ROBERTS v. DICKEY.

{4 Fish. Pat. Cas. 532; 1 O. G. 4: 4 Brewst. 260; 3 Pittsb. Rep. 352; 19 Pittsb. Leg. J. 137; Merw. Pat. Inv. 328.}[1]

Circuit Court, W. D. Pennsylvania. May, 1871.

PATENTS—NOVEL PROCESS—CLAIM—HOW CONSTRUED—DISCOVERY OF NATURAL LAW—WATER TAMPING IN OIL WELLS.

1. It is not to be doubted that a novel process or mode of operation, that amounts to a successful 881 application of known things to a practical use, is patentable as an art.

{Cited in Cary v. Lovell Manuf'g Co., 31 Fed. 346.}

2. There are many cases in which the materiality of an invention, whether it be a machine or a process, can be judged of only by its effect on the result, and this effect is tested by the actual improvement in the process of producing an article, or in the article itself introduced by the alleged invention.

3. The patentee claimed "the above-described method of increasing the productiveness of oil wells, by causing an explosion of gunpowder, or its equivalent, substantially as above described." *Held,* that this was not a claim for any, or all modes of increasing the capacity of oil wells, nor for any, or all modes of causing explosions in such wells.

4. When a claim immediately follows a description of an invention, it may be construed in connection with the explanations contained in the specification, and when it contains words referring to the specification, it cannot properly, be construed in any other way.

{Cited in Cary v. Lovell Manuf'g Co., 31 Fed. 346.}

5. The invention claimed by Roberts is not the employment of explosive materials as a mechanical force, nor is it inclosing such materials in flasks of specified forms, or any particular mode of merely producing an explosion. Nor is it simply causing an explosion in a well, or under water. Nor is it a result-obtaining oil. It is doing these things under peculiar and novel arrangements. It is a process, of which some or

all of these things are a part, instruments, or agencies in the process.

[Cited in Andrews v. Carman, Case No. 371; Clark v. Kennedy Manuf'g Co., Id. 2,826. Approved in Roberts v. Schreiber, 2 Fed. 859.]

6. The discovery of a law of nature, or a geological truth, as that the seams or rifts in oil-bearing rock, would, if opened by a blast, yield oil, is not patentable.

7. The patent must be for new and useful means of turning the geological truth to practical account.

8. The sufficiency of water tamping alone, for deep underground blasting, in vertical bores of small diameter, was the discovery of Roberts, and its application is an essential element in his process.

[Cited in Roberts v. Roter, Case No. 11,912.]

9. However suggestive unsuccessful experiments may have been, they cannot be made available to defeat a patent granted to an inventor, who, subsequently to the failure of others, reduced his idea to practice, and revealed to the public a useful process, which the crude and fruitless experiments of others had not made known.

10. A patent is rendered invalid by a prior published description only where that description was sufficient to give to the public a practical knowledge of the invention claimed.

11. Letters patent for "improvement in method of increasing capacity of oil wells," granted to E. A. L. Roberts, November 20, 1866, examined and sustained.

[Approved in Roberts v. Schreiber, 2 Fed. 859.]

This was a bill in equity, filed to restrain the defendant [James Dickey] from infringing letters patent [No. 59,936] for "improvement in method of increasing capacity of oil wells," granted to Edward A. L. Roberts, November 20, 1866, for seventeen years from May 20, 1866 [reissued January 26, 1875, No. 6,258].

The specification, in full, was as follows:

"Be it known that I, Edward A. L. Roberts, of the city, county, and state of New York, have invented a new and useful method of increasing the capacity of oil wells, and of restoring oil wells that have become clogged, to productiveness; and I hereby declare that

the following is a full and correct description thereof, reference being had to the accompanying drawings, and the letters of reference marked thereon, making a part of this specification, a portion of which represents the apparatus used by me in working out my invention. The petroleum or oil taken from the oil wells is, before it is removed, contained in seams, usually in the second or third strata of sandstone or other rock abounding in the oil regions, which are represented in figure 1 of the accompanying drawings.

"Figure 1 represents a sectional view of the different strata of rock usually found in oil producing regions, and the seams or crevices containing the oil are represented by the irregular lines traversing the second and third strata of sandstone rock there shown. N and N' represent wells sunk into the rocks. In order to take the oil from the seams or crevices in the rock, wells must be sunk which shall tap or intersect the seams, or some of them, containing the oil. The wells are frequently sunk to a depth of from eight to nine hundred feet below the surface of the earth, and usually from three to six inches in diameter, and it frequently happens a well will be sunk for a great distance into or through the rock containing the oil without tapping or passing through any of the seams in which it is contained, as shown by the course of the well n, in figure 1. When this happens to be the case, the well is sometimes made available by increasing its diameter until it strikes some of the seams; this is done by boring from the top all the way down into the stratum of rock containing the oil, and is attended with nearly as much labor and expense as boring the well in the first instance. It also frequently happens that the seam intersected by the well is very small or that the aperture into the well from the seam is very small, in either of which cases it is very liable to become clogged or stopped up, during the working of the well, by substances contained therein, which

prevent the oil from flowing or being sucked into the well. These stoppages are removed sometimes by enlarging the diameter of the well as before stated, and sometimes, when the difficulty is slight, by forcing air down to or near the bottom of the well, and allowing it suddenly to escape. It is desirable, In order to increase the productiveness of wells, as well as to prevent stoppages from obstructions, to have the well tap or connect with as many of the seams or crevices or the tock containing the oil as possible. The capacity of wells, as at present constructed, to tap or 882 intersect seams is limited to the circumference of the well. In my improved method of increasing the capacity of wells, I fracture the rock containing the oil to some distance around the wells, thus creating artificial seams, and enabling me to connect the well thereby with seams containing the oil that would not have been otherwise reached by the well, and also to enlarge the aperture into any seam that might have been tapped by the well, and this I accomplish in this way: When the well is bored in the usual manner to a sufficient depth, I sink a flask containing gunpowder, or other powerful explosive material or gas, down the well until it reaches the bottom of the well, or that portion of it which passes through the oil-bearing rock. When the flask has reached this position, if the well above should not be filled with water when the flask is let down (which will almost always be the case unless it has been pumped out), it is then to be filled up before the contents of the flask are ignited; the column of water then above the flask will be of so great gravity as to confine the effect of the explosion to the rock in the immediate vicinity of the flask, without materially affecting the strata of rock above, and I make use of it for that purpose. I then ignite the contents of the flask by means of fulminating powder, electricity, or other means used to explode shells, torpedoes, or cartridges under water, and the explosion, which thereupon takes

place fractures the oil-bearing rock, opens the seams therein, and connects them with the wells; and when the seams leading into a well have become stopped by substances getting into the seams and closing it so as to prevent the oil from flowing or being sucked into the well, as before described, such stoppages may be removed more readily by the aid of an explosion produced in the vicinity of the stoppage than can be done by any means now in use. In order more fully to explain my method of working, I will describe the apparatus I use.

"Figure 2 represents a sectional view of the hollow flask, made of iron, or glass, or other material, and filled with powder or other explosive materials, with the cover and means of letting the same down into the well, and exploding the contents. Letter a is the body of the flask containing the powder or explosive materials, b is a cover screwed down on the top of the flask, water-tight, and covers the hole through which the powder is introduced. 11' are two small lugs placed at or near the top of the flask, and on opposite sides of the cover, into which cords are fastened to assist in letting the flask down-into the well, and in removing it, if for any reason the contents should not explode, c is a stuffing-box, or gland, through which the wire, d, passes, which connects at one end with a small quantity of fulminating powder upon the disks e and e', on that end of the wire in the interior of the flask, and at the other end with a cord extending out of the top of the well, and sufficiently strong to enable the operator to pull the wire d, through the stuffing-box c, with sufficient force to ignite the fulminating powder on the disks e e', on the end of the wire d, which will readily ignite the powder in the flask a. If electricity is used to ignite the contents of the flask, the wires can pass through the stuffing-box c, in the same manner as the wire d, or the contents of the flask may be ignited by means of the arrangement shown at figure 3, in

which a represents the flask; g and g‘ are percussion caps fitting upon the top of the hollow nipples, b and b‘, on the top of the flask, connecting with the powder on the inside, and placed near together or on opposite sides and equidistant from the wire i, which is connected with the top of the flask in any manner convenient, and is used to assist in letting the flask down into, or in raising it out of the well, and also to guide the weight w in its descent to the caps on the nipples, w is an oblong weight, made of any metal of sufficient gravity to fall rapidly through the water, and heavy enough to explode the caps by the momentum given by falling down the well to the nipples, and of a little greater diameter at the bottom than the space between the tops of the two nipples; and with a hole running longitudinally through the center large enough to allow wire to pass easily through it where the flask is in position. The contents may be exploded by allowing the weight to slide down the wire to the caps, which will be exploded by the concussion, and the contents of the flask thereby ignited. After the caps are put on the nipples they should be varnished, or other similar substance applied to them, to make the connection between them impervious to water. In figure 3 the flask has no cover, but the powder is introduced through a hole in the bottom, which is stopped by the screw-plug p, which is made to fit water-tight I prefer to have the flask made of cast-iron, or glass. It should be sufficiently strong to resist the pressure of the column of water which will be above it when sunk to the required depth, and made impervious, to moisture. It should be a little less in diameter than the diameter of the bore of the well, in order to slide easily down the bore of the well through the water. The length of the flask will depend upon the amount of force which may be required for the explosion, care being taken not to have it so great as to shatter or displace the sides of the well above the rock

which it is desired to have opened by the explosion, to guard against which, the flask should be somewhat shorter than the distance which the well extends into the oil-bearing rock. Instead of the particular means above described by me for igniting the contents of the flask, any means used to explode shells, torpedoes, or cartridges, under water, may be employed for that purpose.

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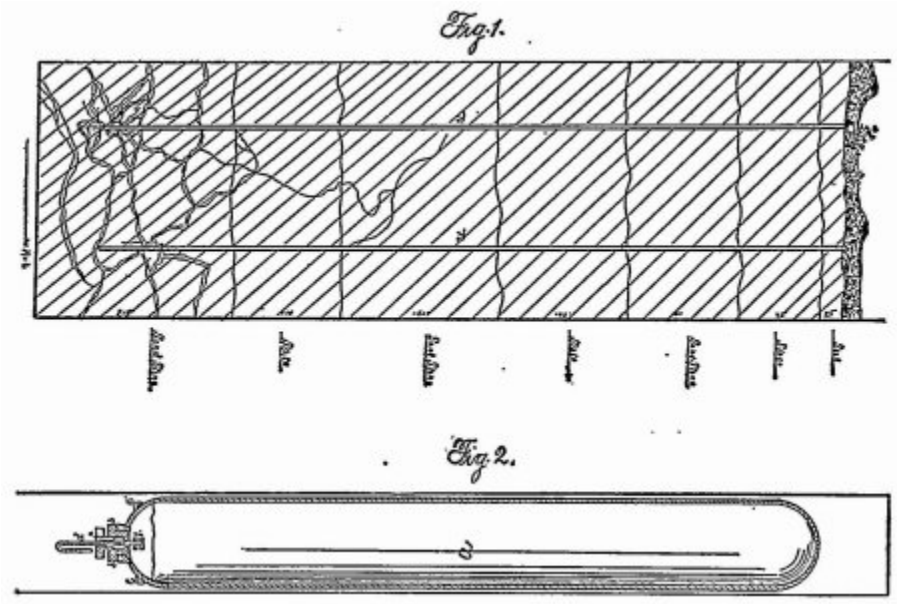
{Drawings of patent No. 59,936, granted November 20, 1866, to E. A. L. Roberts; published from the records of the United States patent office.}



"What I claim as my invention, and desire to secure by letters patent, is: The above described method of increasing the productiveness of oil wells by causing an explosion of gunpowder, or its equivalent, substantially as above described.

"E. A. L. Roberts."

J. K. Kerr, H. B. Swope, Bakewell & Christy, and Geo. Harding, for complainant.

Geo. Shiras, Jr., and Keller & Blake, for defendant.

Before STRONG, Circuit Justice, and McKENNAN, Circuit Judge.

STRONG, Circuit Justice. This case is a bill in equity, for an account, and for an injunction against further infringement of a patent dated November 20, 1866, granted by the United States to the complainant for "a new and useful method of increasing the capacity of oil wells, and of restoring oil wells, that have become clogged, to productiveness." The defense is rested, not so much upon a denial that the patent has been infringed by the defendant as upon the assertion that the invention described is not a proper subject for a patent, or that (if it is) the patent is invalid for want of novelty in the invention.

Such being the nature of the defense, a clear apprehension of what was precisely the thing patented is indispensable to a correct understanding of the merits of the controversy between the parties. The theory of the patentee is, that petroleum, or oil taken from oil wells, is, before it is removed, contained in seams or crevices, usually in the second or third strata of sandstone, or other rock abounding in the oil regions. These seams, or crevices, being of different dimensions, and irregularly located, there is danger that a well, sunk through the oil-bearing rock, may not touch any of them, and thus that it may obtain no oil, though it may pass very near the crevices. Or it may, in its passage downward, touch only small seams, or make small apertures into neighboring crevices containing oil, in either of which cases the seams or the apertures are liable to become clogged by substances in the well or in the oil. The wells are usually, or frequently, eight or nine hundred feet deep, with a diameter of from three to six inches. Owing to the smallness of their diameter they may be in close proximity to deposits of oil without communicating with them perfectly, or at all, and consequently the supply gathered must be much less than it would be if they opened more seams, or if the apertures into the crevices, which they do open, were cleared or enlarged. Modes of

removing stoppages of flow into the wells were known when the patentee claims to have made his invention, and two are described in his specifications. One was enlarging the diameter of the well, which, of course, was attended with much expense, and another was forcing air down to the bottom and allowing it to escape suddenly. Neither of these methods, however, were effective 884 to open passages to oil deposits that were not intersected by the bore of the well, or were not connected therewith by existing fissures in the rocks.

It was in view of this theory and this state of the art that the patentee devised his improvement. Its objects, as avowed in the specification, were to fracture the oil-bearing rock in proximity to the bore of the well, and for some distance around it, thus mailing artificial passages into seams or crevices containing oil, which, without such passages, would not be connected with the well, and also enlarging existing apertures into oil deposits, or clearing such apertures when they had become clogged. The method devised for accomplishing these objects is described to be, sinking to the bottom of the well, or to that portion of it which passes through the oil-bearing rock, a water-tight flask, containing gunpowder or other powerful explosive material, the flask being a little less in diameter than the diameter of the bore, to enable it to slide down easily. This torpedo, or flask, is so constructed that its contents may be ignited either by means of caps, with a Weight falling upon them, or by fulminating powder placed so that it can be exploded by a movable wire, or by electricity, or by any of the known means used for exploding shells, torpedoes or cartridges under water. The length of the flask is arranged with reference to" the force required, care being taken that it shall not be so great as that the explosion shall shatter or displace the sides of the well above the rock which it is

desired to have opened, and therefore that it shall be less than the distance which the well extends into the oil-bearing rock. When the flask has been sunk to the desired position, the well is to be filled with water, if not already filled, thus making a water tamping, and confining the effect of the explosion to the rock in the immediate vicinity of the flask, and leaving other parts of the rock surrounding the well not materially affected. The superincumbent water tamping is essential to the process, and is always employed. When these arrangements have been completed, the contents of the flask are exploded by any of the means above described, and the effects are produced, which it was the avowed object of the patentee to secure.

Having thus described the art or method of securing the desired result, the patentee announced his claim to be "the above described method of increasing the productiveness of oil wells, by causing an explosion of gunpowder, or its equivalent, substantially as above described." To determine what that is, regard must be had to the preceding specification. Looking to that, it is evident the invention claimed is not any particular form or mode of construction of a torpedo or flask containing explosive material. A flask is described, it is true, as also are modes of exploding its contents, but that is not the thing claimed to have been invented, or attempted to be secured by the patent. Nor is the thing patented any and every mode of blasting in a well. But it is a combination of arrangements and processes, substantially such as described in the specification, to work out a new and useful result. It is the employment of specified means, or their equivalents, for the accomplishment of a desired end—a novel adaptation of things, not themselves claimed as novel, to a novel and beneficial use.

That the art or method of operation does work out beneficial results, that it is efficient to remove

obstructions to the flow of oil into oil wells which, having been worked, have almost ceased to be productive, and that it opens new sources of supply, is very satisfactorily established by the evidence that has been taken in the case. It is in proof that these effects have been produced in most instances in which the Roberts invention has been used, and it has been used in a great number of wells since the first experiment was made in the "Ladies' well," in January, 1865. Paraffine in semi-fluid form has come from the wells after the use of the process, thus demonstrating its efficiency in the removal of obstructions. In some cases the product of the wells has been increased more than twenty fold, and so manifestly useful has the invention proved, that though at first it was regarded with distrust, and with much apprehension that its application would destroy the wells, it soon came into general favor. In fact, it has proved a great public benefit. There is evidence in the case that it has largely increased the production of oil in the oil-producing regions of Pennsylvania. As might have been expected, since the trials of the complainant's invention have demonstrated its usefulness, repeated attempts have been made by others to effect the same result by similar processes. This is the common fate of meritorious inventors.

Now that such an invention, if it was novel, was a proper subject for a patent, hardly admits of question. It was a new and useful art. It was a process combining instrumentalities before known, but not employed together, to accomplish a new and useful result. It is not to be doubted that a novel process or method of operation, that amounts to a successful application of known things to a practical use, is patentable as an art. There are many cases in which the materiality of an invention, whether it be a machine or a process, can be judged of only by its effect on the result, and this effect is tested by the actual improvement in the

process of producing an article, or in the article itself introduced by the alleged invention. Curt. Pat § 9. "In these cases," says that author (section 10), "the subject of the invention is not the particular machinery, or apparatus by which the new application is made 885 to be available, but it is the new application itself of certain known substances or agents, to produce a particular result, differing either in the process, or in the article produced from the former methods of producing the same thing, and thereby producing a better article, or producing it by superior and cheaper processes. It is obvious that the results in such cases furnish a complete test of the sufficiency of the inventions, because the importance of the result shows that, whether actually exercised or not, the possibility of the exercise of thought, design, ingenuity, and skill is not excluded." Similar observations may be found in Webster, on the subject-matter of patents (page 30), where it is said: "The utility, then, of the change, as ascertained by its consequences, is the real practical test of the sufficiency of an invention, and since the one cannot exist without the other, the existence of the one may be presumed on proof of the existence of the other. Whenever the utility is proved to exist in any great degree, a sufficiency of invention to support the patent must be presumed." These remarks are very pertinent to the present case, and they are obviously founded in good sense.

It must not be overlooked that while the invention claimed by Roberts, the patentee, is a method of accomplishing a desired result, it is not liable to the charge of being so broad as to be unpatentable. The patent is not for any, or all, modes of increasing the capacity of oil wells, nor for any, or all, modes of causing explosions in such wells. Very far from it. The claim well states the invention and the thing patented. It is "the above-described method of increasing the productiveness of oil wells, by causing an explosion

of gunpowder, or its equivalent, substantially as described." Resort must therefore be had to the specification to see what the method claimed was. When a claim immediately follows a description of an invention, it may be construed in connection with the explanations contained in the specification, and when it contains words referring to the specification, it cannot properly be construed in any other way. Curt Pat. (3d Ed.) §§ 225, 227; Seymour v. Osborne, 11 Wall. [78 U. S.] 516. Construing the claim in connection with the specification, the method claimed appears to be definitely and distinctively set out Plainly, it is only one of many methods that might be adopted, having its essentials distinguishing it from others, and constituting its individuality. The patent is therefore not obnoxious to the objection successfully made against the eighth claim of the Morse patent in O'Reilly v. Morse, 15 How. [56 U. S.] 62. That was a claim for the use of the motive power of the electric or galvanic current, however developed, for making or printing intelligible characters, signs, or letters at any distance. It was, therefore, a claim for a principle, a natural law, and not for any particular method of applying it. It has no analogy to the claim in the present case. If this were a claim for any mode, or all modes, of increasing the productiveness of oil wells, or any mode, or all modes, of blasting, or for any or all modes of causing explosions in oil wells, there would be some resemblance to the eighth claim of Morse's patent But the explosion of the cartridge and the flask in the well are only parts of the patentee's process, or practical method of increasing the production of the well. Every other process, though securing the same results, is left open for the appropriation of other inventors.

It was insisted at the argument that the claim of the patentee is for that which is known and denominated as a double use, and it was urged that if Roberts was the first to use torpedoes in oil wells with success,

it was only obtaining a different fluid from what had been obtained before by the same means. This argument proceeds under a misapprehension of the subject of the patent. It would be of weight were the invention claimed only the application of an old and known process to a new use. But that is not what was patented. It has already been seen that the invention claimed is not the employment of explosive materials as a mechanical force, nor is it inclosing such materials in flasks of specified forms, or any particular mode of merely producing an explosion. Nor is it simply causing an explosion in a well, or under water. Nor is it a result—obtaining oil. It is doing these things under peculiar and novel arrangements. It is a process of which some or all these things are a part, instruments, or agencies in the process. Until, then, it is shown that the process, as described in the specification, was known as a process before this patent was issued, and that it had been applied in the same way to some use cognate to that to which this patentee applied it, the argument of the defendant that the claim is only for a new use of an old thing, or, in other words, for a double use, must fail. It is an incorrect view of the patent to consider it as an attempt to secure the exclusive use of a well-known mechanical force operating in the usual manner, and applied by familiar mechanical devices, for a purpose existing in the mind of the operator, in the same way in which it had been applied for other purposes by other operators.

It has been further urged that all Roberts discovered was that the seams or rifts in oil-bearing rock would, if opened by a blast, yield oil, and that this was merely a discovery of a law of nature, a geological truth, and not the invention of a new art, or manufacture. If this were all, doubtless it would not have been patentable. But it was not all. He devised a mode of turning to practical account this geological truth; and if the means, thus devised were

novel, if the process was the product of invention and was useful, it was a proper subject for a patent. 886 The next inquiry that demands attention is whether the defendant has succeeded in showing the patent to be invalid for want of novelty in the invention. It is hardly necessary to remark that the patent itself makes a prima facie case, in favor of the complainant, that he was the first inventor. The reasons for such a deduction have often been stated, and they are so obvious that it would be superfluous to restate them. Curt. Pat. § 472; Philadelphia & T. R. Co. v. Stimpson, 14 Pet. [39 U. S.] 458. The burden of proof is, therefore, upon him who denies the validity of the patent, on the ground that the invention claimed by the patentee was not new, to establish his allegation by satisfactory and preponderating evidence, and this the defendant has attempted in the present case. He has given in evidence a description of the employment of a percussion blast for sinking a shaft in the Mansfelt copper mine, in Saxony, published by Dr. Karsten, at Berlin, in 1834, in the "Archiv für Mineralogie, Geognosie, Bergbau und Hüttenkunde." The description of that operation, so far as it is necessary to state it, is substantially this: A miner's shaft had been sunk to the depth of over an hundred feet; it then partially filled with water, so that the work of further excavation was impeded. In order to draw off this water, a bore hole, three inches in diameter, was pierced from the bottom of the shaft, with a view to opening a connection with an existing underground gallery. The bore hole, however, in consequence of a mistake in calculation, did not intersect the gallery, but passed about twenty inches from its side. Attempts were then made to blast the rock from the inside of the gallery so as to connect it with the bore hole, but the attempts were only partially successful. The rock was fractured, and so much water escaped from the bore into the gallery as to compel the retreat of the

workmen. An elongated cartridge, containing two and a half pounds of powder, was then constructed, with a diameter a little less than that of the bore. It was made watertight and fitted with percussion caps on its upper end protected against displacement, yet so arranged as to be easily exploded. It was then lowered by means of a cord, to its place opposite the gallery, about one hundred and fifty feet below the surface. A ram, or punch, of the exact diameter of the bore tube (three inches), attached to the end of a bore rod in length about twenty-five fathoms, and weighing about nine hundred pounds, was then let down to within a quarter of a fathom of the cartridge, so that by its fall through that distance the percussion caps might be exploded, causing a blast. At the time there were thirteen fathoms of water in the bore. When the bore rod and ram were let fall, the cartridge was exploded, and the fractured side of the bore was successfully blown out into the gallery.

This operation, undoubtedly, had some points of resemblance to the Roberts process. It was a mode of blasting under water in a deep bore of small diameter, and some of its details are like those made use of by this patentee. But we have already seen that the invention now claimed is not that of any mode of blasting in wells, or under water. Nor does it consist in any of the details which it has in common with the Mansfelt mine operation. Considered as processes, combinations, and arrangements of details there are very marked and substantial differences to be observed. In the first place, the objects sought to be accomplished, and the results attained, are entirely unlike. What was attempted in the Boltze operation (viz. that of the Mansfelt mine), was the destruction of the bore by blowing out its side, thus rendering it incapable of gathering and retaining water. What is sought and attained by the Roberts process is, not the destruction of the well, but an increase of its

capacity to gather and hold oil from the reservoirs surrounding it. And the modes of operation are also unlike. To say nothing of the structure of the flasks, or torpedoes containing explosive material, and nothing of the modes of ignition, the tamping contemplated and used in the Roberts invention is entirely novel. In the Mansfelt mine operation the tamping made use of was an iron rod and ram weighing nine hundred pounds, the ram fitting the bore tube, and the whole weight dropped a quarter of a fathom upon the cartridge. It is true there was also water in the bore, in depth thirteen fathoms, but the water does not appear to have been relied upon for tamping. The bore was not filled, as it is in the Roberts invention, and the presence of water was accidental, unavoidable, and plainly undesired. It was apparently no essential element of the process in the mind of the operator. Certainly it was not consciously employed as such, and there is nothing in the description that suggests the probability of using efficiently mere water-tamping for blasts in deep bores, much less anything that can serve as "a direction for doing or practicing the thing," which the Roberts process does accomplish through the agency of filling the wells with water. It is, in our judgment, one of the distinctive and most valuable features of the Roberts invention that it reveals and makes use of the sufficiency of water-tamping alone for deep underground blasting in vertical bores of small diameter, and that it has applied this discovery, not to the destruction, but to the enlargement of the capacity of wells designed for the collection of subterranean fluids. The specification of the patent states it as an essential element in the process, and claims it particularly. There is nothing in the Berlin publication that revealed it. To an Inventive mind that publication may have been suggestive, but it often happens that most ingenious and useful inventions are the development of ideas suggested in some way to the

mind of the inventor. They are not the less novel on that account.

There are other elemental differences between the Boltze operations and the method of this patentee, among which are the arrangements of the latter for locating and suspending the torpedo at the proper position In the bore, so that it may be exploded opposite the oil-bearing rock, neither above nor below. These are important requisites, inasmuch as the bore of oil wells is often sunk through the strata of such rock, at some distance below. There was no such arrangement, nor any equivalent therefor in the Operation at the Mansfelt mine. The explosion was necessarily made at the bottom of the bore, and there were no instrumentalities for suspending the cartridge after the tamping rod and ram were introduced, for the ram, being three inches in diameter, must have filled the bore-tube, and interfered with the cord by which the cartridge was lowered. It is, however, unnecessary to dwell upon these differences. It is enough that the employment for tamping of a superincumbent column of water filling the bore, of sufficient gravity to give a lateral direction to the explosive force of the torpedo, and the use of such tamping alone, distinguishes the Roberts method or process radically from the operations described in the Archiv by Dr. Karsten.

The defendant, further, in support of his allegation that the invention of the patentee has been anticipated, relies upon a publication made in London in the year 1800, in a work entitled "Phytologia, or the Philosophy of Agriculture and Gardening." The part considered important has reference to the productions of springs, and contains the following statements: "And at Hartford, Connecticut, there is a well which was dug seventy feet deep before water was found, and then on boring an auger hole through the rock, the water ran so fast as to make it difficult to keep it dry by pumps till the hole could be blown larger by gunpowder, which

was no sooner accomplished than it filled and ran over, and has been a brook ever since." On the next page is the following: "A third deduction from the knowledge of this geology concerning the production of springs, teaches that by enlarging the bottom of a well, when the water oozes from between the surrounding strata in too scanty a supply, a proportionable greater quantity of water may be procured."

Not much need be said respecting this publication. The description is so imperfect that little can be gathered from it, certainly nothing suggestive of the method that constitutes the Roberts invention. It is not even stated that the blast was made in the auger hole, which had tapped water sources. Much less does it appear how the cartridge was placed, tamped, or fired, or that it was exploded under water. It would rather seem to have been a case of dry blasting, for the difficulty of keeping the hole dry until it could be blown larger is particularly mentioned. It is very evident that the passage mentioned was not intended as a description of any process. It was rather, an illustration of the theory previously advanced by the author, that the sinking or enlargement of the bottom of a well might result in tapping new springs. Surely it cannot be claimed that it enabled the public to practice the invention afterward introduced by this patentee. Yet unless it did, it cannot defeat his patent. A patent is rendered invalid by a prior published description only where that description was sufficient to give to the public a practical knowledge of the invention claimed. See, Curt Pat. §§ 378, 378a, with the cases referred to in the notes.

In addition to these publications, the defendant has called witnesses to prove the fact that torpedoes were exploded in oil wells, for the purpose of obtaining oil, before the patent of the complainant was obtained. The date of the patent was November, 1866, but it is satisfactorily proved that the idea of the invention was

conceived in the fall of the year 1862; that sketches of it were made early in 1863; that drawings for the patent office were prepared in October, 1864, when also torpedoes were constructed for use; and that in January, 1865, the invention was put into practical and successful operation. Bearing these dates in mind, we proceed to inquire whether any of the witnesses prove that Roberts was anticipated in his invention.

In the fall of 1860, Washington T. Kingsbury exploded a torpedo in an oil well by means of a submarine fuse. It was exploded some twenty or thirty feet down in the well, throwing the water out and that, as the witness states, was all the effect produced. In 1861, he exploded another torpedo in another well in the same manner and with like results. Neither experiment proved efficacious in obtaining oil, and the wells were abandoned as worthless. His was, therefore, a case of unsuccessful and abandoned experiment. His process did not correspond with the ideas conceived in the Roberts invention of locating the torpedo in juxtaposition with the oil-bearing rock with a water column above it, sufficient for tamping, so as to give full lateral force to the explosion.

G. V. Harper put a torpedo into an oil well at Tidioute in 1860, and exploded it, but without any success in obtaining oil. The torpedo was fitted to gas pipe extending to the top of the bore, through which heated metal was dropped to ignite the powder. Mr. Harper exploded other torpedoes in wells, in a similar manner, and always with like failure to obtain beneficial results. No attention appears to have been paid to tamping, and none to a proper location of the torpedo. His own confession was, "that as far as he had tried his method," he had met with rather poor success in benefiting wells. Manifestly, 888 all that he did must be classed with unsuccessful experiments.

It is also in evidence that in 1860, Mark Wilson, a toll-keeper at a bridge, commenced lecturing on

electricity, in connection with one L. G. Merrill. They advertised that they would explain how blasts could be made in oil wells by electricity, but neither of them ever exploded a torpedo in a well, nor is there any evidence that they ever knew or explained how it could be done with beneficial effect. The most they appear to have done was to exhibit some of the effects of electrical action, and to show that by it a torpedo might be exploded in a well. How far short all this came of devising and making practical a process for adjusting a blast properly in a deep bore, tamping it adequately with water, and exploding it successfully so as to increase the flow of oil, is too apparent to need elucidation.

Still another witness, Frederick Crocker, put a torpedo into an oil well in the spring or summer of 1864, and exploded it, but, so far as it appears, without any beneficial results. All these cases show the possibility of exploding torpedoes in oil wells was known, and that such explosions had been made before Roberts made his invention. But they do not show any knowledge of an arrangement of instrumentalities, or of a method or process by which torpedoes could be exploded with the effect of increasing the productiveness of such wells. They show one link in a chain, but not the chain itself. The operators had regard only to the structure of the flask, and the means of ignition. The accompanying arrangements, essential to the attainment of the beneficial results secured by the Roberts method, were not made, and consequently their experiments were failures.

The only other experiments, claimed to have anticipated the Roberts invention, which it is necessary to notice, are those made by William Reed. He first exploded a torpedo in an oil well early in July, 1863. This was in the Criswell well, before Roberts' successful experiments were made, though after his

invention had been conceived. The beneficial effects, if any, resulting from Reed's first attempt, were not appreciable. What the well had yielded before does not appear, but it does appear that, after the explosion, and after the well had been cleared out, and pumping had been commenced, it yielded not more than about a barrel a day. He put a second torpedo into the same well in September, 1863, and a third in October next following, but it does not appear that any considerable increase in the well's productiveness was caused thereby. In September, of the same year, he put a torpedo into a well owned by John Fertig and others, but without any beneficial results. In January, 1864, he tried the experiment again in the well of Samuel Fertig, and again without success. He then appears to have abandoned his attempts, and to have left the oil region. In September, 1865, having returned, he put a torpedo into another well, but the result did not amount to anything. In 1866, he put in two other torpedoes in a new well never tested, and the well afterward produced only about a barrel a day. What it would have produced had the torpedoes not been exploded in it we are not informed by the evidence. These are all the experiments made by him before the Roberts method was successfully tried, and indeed before the patent was issued. Of them all it may be said they were unsuccessful. They do not exhibit a mode, or process, by which the productiveness of oil wells might be increased, or by which oil wells that had become clogged might be restored. The attention of Mr. Reed, as of the other experimenters, was evidently directed to the torpedo itself, and the manner of igniting it. Not a word in his testimony relates to tamping, so as to give the explosion lateral force, and we are not informed what column of water was above it, or whether any reliance was placed upon the gravity of the water. It is further to be observed, that Reed abandoned his experiments

in 1864, and did not resume them until after Roberts had demonstrated, by actual trial, that his method was efficacious. Roberts was then the first to reduce the method invented to actual and successful practice, and all that was done by others may be properly classified among unsuccessful experiments. However suggestive they may have been, they cannot be made available to defeat a patent granted to an inventor, who, subsequently to the failure of others, reduced his idea to practice and revealed to the public a useful process, which the crude and fruitless experiments of others had not made known. In Parkhurst v. Kinsman [Case No. 10,757], Mr. Justice Nelson said: "Crude and imperfect experiments, equivocal in their results, and then given up for years, cannot prevail against an original inventor, who had perfected his improvement and obtained a patent." There can be no better evidence that all the trials of blasting in oil wells, which were made before the complainant obtained his patent, were immature and inadequate to the accomplishment of the desired result, than the fact that they were abandoned, and the patentee's method was resorted to so soon as it became known. Certain it is, a great boon has been given to the oil-producing regions. Something has been conceived and worked out that has immensely increased production It is confessedly embodied in this patentee's method, and it is described in his patent. Certain it is, that no one of the experimenters, whose testimony we have considered, can say, "I did it" No other than Roberts can say: "I devised and practiced that which has conferred these benefits upon the public. I perfected this invention."

Of the blasting made in the Pennsylvania Coal company's well, in 1855 and 1856, it is 889 unnecessary to say more than that, In our judgment, it was an entirely different process from that which the complainant claims as his invention. There is,

therefore, no evidence in the case sufficient to repel the presumption arising from the patent itself that Roberts was the first inventor of the method secured to him.

It remains only to inquire whether the defendant is proved to have been guilty of an infringement. In regard to this there is hardly any contest. The infringement is established by the admission of the defendant, and by the testimony of William B. Roberts. The complainant is, therefore, entitled to a perpetual injunction, and to a decree for an account.

Let a decree be prepared accordingly.

{For other cases involving this patent, see Roberts v. Roter, Case No. 11,912: Same v. Schreiber, 2 Fed. 855; Same v. Walley, 14 Fed. 167.}

[1] {Reported by Samuel S. Fisher, Esq., and here reprinted by permission. Merw. Pat In v. 328, contains only a partial report.}