

# Shooters – A “Fracking” History



aghs.org/technology/hydraulic-fracturing/

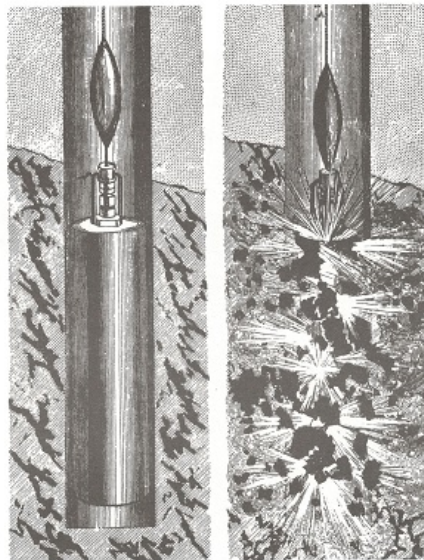
April 22, 2023

## The evolution of technologies for fracturing geologic formations to increase oil and natural gas production.

*Since America’s earliest oil discoveries, detonating dynamite or nitroglycerin downhole helped increase a well’s production. The geologic “fracking” technology commonly used in oilfields after the Civil War would be significantly enhanced when hydraulic fracturing arrived in 1949.*

Modern hydraulic fracturing — popularly known as petroleum well “fracking” — can trace its roots to April 1865, when Civil War Union veteran Lt. Col. Edward A. L. Roberts received the first of his many patents for an “exploding torpedo.”

In May 1990, Pennsylvania’s Otto Cupler Torpedo Company “shot” its last oil well with liquid nitroglycerin as the company abandoned using nitro while continuing to pursue a fundamental oilfield technology. Company President Rick Tallini credited Col. Roberts’ original patents for leading to the modern fracturing systems.



In 1862, E.A.L. Roberts was appointed Lieutenant Colonel of the Union Army. In December he “conceived the idea of opening the veins and crevices in oil-bearing rock by exploding an elongated shell or torpedo therein.” Images courtesy Drake Well Museum, *Early Days of Oil*, Princeton University Press.

When the Roberts patent expired in 1883, his company was sold to former employee Adam Cupler Jr. (who died in a 1903 nitro explosion). The Cupler Torpedo Company became Otto Cupler Torpedo Company in 1937 after Otto Torpedo Company purchased it.

“Our business since Colonel Roberts’ day has concerned lowering high explosives charges into oil wells in the Appalachian area to blast fractures into the oil bearing sand,” Tallini said.

Roberts’ torpedo company operated in the Allegheny region of Titusville, where the U.S. petroleum industry began in August 1859 with the first American well specifically drilled for oil. His explosive method for fracking wells in Pennsylvania’s oil-bearing geologic formations would be adopted as other states made their first oil discoveries.

### Civil War Veteran’s “Torpedo”

Civil War veteran Col. Edward A.L. Roberts led a New Jersey Regiment at the bloody 1862 Battle of Fredericksburg, Virginia. Amid the chaos of the battle, he saw the results of explosive Confederate artillery rounds plunging into the narrow millrace (canal) that obstructed the battlefield.



When E.A.L. Roberts founds his company in 1865, his many patents give him a monopoly on torpedoes needed by the oil industry.

Despite heroic actions during the battle, he was cashiered from Union Army in 1863. But the Virginia battlefield observation gave him an idea that would evolve into what he described as “superincumbent fluid tamping.”

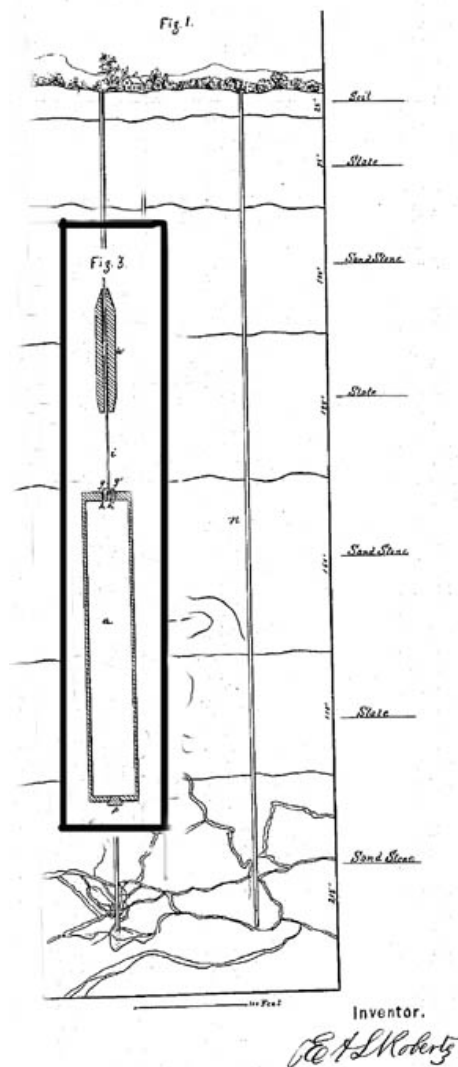
Roberts received his first patent for an “Improvement in Exploding Torpedoes in Artesian Wells” on April 25, 1865. His oilfield invention of fracturing to improve a well would vastly improve oil production from America’s young petroleum industry. Many more of the technology patents would follow.

The Roberts torpedo system eclipsed earlier oilfield methods, including black powder or dropping sticks of dynamite down a well, which often collapsed boreholes and ruined production.

The same month Roberts was awarded his first exploding torpedo patent, an actor with a failed Pennsylvania oil well assassinated President Lincoln. In June 1864, John Wilkes Booth left Pennsylvania's oilfields after a botched fracturing attempt at an oil well drilled by his Dramatic Oil Company.

Roberts received another U.S. Patent (No. 59,936) in November 1866. This improved device would become widely known as the "Roberts Torpedo." The advanced petroleum production technology used a column of water on top of an explosive device downhole to more effectively breakup rock formations at the oil-producing depths of wells.

*E. A. L. Roberts. Torpedo  
N<sup>o</sup>. 59936. Patented Nov. 20. 1866*



Early "torpedoes" were set off by a weight dropped along a suspension wire.

## Shooting Oil Wells

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The Titusville Morning Herald newspaper reported: *Our attention has been called to a series of experiments that have been made in the wells of various localities by Col. Roberts, with his newly patented torpedo. The results have in many cases been astonishing.*

*The torpedo, which is an iron case, containing an amount of powder varying from fifteen to twenty pounds, is lowered into the well, down to the spot, as near as can be ascertained, where it is necessary to explode it. It is then exploded by means of a cap on the torpedo, connected with the top of the shell by a wire.*

Filling the borehole with water provided Roberts his “fluid tamping” to concentrate concussion and more efficiently fracture surrounding oil strata.

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The downhole technique had an immediate impact — production from some wells increased 1,200 percent within a week of being shot – and the Roberts Petroleum Torpedo Company flourished.

Roberts charged \$100 to \$200 per torpedo and a royalty of one-fifteenth of the increased flow of oil. Attempting to avoid Roberts’ fees, some oilmen hired unlicensed practitioners who operated by “moonlight” with their own devices. The inventor was outraged.

Roberts hired Pinkerton detectives and lawyers to protect his patent — and is said to have been responsible for more civil litigation in defense of a patent than anyone in U. S. history. He spent more than \$250,000 to stop the unlawful “torpedoists” or “moonlighters.”



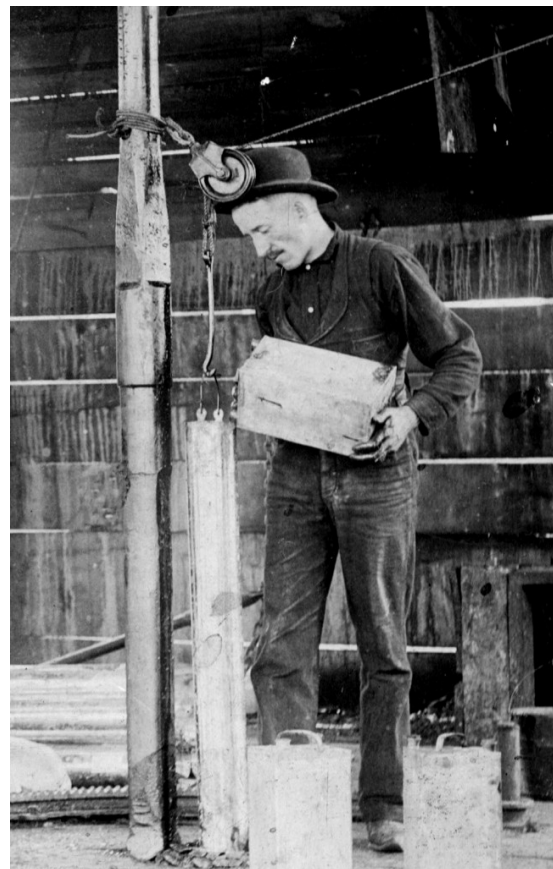


Pouring nitro into a canister to prepare a “shooting” of a well drilled using a cable-tool rig powered with a nearby steam boiler.

Applied legally or illegally, by 1868 nitroglycerin was preferred to black powder, despite its frequently fatal tendency to detonate accidentally.

“A flame or a spark would not explode Nitro-Glycerin readily, but the chap who struck it a hard rap might as well avoid trouble among his heirs by having had his will written and a cigar-box ordered to hold such fragments as his weeping relatives could pick from the surrounding district,” noted John J. McLauren in 1896 in his book *Sketches in Crude Oil — Some Accidents and Incidents of the Petroleum Development in all parts of the Globe*.

Roberts died a wealthy man on March 25, 1881, in Titusville. His heirs sold Roberts Petroleum Torpedo Company to its employees, who continued in business as the Independent Explosives Company. By then, the Civil War Union veteran’s revolutionary “fracking” technology was being applied by the petroleum industry worldwide.



Pouring nitroglycerin was risky enough in late 19th century oilfields. Doing it for an illegal well “shooting” led to the term “moonlighting.”

### **Otto Cupler Torpedo Company**

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Rick Tallini’s historic Otto Cupler Torpedo Company at one time produced its own nitroglycerin in plants near Titusville — until the last of the company’s plants exploded in 1978. They continued using liquid nitroglycerin for more than a decade. Then the company’s

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