

ALL PUMPED

When an oilman's gamble pays off with a producing oil well, much remains to be done before the oil can make it to market. In 1859, "Colonel" Edwin Drake used a common water well hand pump to retrieve oil from 69.5 feet. It wasn't long before necessity and ingenuity combined to find something more efficient.

Oil wells will run dry, but advances in technologies can put off the inevitable. Even with the best technologies, more than half of the oil can remain trapped.

The evolution of oil production is reflected in thousands of marginally producing oil and natural gas wells quietly reaching for often stubborn reserves. Low-volume "stripper" wells produce no more than 15 barrels a day.

The average stripper well produces only about 2.2 barrels per day. However, according to the Independent Petroleum Association of America (IPAA), these wells comprise 84 percent of domestic oil wells and produce over 20 percent of all domestic oil – an amount roughly equal to imports from Saudi Arabia.

Marginal oil and natural gas wells number about 650,000 of the nation's 876,000 wells, IPAA notes. Once shutdown, they are lost forever. Keeping them in production has long been a challenge for oilmen.

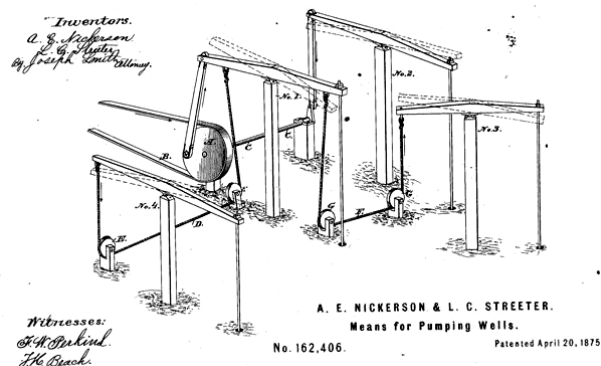
From Jerk Lines to Eccentric Wheels

Marginal quantities of oil sometimes need help leaving the well. One of the early oil pumping innovations came from an 1875 patent: "The object of our invention is to enable the pumping of two or more wells with one engine."

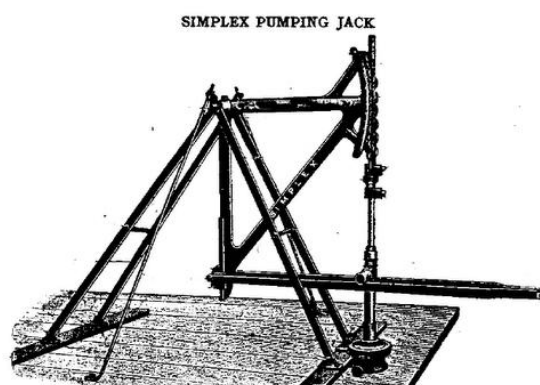
However, it wasn't long before the multiple wooden Samson post and walking beam arrangement was replaced by more compact and efficient mechanisms.

The 1913 Simplex Pumping Jack was a widely popular offering from Oil Well Supply Co. of Oil City, Pa. A central power source could connect and operate several of these dispersed Simplex units by way of steel rod lines (also called jerk lines.)

Roger Riddle, a local resident and field guide for the West Virginia Oil & Gas Museum in Parkersburg, was raised around central power units and the rhythmic clanking of rod lines. Today, he guides visitors through the nearby woods where remnants of these elaborate systems quietly rust.



"The object of our invention is to enable the pumping of two or more wells with one engine," notes a patent from 1875. The illustration reveals the system's simplicity, but it did not last.



Simplex Pumping Jack offered by Oil Well Supply Co. in 1913.

"They pumped with just these steel rods, just dangling through the woods," says Riddle. "You could hear them banging along – it was really something to see those work. The cost of pumping wells was pretty cheap."

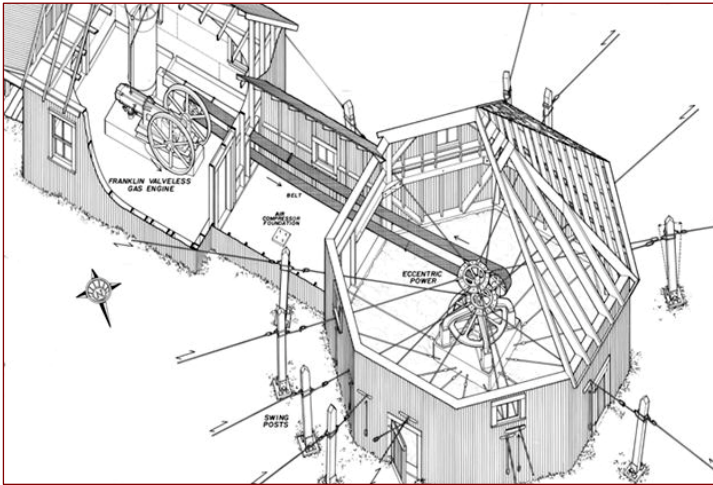
Steam power initially drove many of these eccentric power units, but some were converted to burn the natural gas or other inflammables often found with oil. Electrification arrived and the heyday of central power units passed.

Prototype of Today's Pumping Unit

A new icon of oilfield success appeared and was soon known by many names: Donkey, Grasshopper, Horse-head, Thirsty Bird, and Pump-jack, among others.

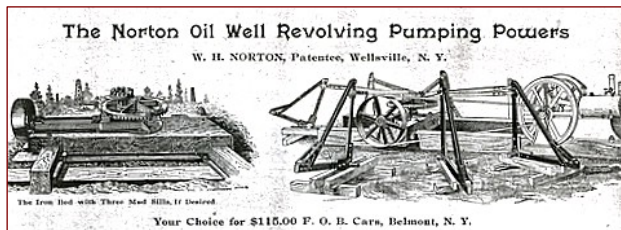
Walter W. Trout was working in Texas for Lufkin Foundry & Machine Company in 1925 when he sketched out his idea for the now familiar counterbalanced oilfield pump jack. Before the end of the year, the prototype was installed and working near Hull, Texas, in a Humble Oil Co. field.

"The well was perfectly balanced, but even with this result, it was such a funny looking, odd thing that it was subject to ridicule and criticism, and it took a long time, nearly a year, before we could convince many the idea was a good one," Trout explained.



A belt brings power from the engine to “eccentric” cams, which alternately push and pull rod lines to remote pump jacks (a widely used engine manufactured in Franklin, Pa., is in the illustration at left). The historic technology is rare, but still used in several early oil producing states, including Oklahoma, New York and Pennsylvania. A working central-power unit is preserved at the Drake Well Museum in Titusville, Pa.

The modern oil pump (right) resulted from a design by Walter Trout, inventor of “the enclosed worm gear and counter-balanced pumping unit.” Lufkin Industries began in 1902 as a small machine shop in Lufkin, Texas. The earlier Norton Oil Well Revolving Pumping Powers of Wellsville, N.Y. (below) was among the early eccentric wheel systems used to pump multiple wells from a single power source.



Today’s stripper wells still look much like Walter Trout’s original, but they enjoy the reliability and efficiency that 80 more years of evolving technology have produced. It still isn’t easy. Modern low-volume stripper oil and natural gas wells have unique technology and economic concerns, notes the Petroleum Technology Transfer Council (PTTC).

PTTC believes that a key to keeping stripper wells producing and contributing to domestic production is to identify projects that government and industry can co-fund.

The U.S. Department of Energy, Pennsylvania State University and the University of Tulsa today operate the Stripper Well Consortium – “to achieve greater results than individual companies could through collaboration in identifying and funding small R&D oilfield projects.”

The Stripper Well Consortium has produced a documentary, *Independent Oil – Rediscovering America’s Forgotten Wells*. Since its 2005 release, more than 4,000 copies of the 26-minute DVD have been distributed. The documentary was showcased in the New York State Energy Smart Students Program. ▽

Walter Trout’s 1926 patent for a counterbalanced pump still dominates U.S. oilfields. – *Illustration courtesy of the California Dept. of Conservation.*

Editor’s Note – In 1942, a Japanese submarine shelled an oilfield on the California coast, resulting in mass panic but little damage (see “Aliens Attack,” June 2005 *Petroleum Age*). The only casualty was a Lufkin Co. pumping unit, according to Bob Bowman, an East Texas historian and author.

