ROBERTS AND OTHERS *v.* SCHREIBER.

Circuit Court, W. D. Pennsylvania. June 19, 1880.

PATENT NUMBER 6,258 SUSTAINED—METHOD OF INCREASING THE CAPACITY OE OIL WELLS.—Re-issued process patent number 6,258, granted January 6, 1875, for a new and useful improvement in the method or process of increasing or restoring the productiveness of oil wells, by causing an explosion of gunpowder, or its equivalent, at or near the oil-bearing point, in connection with superincumbent fluid tamping, is not invalid for want of novelty and originality, or for any other reason.

SPECIFICATION—CONSTRUCTION.—The specification of a patent is to be construed with reference to the purpose of the patent.

PATENT NUMBER 47,458 SUSTAINED.—Patent number 47,458, for an improvement in exploding torpedoes in artesian wells, sustained.

In Equity. Bill for infringement of two patents.

D. F. Patterson and *George Harding,* for complainants.

James C. Boyce and *Henry Baldwin, Jr.,* for defendant.

STRONG, G. J. The bill charges infringement of two patents belonging to the complainants. The first is a process patent (No. 6,258) granted on the sixth day of January, 1875, to Edward A. L. Roberts, a re-issue of letters patent, (No. 5,434,) which was itself a re-issue of original letters, dated May 20, 1866, granted to said Roberts, and numbered 59,936. The original was for a new and useful improvement in methods of increasing the capacity of oil wells, described in the specifications and drawings. The specification of the re-issued patent No. 6,258, upon which this suit is partly founded, sets forth subtantially the improvement or process described in the original, and the claim is for "the method or process of increasing or restoring the productiveness of oil wells, by causing an

explosion of gunpowder, or its equivalent, at or near the oil-bearing point, in connection with superincumbent fluid tamping, substantially as set forth" in the specification.

The other patent belonging to the complainants, and alleged to have been infringed by the defendant, numbered 47,458, and dated April 25, 1865, was granted, also, to the said Edward A. L. Roberts. It is for a new and useful improvement in apparatus for exploding gunpowder or other explosive material when submerged in water in artesian or other similar wells. The apparatus is clearly and minutely described in the attendant specification, and the claims are as follows: *First,* the priming chamber *b,* in combination with the flask, plug and nipple, substantially as set forth; *second,* the arrangement of the tube *f,* or its equivalent, composed of India rubber, or other similar material, with the guard *d* and bolt *e,* substantially as described, in combination with the flask *a.*

The answer of the defendant to the charge of infringement of the process patent, while admitting the issue of the original, and the re-issues, as set forth in the bill, denies generally that the alleged improvement was new and useful; that Roberts was the original, true, or first inventor; and it denies also that the invention was not known or used before application was made for the patent, and denies that the invention was not, for more than two years prior to the date of Robert's application for a patent, in public use, or on sale in this country. Passing from these general denials, the answer proceeds to allege that the re-issue 5,434 was invalid and void, because it described and claimed things substantially different from what was described and claimed in the original patent. It also alleges that the second re-issue (that upon which this suit is brought) was not for the same invention as that described and specified in the original patent, or in the first re-issue. There is also a general denial that the

defendant has infringed the complainant's invention claimed in the re-issue 6,258.

The answer then proceeds to set forth these and other defences 857 more particularly. Repeating the averment that Roberts was not the first and original inventor of the process claimed, but that the same, "or a substantial and material part thereof, or substantial and material parts thereof, claimed therein as new, was, or were before the said Roberts' supposed invention, known to and used" by numerous persons, whose names and the places of use are specified, the answer further avers that the invention was described in certain patents and in printed publications in this country and in Europe before it is claimed to have been made by the patentee.

The answer also alleges that Roberts had never reduced to practice his supposed improvement when he filed his application for a patent, or, in other words, that it was not then a complete invention; that the re-issue 6,258 does not describe any practically useful mode of increasing or restoring the productiveness of wells; that it has no utility; that for the purpose of deceiving the public the description in the second re-issue was made to contain less than the whole truth relative to the invention or discovery, and that for that reason the patent is void; that for the purpose of deceiving the public the application for the re-issue was made to contain more than is necessary to produce the desired effect, or the alleged useful result, and that the patent is void for that reason; and that the specification of the re-issued patent does not describe the alleged invention in such full, clear and exact terms as to enable any person skilled in the art to which it appertains to use the same, and that for this reason the patent is void.

Passing from the process patent to patent 47,458, the defendant's answer denies any infringement thereof, and avers that the letters patent are for a

combination of parts not new, and constituting a cartridge or torpedo which was not new, if at all, otherwise than as specific devices or specific combinations of the parts constructed and combined as described in the specification, and specified in the claims; that Roberts was not the true original and first inventor of said parts, nor of any or either of them, nor of either of the combinations specified in the letters patent, if at all, except when such parts respectively were constructed and combined substantially 858 as set forth in the patent; that the same, or substantially the same, things claimed in the patent as new, or material or substantial, parts thereof, were long prior to the supposed invention of the said Roberts known by and used at certain places designated by persons whose names are given, and that they were described in certain letters patent specified, and in certain printed publications.

Such are the defences set up against the bill of the complainants, and a very elaborate argument has been submitted in support of them. It must be admitted that the answer, so far as it relates to the process patent, is exceedingly full. It avers almost everything that may in any case be relied upon as a defence to the charge of infringing a patent, but most of its allegations are totally unsustained by anything in the record. They have not been insisted upon in the argument, and some of them have been expressly disclaimed. They will, therefore, require only a passing notice.

First, as to those which relate to the validity of the patent. There is no evidence to sustain the averment that the invention was in public use or on sale more than two years prior to Roberts' application for a patent, which was in 1864. The proof is directly to the contrary, and the averment is inconsistent with another allegation contained in the answer, towit, that at the time of filing his application he had never reduced to practice his supposed improvement or invention.

Nor is there anything to sustain the assertions of the answer that the patentee was guilty of fraud in this, that for the purpose of deceiving the public he made his application for the re-issue to contain less than the whole truth relative to this invention, and also that, for the same purpose, he made it to contain more than is necessary to produce the desired effect, or the alleged useful result. Such averments tend to awaken a suspicion that the defendant mistrusted having any substantial defence.

Equally unfounded is the defence that the description of the invention in the specification is not sufficiently full, clear and exact to enable any person skilled in the art to which it appertains, or with which it is most closely connected, to use it.

859

In face of the proofs, the denial of the utility of the invented process is most remarkable. The evidence shows the invention or process to have been pre-eminently useful. It has gone into very extended use throughout the entire oil region, and its use has immensely increased the production of oil. It has been this large and useful efficiency which has stimulated so great a number of infringers to invade the patentee's rights. Nor is there any reasonable pretence that the reissued patent is for a different invention from that described in the specification of the first re-issue, or that described in the original patent of 1866. The three patents are in evidence, and there is nothing in the one upon which this suit rests, in part, which is not exhibited in the original specification. Indeed, the claim of the last re-issue is almost identical with the claim of the original patent. This defence has been abandoned. We come, then, to the only defence upon which any reliance is placed, so far as it relates to the validity of the patent. It is the alleged want of novelty and originality of the invention. It is strenuously insisted that the patented process was known and in

use before Roberts invented it and made application for his patent.

The question thus presented is not a new one in this court. It was raised and vigorously urged in *Roberts* v. *Dickey,* reported in 4 Fisher, 532. In that case the original patent was assailed for alleged want of novelty, and after an extended argument, and the presentation of much evidence, the patent was sustained. No appeal was taken from the decree, and the patent, since the decree was made, has been enforced in numerous cases. We do not say our former decision is conclusive upon this defendant. The parties are not the same now, and there is some evidence which was not in the former case. In *Roberts* v. *Dickey* we stated at length what we regarded as the true meaning of the patent, and what, in our opinion, was the process claimed. We shall not repeat what we then said, only observing that we adhere to what we decided.

In support of his averment of the want of novelty of the Roberts invention the defendant has given evidence of numerous 860 acts which he claims to have been anticipations. Some if not most of them were in evidence in the former case, and were held insufficient to establish the invalidity of the patent. They will require but brief notice. There are several, however, that appear in evidence first now. They will be particularly considered. One of these, and one upon which much stress has been laid in the argument, is described in the testimony of George W. Beardslee. In 1844, at Rochester, New York, he excavated an ordinary well, six feet in diameter, and 12 to 15 feet down to limestone rock of a peculiar formation, and then from two to five feet into the rock. The strata were thick, two or three feet, and without fissures. Finding it difficult to blow out the rock by ordinary blasting he drilled a two-inch hole in the center of the excavation, to the depth of four or five feet, without

striking the water he anticipated. He then put a charge of powder in a tin case into the hole and fired it by a fuse. When fired the water had risen over the hole, as he says, three or four feet. The result of the explosion was, he thinks, to reach a substratum of water for which he was seeking. Before the blast he could bail out the well with a bucket, and afterwards he could not.

It would, we think, be a very unwarranted conclusion to draw from Beardslee's evidence that his experiment was an anticipation of Roberts' process. The well was in no sense an artesian well. The cartridge was 13 or 14 inches long, and it was of such a diameter as to fill the hole during its length. It was not arranged in a position having particular reference to the place where the effect of an explosion was desired. It rested on the bottom of the hole, without being suspended. Obviously it was a case of ordinary blasting. The proportion to which the hole was filled with powder, about one-third, is the proportion required and ordinarily adopted in common blasting. 1 Knight's Mechanical Dictionary, 295. Plainly the purpose was to blow out the rock above the cartridge into the well. We fail to see the identity of such a process with exploding a torpedo many hundred feet below the surface of the ground, and below the top of 861 the rock through which an artesian well has been sunk, and exploding it at the exact point in the well where the effect of such an explosion is desired, with a water tamping sufficient to confine the effect to the vicinity of its location.

But this is not all of Beardslee's testimony. It does not appear that he repeated his experiment for years. In May, 1865, after Roberts had applied for his patent, he went to the oil region, having meanwhile made experiments and manufactured apparatus to determine the best method of firing, and there experimented in firing torpedoes in oil wells. He appears to have had

very poor success. His trials were substantial failures. Evidently he did not regard them as anything more than experiments, and unsuccessful ones. He received nothing for them, and in July next, following, he left the region and never returned. Then a successful mode of exploding a torpedo in an oil well was in demand, and if his operations had revealed it, it is incredible that it would have been abandoned.

Our attention was next directed to the Thomas well, and the operations there. Mr. Thomas, in 1858, made an application for a blast in a bore hole sunk in the bottom of an ordinary well. The well was sunk about 80 feet through clay, the inside diameter being six feet and four inches. When the rock was reached some water was found. The excavation was then continued some 15 or 16 feet through solid rock, the water somewhat increasing. A bore hole about four inches in diameter was then sunk from the center of the bottom 37 feet deep. The water increased during this process. A cartridge of powder was then placed in the bottom of the bore hole and exploded by a fuse, leading to the cartridge through a gas pipe. The cartridge was an India ruber tube, made to fit the hole, and it contained about 12 feet of powder. The water filled the hole above the cartridge, and a foot or two was in the bottom of the well. There was no other tamping. The result of the blast seemed to be some increase in the water. A second blast was then made, after the hole had been extended five or six feet deeper; but there was still an insufficiency of water.

862

In regard to this experiment it is to be observed that it had the characteristics of ordinary blasting. The blast was at the bottom of the hole. The hole was filled by the cartridge 12 feet, about one-third of its depth, the proportion to common blasting. There was an open space above of about 36 square feet. It might have been expected that the rock between the blast

and that open space would have been broken and lifted, if not blown out. A much greater quantity of rock has been moved in some cases. The second blast below seems to indicate such an intention. However this may have been, Thomas' was a single experiment. He never repeated it. Though he sunk many wells afterwards, he dug them of the ordinary size—six feet in diameter—and, on reaching rock, blew out the bottom by ordinary blasting. It seems never to have occurred to him, or to any person who saw it, that it was a process that was useful, or that could be applied to artesian wells hundreds of feet deep, some of them 1,500 or more, of uniform bore from the surface of the ground. Though it was tried in public, and was somewhat remarkable in its character, it never suggested to Mr. Thomas, or to any one, that it could be applied to increase the productiveness of oil wells, though some successful process of causing explosions at particular points in such wells was very much needed and very much considered. It may, we think, very properly be denominated an abandoned experiment, never perfected so as to reveal the process Roberts afterwards discovered.

Of the Boltze explosion we propose to say nothing more than we said in *Roberts* v. *Dickey.* Maillifert's blasting was upon the surface, and though it showed water tamping to be useful and effective in some circumstances, it bore no resemblance to the process exhibited in the complainant's patent. It may be that water tamping, or the resistance of a body of water above a blast, had been known before Roberts applied it in his process, but water tamping is but one element of that process.

The other alleged anticipations of Roberts' invention require but brief notice. The first oil well was bored by Col. Drake, in August, 1859. In the September following A. W.

Raymond commenced drilling one, and stopped drilling in the spring of 1860. In the summer or fall of that year he attempted to explode in the well a tin case filled with powder, but the fuse went out, the case collapsed, and he never tried the experiment again. In May or June, 1860, Henry H. Dennis unsuccessfully exploded a torpedo in an oil well, and abandoned the experiment.

In 1860 John C. Ford exploded a torpedo in a well some 248 feet deep, employing a round or oblong tin can filled with powder. It had a nozzle with a screw thread on the end of it. To this he screwed a gas pipe of sufficient length, and dropped a heated iron down the pipe into the torpedo, thus causing the torpedo to explode. The experiment was a complete failure, and the well was abandoned. How Ford regarded it is shown by the fact that he afterwards had Robert' process applied to his well. Another torpedo was fired in 1860, on the Stackpole farm, with like ill success, and the experiment was not repeated. George B. Walhee also made an unsuccessful experiment in 1860 at Tidioute. Other fruitless experiments are proved to have been made. The Reed trials we fully considered in *Roberts* v. *Dickey,* and it is unnecessary to say more of them. We refer, however, to the report of the examiners in a case of interference, No. 3,859, dated July 10, 1869.

It may be noticed that most of these unsuccessful experiments were made in 1860 or 1861. Roberts conceived the idea of his process in 1862, and in 1864 he applied for his patent. Up to that time there is no proof that any torpedo had been exploded in an oil well with substantially good results. Numerous experiments had been tried and abandoned; but when the Roberts process was tried it was immediately successful. The first trial increased the production of oil 60 barrels a day, and the process has continued to be a success. Doubtless there has been an occasional

failure, but in comparison with complete success it has been very rare. It is in proof that it has increased production at least one-half—in some wells from five to six barrels a day to one hundred; 864 and in a single territory along Oil creek, where one operator operated, it has increased the production several hundred thousand barrels. In the Bradford oil district, where the daily production is from 22,500 to 25,000 barrels daily, one-half is proved to be due to the Roberts invention. The cause that works such results cannot be the same as that exhibited in the abandoned experiments. Holding them up as anticipations of the patented device is another illustration of what is very common, an attempt to defeat a meritorious patented invention by proof that something similar had been previously known, though it had never been perfected, and had never been any useful contribution to human knowledge or convenience.

We conclude what we have to say upon this branch of the case by quoting what we said in the former case: "Roberts was 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 *Partchnut* v. *Kinsman,* 1 Blatch. 494, Mr. Justice Mason 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 Roberts 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 as 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 865 is described in his patent. Certain it is that no one of the experimenters, whose testimony we have been considering, can say 'I did it.'"

Our conclusion, then, is that the defendant has not succeeded in showing that the patent, No. 6,258, is invalid for want of novelty and originality of the invention, or for any other reason. The patent is therefore sustained. The defendant's answer substantially admits the infringement charged. In describing the mode of torpedoing an oil well practiced by him and his servants, agents and employes, since the third of April, 1875, it states that iron casing is put down within the well to a point below where fresh-water veins are struck in boring, and the borer is then projected down until the oil-bearing rock is reached. A pump tube is then inserted through the casing and lowered down into the oil rock. This relates to the construction of the well.

The answer then proceeds to say that if it is deemed advisable to try the experiment of torpedoing the well the sucker rods and tubing are drawn, and the well is left with the casing in it to keep the water in it from coming in—meaning, of course, only that from the fresh-water veins. The torpedo is then placed at such point as the manager of the well may direct, and is exploded. No water or other fluid is put in the well, or permitted to come into it, so far as its entrance can be controlled, and fresh water is effectually excluded by the casing. No extraneous fluid is ever introduced into the well, though it may and sometimes does happen that there will be fluid in the well above the point

at which the explosion is effected; but it will be only oil, or salt water and oil, which comes in, if at all, at points below the casing, and no regard is placed to its presence so long as it does not fill up the well to the bottom of the casing. Such fluid cannot be excluded, as the fresh-water veins can be and are by the casing; nor is any regard paid to the absence of fluid in the well, because fluid is not at all desired; nor is it relied upon for any effect to be produced thereby. Such is the defendant's description. It will be observed he does not deny that water tamping always attends his process, and the proof is quite clear that, 866 in practice, he was always had a body of fluid in the well above the torpedo, which, of course, operated as tamping, and thus he has succeeded in increasing the production of oil, and obtaining the results which the Roberts process secures.

It is too obvious for denial that there is no essential difference between this process, as described in the answer, and that described in the Roberts patent, unless it be that the defendant does not fill the well with water up to its top. To establish that as an essential difference we are asked to give a very strict and limited construction to the patent, and to hold it indispensable to the Roberts process that superincumbent fluid tamping be introduced or admitted into the well, and used therein substantially as described, the well being entirely filled with water or fluid. It is said that if the well be filled to the top the casing will be destroyed by the explosion, or displaced, and that Roberts does not now use his own process, or allow the water to rise in the well above the bottom of the casing, or up to it. In short, the argument is that because the defendant does not allow the fluid in the well to rise above the bottom of the casing when he explodes a torpedo in a well, his process is not the same as that of Roberts, which requires the well to be entirely filled.

The argument is plausible, but unsound. It requires an unreasonable construction of the patent. Looking to the specification, it is evident that the presence of the superincumbent column of water was regarded as essential only for sufficient tamping of the blast. It is not a fair construction of it that it requires the well to be filled to the top. Its language is: "When the flask has reached a position opposite the oil-bearing rock," (where the effect of an explosion is desired,) "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 columns of water above the flask will then 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 stratums of rock above, and I make use of it for that purpose." It is obvious 867 from this that all the patentee sought was a sufficient column of water thus to confine the effect of the blast. The direction to fill up the well, if not already filled, was for that purpose only, and that purpose is to be kept in view in the construction of the patent, and in following its directions.

It is not to be inferred from the language used that in all cases the well is to be filled to the very top. The specification is intended to inform those who are skilled in the art to which it relates, and it is to be such that the process may be advantageously used by them, and if it be sufficient for their direction it is all the law requires. As was said in *Mory* v. *Whitney,* 14 Wall. 645, "it would be most unreasonable to read the directions of the specification without reference to the object they have in view." Upon this subject we refer at large to what was said in that case, and especially to pages 643, 4, 5, and 6. It has a direct hearing upon the subject we are now considering. See, also, *Tilghman* v. *Mitchell,* 2 Fisher, 518.

At the time when the Roberts patent was granted oil wells were comparatively shallow—not much, if any, over 500 feet deep. Very many of them were not more than half that depth, and some were not more than from 40 to 70 feet deep. Few of them, if any, had any casing exterior to the tube through which the pumping was done. Later, the depth of the bore has been greatly increased. It now is driven through one, upper, what is called a surface, rock, and below through one, two or three oil-bearing rocks. As the casing only extends down to the surface rock there is generally a much greater length of bore below than above. There may be, therefore, and such we apprehend is generally the case, a sufficient column of water in the bore below the casing and above the torpedo to answer all the purposes of fluid tamping contemplated by the patent. If the wells be, as in many districts they are, 1,500 feet deep, and the casing extends from 300 to 500 feet deep to the surface or upper rock, which is more than it usually does, there will be hundreds of feet below the casing and above the point of the explosion which may be 868 filled with fluid tamping more than the entire depth of the well, as they were in 1864.

Now any operator with common sense, having knowledge of oil wells and having Roberts' patent before him, and thus being informed of the object which it seeks to secure by water tamping, cannot fail to see that he accomplishes all the patent proposes, secures all the tamping needed by a column of fluid wholly below the casing, and that a column permitted to come up to the surface of the ground would be not merely useless but positively hurtful. He would be no skilful operator if he did not perceive that Roberts intended no unnecessary filling, when his avowed purpose was to use the water only for the purpose of confining the effect of the explosion to the vicinity of the point at which the torpedo was placed. We must hold, therefore, that the averment of the bill

that the patent has been infringed by the defendant, and that he has been using the process which belongs exclusively to the complainants, is sustained, and we shall decree accordingly.

We pass next to the charge made in the bill that the defendant has infringed patent No. 47, 458, granted on the twenty-fifth of April, 1865, to Edward A. L. Roberts, and assigned to the complainants. That patent was, as we have heretofore stated, for a new and useful improvement in apparatus for exploding gunpowder, or other explosive material, in artesian or other similar wells. To understand the device it is necessary to notice both the object sought to be accomplished and the manner contrived for obtaining it. The evil sought to be overcome is thus described in the specification. It has always been found difficult to explode gunpowder in a vessel in the water several hundred feet below the surface, and at any given point above the bottom of an artesian well, for two reasons—*First,* that the powder is liable to become dampened from exposure to the water about the place where it is connected with the machinery for igniting it; and, *second,* such machinery, being usually connected with the top of the vessel containing the powder, which is usually 869 a flask, made of considerable length, in order to hold sufficient powder to create the force required upon its explosion, the powder is very liable to settle down so far in the flask, on account of the motion and jamming that it necessarily undergoes in being placed in position, as to fall beyond the reach of the fire intended to ignite it.

It was these hazards that the patented device was intended to meet. It is a combination of a flask to contain powder, or some explosive material, constructed with a close cover; a priming chamber in the cover being a tube extending down into the interior of the flask; a hollow nipple in the upper part of the priming chamber for the purpose of receiving a

percussion cap on its upper end, and a guard around the nipple, extending above it about one inch, serving as a guide to a bolt, and keeping it in place directly over the nipple, the bolt being used to explode the cap on the nipple, and sliding easily in the nipple guard. A plug is used to stop the lower end of the priming chamber. This description will be more fully understood by observing the mode of operation of the device. The flask is filled with powder, and the priming chamber also, its bottom being closed by the plug, inserted tightly enough to keep the powder from falling out, but not so tightly that it will not be driven out when the material in the priming chamber explodes. A percussion cap is placed on the nipple, the lower end of the bolt is placed on the guard, an India-rubber tube is drawn over the guard and bolt and tied closely at its lower end around the guard, and at its upper around the head of the bolt, to keep the percussoin cap dry. Thus equipped the apparatus is lowered to its proposed position in the well, and the torpedo is exploded by dropping a weight guided by the wire that sustains it, which forces the bolt upon the percussion cap, thereby exploding the powder in the priming chamber, and forcing the fire and the plug into contact with the explosive material in the flask.

It is this combination of the flask, the priming chamber, the plug, (shutting off the chamber from the body of the flask,) and the nipple, which is the first claim of the patent. It constitutes the first claim. After an examination of the patented 870 combination and the device of the defendant, which it is admitted he has used, both of which have been before us, we cannot doubt that they are substantially the same. The differences, so far as they exist, are merely formal. The function performed by each device is the same; the mode of performance is substantially the same in each, and the elements of the combination are found in each. Those elements are four. Each has a flask to

contain material for a blast, and each flask has a cover. It is immaterial how the cover is attached to the body. The mode of attachment constitutes no part of what the patentee claims, nor does the shape of the cover. Both devices plainly have reference to a torpedo to be set vertically, and to be fired by a weight dropped from above. The patentee has a priming chamber entered through the cover. The priming chamber is a small apartment entered through the cover, intended to contain a charge to be fired into the body of the flask. Of what material the chamber shall be made is not made essential or specified.

The defendant's device has three priming chambers entered through the cover of the flask, or plate or disk, which constitutes the cover. Through this cover three perforations are made, extending into the interior of the flask, and a Smith & Wesson pistol cartridge is forced into each. It is needless to say, what is too obvious to need any remark, that the copper case of the cartridge, filled as it is with powder to be exploded by a fulminate in the vein, is a priming chamber answering all the purposes of that in the Roberts patent, and a clear equivalent for it; and the bullet which confines the powder in the copper case is a plug answering all the purposes of the plug in the complainant's device.

The remaining element of the patentee's device is the nipple. The function of the nipple is twofold: to hold the cap in position over the priming chamber, and to supply an anvil upon which the fulminate in the cap may be exploded into the chamber by the falling of the weight. There is no nipple in form in the defendant's apparatus, but there is a clear equivalent, performing the same functions, and in substantially the same manner. The perforation holds the cap in 871 place, and the top of the cover, adjacent to the perforation, is made an anvil. The rim of the cap which contains the fulminate rests on that anvil. Thus, the shoulder

on which the rim rests becomes a nipple, answering all its purposes. A patented mechanical arrangement cannot be thus evaded without liability to the charge of infringement.

Only two things have been urged in support of the defence that Roberts was not the first inventor of his apparatus. One of these is the Crocker torpedo. We have already observed that the Roberts invention is a device for exploding from the top of a shell or flask placed vertically in an artesian well. Crocker's was a device for exploding it at the bottom or lower end. The torpedo had a pistol cartridge in its bottom, and a rod beneath it, varying in length. The torpedo was lowered into the well and allowed to drop to the bottom. By this means, when the end of the rod struck the bottom it discharged a hammer, which struck the head of the pistol cartridge and caused the cap to explode. There was no plug. Mr. Crocker himself testifies that the bullet was taken out of the cartridge, and as the cartridge was placed in an upright position, with the mouth upwards, a plug or bullet was not needed to keep the powder from falling out of the chamber, the purpose it subserved in the Roberts combination. Besides, the device was an experimental one, immediately abandoned, and Mr. Crocker afterwards employed Roberts for torpedoing his wells.

The other alleged anticipation is the Plant torpedo. It is described in the Plant patent, dated November 18, 1862. It is a submarine torpedo, intended for a purpose entirely different from what is sought to be secured by that of Roberts. It is fired horizontally from a war vessel or a fort, arranged so as to explode when it strikes a hard opposing object, such as the hull of a ship, and it is protected by a spring in front against the resistance of the water through which it passes in its rapid flight. This spring is an element not found in the Roberts device. If used in that device it would im ede the operation, if not prevent it

entirely. It would offer resistance to the drop weight, and tend to prevent driving the bolt upon the cap. The purpose was to secure an easy and 872 certain explosion. That of Plant was to guard against an explosion from any less cause than violent concussion with a hard and unyielding object. Roberts sought to overcome the difficulty arising from the settling of the powder in the flask from its top. In Plant's torpedo no such difficulty existed, since its motion was horizontal. Moreover, Plant's device has five elements instead of four. Roberts, with four elements, accomplishes a different result from that which Plant only reaches by five. For these reasons we cannot think they are the same combinations, either in principle or results.

It follows, from what we have said,—*First,* that the reissued process patent No. 6,258, belonging to the complainants, is valid, and that the defendant has been guilty of infringing it; and, *second,* that the patent for an improvement in exploding torpedoes in artesian wells, No. 47,458, is also valid, and that the first claim thereof has been infringed by the defendant.

A decree will therefore be entered for an injunction and an account. Let a decree be prepared accordingly.