmen employed. In case the water near the surface should not

Opinion of the Court.

be of a good quality, the perforation may be continued to a still greater depth till a purer fluid can be procured; and when wells have become impure or tainted from any circumstance or accident, when previously emptied, and the bottom perforated in a similar manner, so as to reach the lower sheet of water, it will rise in the cylindrical tube in a pure state into the body of the pump fixed for the purpose of bringing it up."

The extract from "Brandt's Encyclopædia," under the article "Well," is as follows: "The use of the borer alone may procure an adequate supply of water in particular situations. This mode appears to have been long resorted to in this and other countries. From what we have already stated as to the disposition of strata, the conditions requisite for its success will be readily conceived, viz., watery strata connected with others on a higher level. The pressure of the water contained in the higher parts of such strata on that in the lower will readily force up the latter through any orifice, however small. All that is necessary, therefore, is to bore down to the stratum containing the water, and, having completed the bore, to insert a pipe into the bore, which may either be left to overflow into a cistern or it may terminate in a pump."

A similar one from the Mechanics' Magazine, vol. 2, page 16, is this:

*"Boring Wells.**"Answer to question.**"LEEDS, March 15, 1824.*

"Drive a cast-iron pipe through the gravel — *i.e.*, by means of a weight hung at the end of spring pole, used in boring; and should the pipe meet with any loose stone to obstruct its passage, put the boring rods into the pipe, and bore until the stone is broken to pieces or driven sideways, then drive the pipe as before. I have had the management of a great many bore holes for water in this neighborhood, some above 100 yards deep, and many contrivances I have used on account of difficulties met with in different strata. I shall be happy to give your correspondent every information in my power on the subject, and, if agreeable to you, will send a list of a few

Opinion of the Court.

holes, stating the different strata gone through and the several springs of water met with.

“Yours, &c.,

T. T.

“N. B.—The shell-borer must be used at times to bring out the gravel that gets into the pipe, and the pipe must have spigot and faucet joints.”

There is nothing in these extracts to suggest the peculiarities which distinguish the driven well as described in the reissued patent, and it may be said, in general, of all the extracts contained in the record, including these, that, so far as they undertake to describe anything in actual and practical use, they point merely to the ordinary bored artesian well, or the instruments and implements to be used in its construction.

This view of these publications is strongly corroborated by the circumstances attending the introduction of Green's process of driven wells into public use in England. It is shown that his agent for the introduction of the well into that country, and to whom the invention was sold, James L. Norton, took out in his own name an English patent, and, as has already been stated, and as is shown in the proof, after various experimental tests made by civil and military engineers of high authority, the driven well according to this process was adopted and successfully employed for the purpose of obtaining a water supply for the British troops in the Abyssinian expedition. The present record contains extracts from standard scientific publications in England showing how extensively and successfully the driven well has, since its first introduction, been employed in England for the purpose of raising water, in which it is admitted, as the facts show, that the process was considered new, differing in substance from any previously known and in use, and ascribed to the American invention.

The next defence relied upon by the appellant is, that the evidence fails to establish a case of infringement. It is not important to set out fully the evidence on this point; the substance of it is contained in the opinion of Judge Shipman

Opinion of the Court.

in this case, 15 Fed. Rep. 109. In reference to it the court says: "The defendant's counsel strenuously urge that these wells were constructed by boring; that the wells were bored until water was struck—that is, until a supply of water was obtained; and that the wells were finished by pressing the pipes more deeply into the source of supply which had been reached when the workmen 'struck water.' In other words, the defendant seeks to bring the case within the decision of Judge McCrary in *Andrews v. Long*, 12 Fed. Rep. 871. In this case, however, the witnesses, when they used the common expression 'struck water,' did not mean that they had reached an adequate source of supply for a well, but that they had reached a place where the presence of water manifested itself, and where by continuous excavation an adequate supply would be attained. The wet sand or wet clay upon the auger showed that water was at hand. The well was then finished, and a supply of water was obtained by pressing or driving a tube into the ground, without removing the earth upward, and attaching thereto a pump. When this was done, there was put 'to practical use the new principle of forcing the water in the water-bearing strata of the earth from the earth into a well pit, by the use of artificial power applied to create a vacuum in the water-bearing strata of the earth, and at the same time in the well pit. *Andrews v. Cross*, 8 Fed. Rep. 269.'"

In other words, the case of the appellant is this: He sought to evade the patent by boring instead of driving until he came to the water-bearing stratum. Then, in order to avail himself of the patent, he drove the tube downward into the water-bearing stratum, so as to secure those conditions of an air-tight connection between the point of the tube and the surrounding earth, which constitute the principle of the driven-well patent. It is, therefore, a clear case of infringement.

The decree of the Circuit Court is accordingly affirmed.

MR. JUSTICE FIELD, MR. JUSTICE BRADLEY, and MR. JUSTICE GRAY dissented.