

The Story of the Tillinghast Machine Shop

By

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Background

Historians tell us that in terms of the quality of light whale oil was superior to petroleum based lamp oil. However, petroleum based lamp oil was much cheaper. After Drake drilled the first well, there was an oil boom in and around Oil City Pennsylvania driven by the huge demand for this new and cheaper lamp oil. Derricks mushroomed all over that part of Pennsylvania. The drilling of the well and pumping of the oil were almost always powered by a steam engine. Steam engines were bought by the thousands to operate these wells. In 1882 the first commercial gas well came on line in Washington County Pennsylvania (Forrest, p. 561). Oil was later discovered in the same area in 1885 (Forrest, p. 560). Thousands of new gas and/or oil wells were drilled and/or operated using steam engines in and around the Washington Pennsylvania area during the 1880s-1890s. By the turn of the century, the McDonald Oil Field in Washington County Pennsylvania was the second largest oil field in the world.

Steam engines had two major drawbacks when used in the oilfield. One, they posed a real fire hazard when the well came in. The oil that gushed out of the ground sometimes was ignited by the fire in the boiler and the whole operation would burn to the ground. The second was much more important. After a while the well required pumping only part of a day. So with a steam engine, the boiler had to be lit, brought up to temperature, and then used to pump for only a while, which could be as short as a few hours. This was a time consuming and expensive method to pump crude.

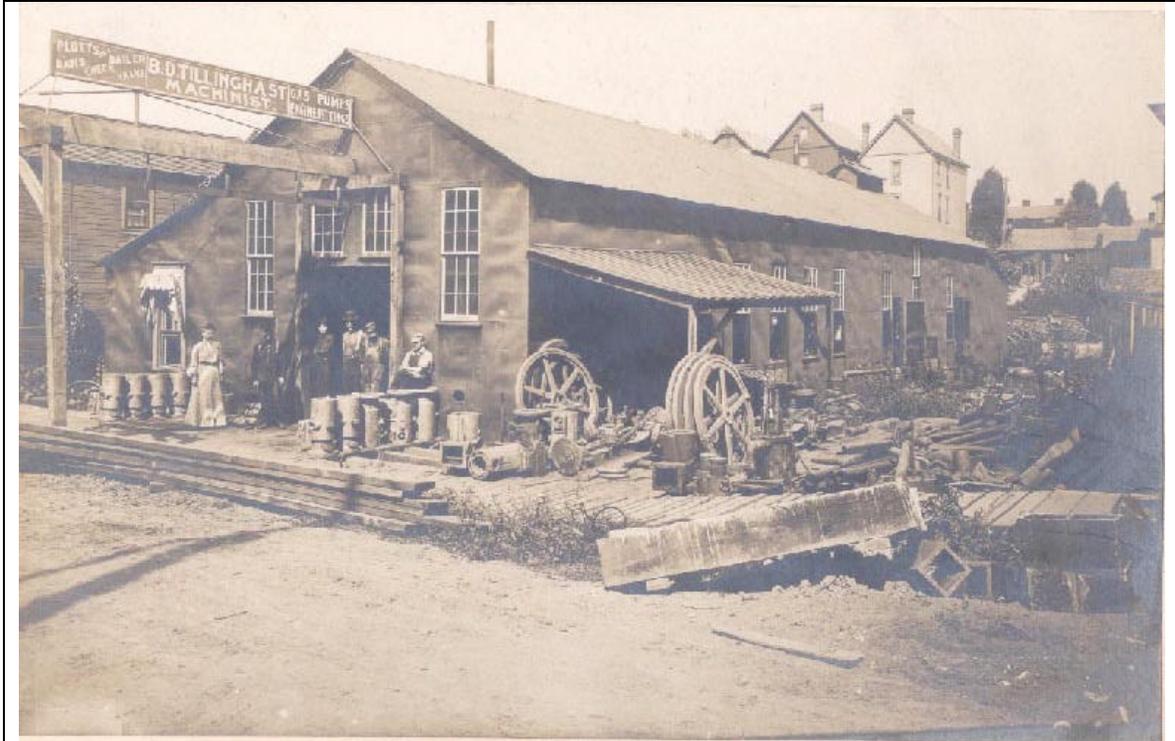
When Otto's patent ran out, firms started to make oil field engines, which did not ignite a gusher and were relatively easy to start and shut down. Best yet, there was an easy and cheap supply of fuel at each of the wells. Natural gas being a byproduct of oil production could be capped and used to fuel a gas engine.

There are many similarities between steam engines and oil field gas engines of that day. Both were about the same size, both had a crankshaft and piston, and both had a large cast iron base. In fact, it was possible to make a gas engine out of a steam engine by simply changing the "top" of the engine. By adding a gas engine cylinder, some sort of carburetion and a governor, a steam engine could be converted

into a gas engine which could then run off of the waste natural gas that came with the crude oil. Several firms started making these conversions which came to be known as a half-breed engines. The Bessemer Gas Engine Company is generally considered to be the first to produce half-breed engines. Misters Fithian and Carruthers were the founders of Bessemer, but much of the credit for using gas engines in the oil fields has to go to Mr. Fithian. Although steam engines can start under load, gas engines cannot. The clutch was therefore necessary to adopt gas engines for this kind of work. Mr. Fithian invented the clutch used on oil field engines, thus allowing them to be substituted for steam engines. However, many firms produced oil field engines, among these was the Tillinghast Machine Shop.

The End

B. D. Tillinghast, who was eleven when President Lincoln was assassinated, died in 1945 at the age of 89. At that time Tillinghast's middle grandson, Donal Galbraith, was on a supply aircraft carrier in the Pacific fighting the Japanese. While Donal Galbraith was serving in WWII, relatives of B. D. Tillinghast had convinced him to shut down the machine shop and use the building to house a frozen food warehouse. When the machinery was removed from the old shop, almost all of the papers, accounting records, and photographs of the Tillinghast Machine Shop were thrown away. After the war when Donal Galbraith came home he was able to find only a few of the old records at what had become the frozen food warehouse. These consist of twenty or so letters, and less than two dozen pictures, some still on glass plates.



Outside the old Tillinghast shop. Circa 1900.

However, Mr. Galbraith still had his memories of growing up with his grandfather. He talked to us in length about these memories which he admits are from the perspective of a boy toward his grandfather. Because he was a child when B. D. Tillinghast was still alive, the business aspects of B. D. Tillinghast's business is pretty well lost to the past. Regardless, Donal did get to spend a short time working along his grandfather's side prior to going into service.

The Beginning

B. D. Tillinghast started out his career in Oil City Pennsylvania. A graduate of Grove City College majoring in mathematics, he and his partner ran a machine shop servicing the oil industry there in 1883. In 1892, he came to McDonald, Pennsylvania to set up his own machine shop. At that time the oil field in Washington/McDonald was the second largest oil field in the world. His "shop" (by 19th century standards was really a small factory) specialized in servicing the oil fields in and around the Washington/McDonald area. As his business expanded, his shop started building half-breed engines, compressors, and some mining equipment for the coal industry. His shop also "repaired mine, mill, and oil

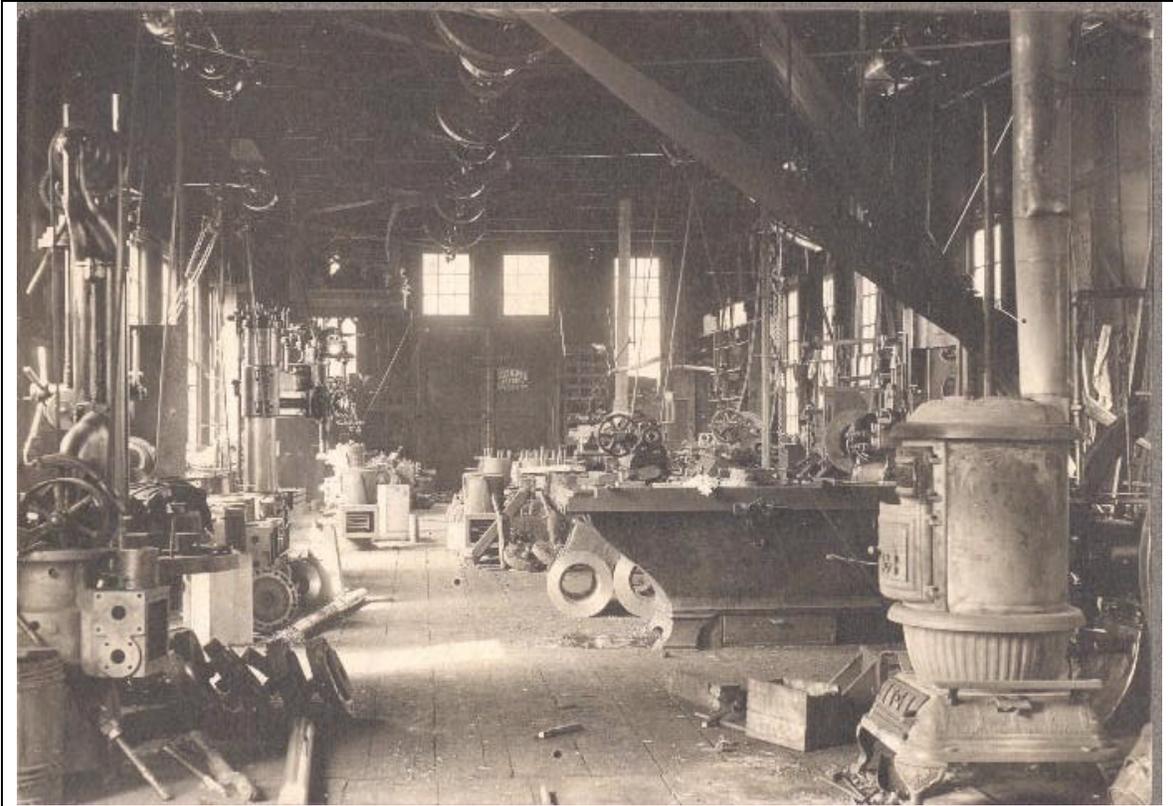
well machinery.” It also handled “new and secondhand machinery and engine fittings of all kinds”(McFarland, p. 445). However, B. D. Tillinghast became famous mainly for half-breed engines and compressors. The firm’s market eventually grew to include the entire nation including Texas and California.



Picture of B.D. Tillinghast and his employees in front of the Machine shop, circa 1905. Tillinghast is the man with the Derby (third from left)

The Productive Years

Although the records of the company are all but missing, we have put together what information we can. It appears that the Tillinghast Machine Shop produced two different kinds of half-breed engines. One was his own design and the other he built for D. C. & U. Although no accounting records are left, most of the photographs that are left show the production of D. C. & U. engines being made. The Tillinghast Machine Shop was the principal partner of D. C. & U. (McFarland, p.445).



View inside the Tillinghast Machine shop. Circa 1900. Note the many D.C. & U cylinders prepped for fabrication.

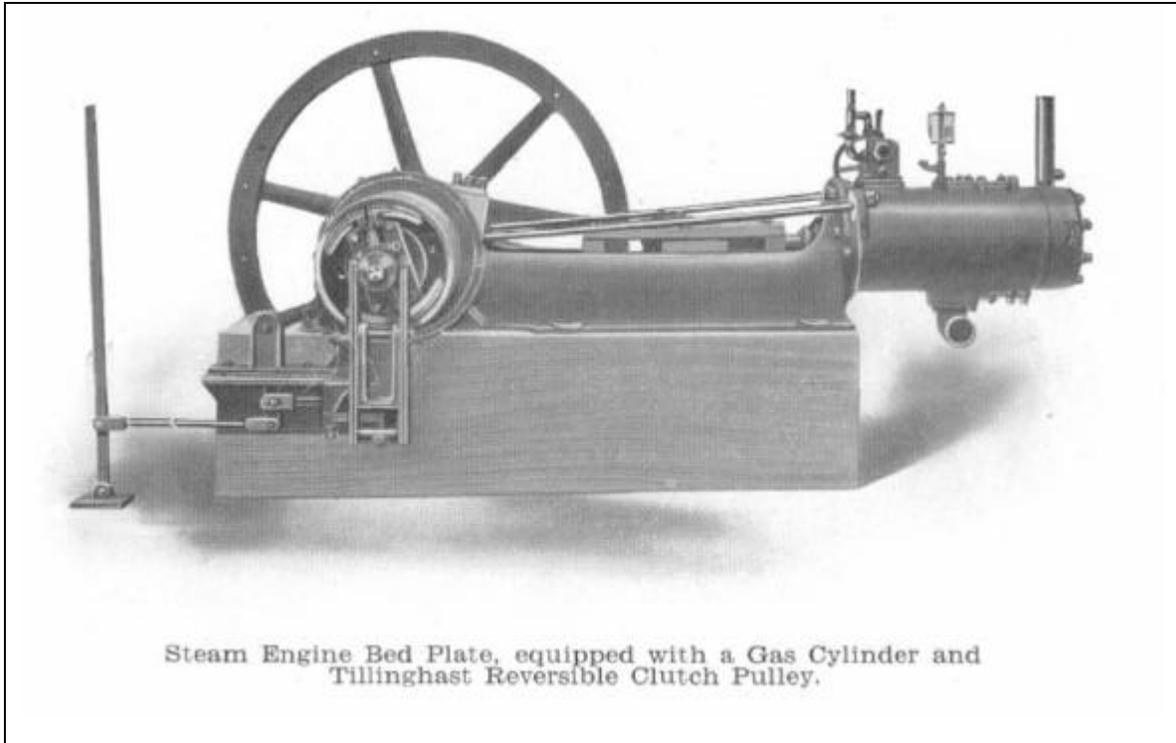
D. C. & U. are the initials of three men, Gustave Dahlberg, Jacob Clicquenois, and Ernest Uhlin. These three men held two 1899 patents (patent numbers 63338 and 63339) on their engine. The engine was of a very unusual design. The D. C. & U. engines could run either on natural gas or steam. They were half-breed engines which maximized flexibility for the operator of the well. As it turns out, gas at the well head was not always a dependable source of power. Sometimes there was not enough natural gas built up to run a gas engine. In that case the operator could fire up the boiler and use it to power the well. Furthermore, according to a Tillinghast advertisement, there were some things that a steam engine could do better than a gas engine. These were, “pulling tubing and rods and for cleaning out.”

The D. C. & U. engine was a half-breed. It mounted on the front of a steam engine. Here is what the B. D. Tillinghast advertisement had to say:

“The D. C. & U. Convertible Cylinder can be attached directly to the bed plate of any standard oil company steam engine. It is installed by simply removing the steam cylinder and putting the D. C. & U. in its place. The engine pulley is replaced with a one-way clutch.

Because of the lack of company records, it is impossible to tell how many of these engines were produced by the Tillinghast Machine Shop. However we do know that in the surviving pictures, many of the engines shown are D. C. & U.s. We also know that the shop was very busy. From a 1900 article in the local paper, we know that the shop was producing at or near capacity. For example one of the things that the article stated was, "A carload has been ordered to be shipped to Indian Territory." McFarland, also tells us that B. D. Tillinghast had fourteen full time employees in 1908. And finally we know that the Tillinghast Machine Shop produced D. C. & U.s for over twenty years (This comes from a Tillinghast advertisement). Given all of that, we estimate that thousands of D. C. & U.s were produced. It is interesting to note here that of the surviving engines in the Washington/McDonald area oil field, neither of the authors has ever seen a D. C. & U. engine in the field. However, there is a surviving D. C. & U. engine at the Coolspring Power Museum.

The Tillinghast Machine Shop also produced its own brand of half-breed engine. It was, of course, the B. D. Tillinghast engine. Although there are many remaining examples, little is known about how many of these engines were made. There are no production records remaining for the Tillinghast company and Donal Galbraith has no knowledge (He was not even born when most of the production took place) of how many engines of either type were produced. This like many other facets of the company is simply lost in the past. However, we can tell from the remaining sales literature that these engines had many practical uses and many satisfied customers.



Early advertisements of the B. D Tillinghast gas cylinder states the following:

Tillinghast gas cylinders for steam engine bed plates are made to meet the real need for an economical oil country gas engine. They are built for use on bed plates of any standard oil country steam engine. One of these cylinders allows an operator, at a small cost, to quickly and easily convert an old steam engine into a strong, dependable gas engine. With the addition of the Tillinghast reversible pulley, he can make the old steam engine a reverse geared gas engine. An engine that will give the same service and be equal in every essential, to any reverse geared gas engine on the market.

In replacing the old steam engine the Tillinghast Gas Cylinder eliminates coal bills and boiler repairs, and saves considerable of the investment in line pipe. There are no shut-downs because of scarcity of water. It keeps the well pumping. It is an economical, successful, convenient method of operating the well.

Throughout the oil country, there are many wells still using steam power, with all its expense and inconvenience, because their production is not large enough to warrant the heavy cost of a new gas

engine. Tillinghast Gas cylinders offer the opportunity to change these wells to gas power at a very small cost.

The Tillinghast Gas Cylinder and a Reversible pulley attached to a steam engine bed plate performs every necessary operation in connection with a producing well. It pumps, pulls tubing and rods, it is used for cleaning out and pulling casing when necessary. It does its work just as effeciently as any reverse geared gas engine, no matter what it cost.

When installing a Tillinghast outfit it is necessary only to take off the steam cylinder and replace it with the gas cylinder; remove the belt pulley and put on the Reversible Pulley. The engine block is not disturbed, as the reversible pulley lines up with the band wheel without moving the block from its original position. This means a big savings in the cost and labor of installing.

Tillinghast Gas Cylinders are not to be compared to the poorly constructed, low-powered gas cylinders that flooded the oil country in the early days of gas power. These early cylinders were made in small sizes only, and while suitable for pumping, they had not the power necessary to cope with cleaning and pulling out operations.

Tillinghast gas cylinders are made in sizes of 10 to 25 HP. When installing these cylinders the bed plate is trussed by two rods extending from the front end of the bed plate to the lugs cast on the flange of the cylinder, as shown in the illustration. These truss rods permit the use of high powered gas cylinders, as they strengthen the bed plate far beyond any possibility of breaking. They make Tillinghast Gas Cylinders suitable for wells of all depths. In fact, they are meeting with unqualified success on wells 3,600 feet deep. They are a practical, common sense equipment for any lease.

These cylinders are of the popular two-cycle type, having a power impulse at each revolution. In most two-cycle engines the metal between the intake and exhaust ports, known as the "bridges," cut out rapidly and makes reboring frequently necessary. In the Tillinghast Gas Cylinder these bridges are so pro-ported that they wear no faster than the rest of the cylinder wall. Reboring because of worn or cut bridges is unknown in a Tillinghast Cylinder, a feature that helps make these cylinders the most economical and durable in the operation of your lease.

Throughout all Tillinghast Gas Cylinders you will find a durability of construction that gives strength and stability. They are made of a special hard, close mixture of iron that assures long wear. They are free from all complicated parts, and give unfailing service with but little care or attention.

The use of jigs and special fixtures in machining insures the absolute interchangeability of every part.

Each Tillinghast Gas Cylinder undergoes a through test in the hands of skilled mechanics before it leaves our shops.

All studs on the cylinder are one size larger than ordinarily used. This saves the annoyance and delay caused by broken studs.

Large roomy Hand Holes for cleaning out the water jackets are a convenient feature of all Tillinghast Gas Cylinders.

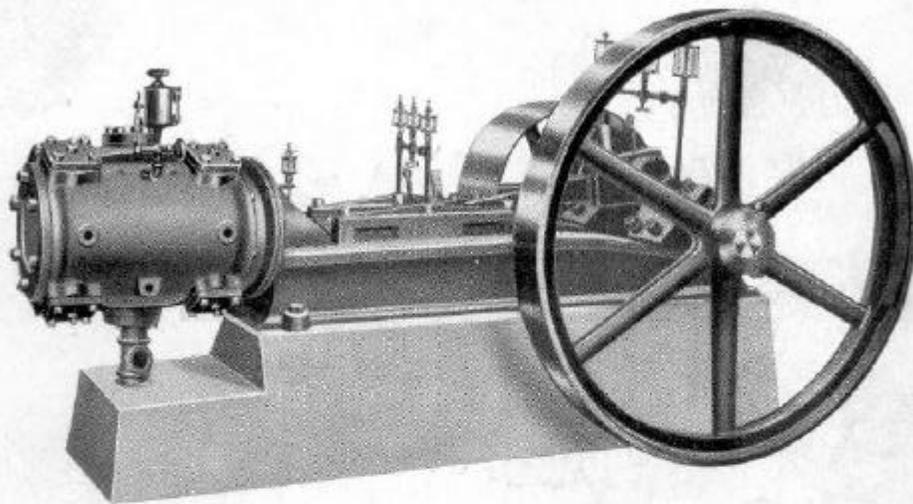
Either Hot Tube or Electrical Ignition is furnished, as ordered.

These cylinders are not new nor experimental in any sense. Hundreds are in constant operation, covering a period of nine to ten years, and are used by some of the largest operators and in the deepest territory.

On wells where frequent pulling is not necessary, or in shallow territory, the cylinder can be furnished with a One-Way Clutch at a considerably lower cost than the Reversible Pulley outfit.

Tillinghast compressors were also known in the oilfield. The next photo shows an advertisement from one of his flyers.

The *New Improved* **TILLINGHAST COMPRESSOR**



SIZES

Two Stage	12x6x12	9x4½x12	6x4x12
Single Stage	12x12	9x12	6x12 4½x12

For Repressuring Oil Sands—Pumping Gas into High Pressure Lines—Gasoline Plants—Vacuum Pumps.

Every feature that makes for efficiency, economy and durability is incorporated in the New Tillinghast Compressor.

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- 1 Plate valves of stainless steel. Light and noiseless.
 - 2 Large air passages permitting the free, unrestricted flow of air.
 - 3 Valves easily accessible with an ordinary wrench.
 - 4 Ample water jacketing provides extra large cooling space.
 - 5 Wide one piece piston head reduces cylinder wear.
 - 6 Step-cut rings re-turned to a perfect circle.
 - 7 The very minimum of clearance space at cylinder ends.
 - 8 All parts interchangeable and readily accessible.

Manufactured by

B. D. TILLINGHAST

McDonald, Pa.

Manufacturing specialties and machinery for the oil country since 1892

Conclusion

In order to be successful in that era, an owner of an engine company had to be a smart businessman, a creative craftsman, and an engineer. B. D. Tillinghast was all of these. He specialized in the production, repair and sales of oil, gas and coal equipment. Of the many things his machine shop produced, he is most famous for engines and compressors, although he produced many other devices for the oil, gas and coal industries. What type of equipment and how much was made is not known. We believe he made thousands upon thousands of engines, some of which were D. C. & U.s, and some of which were the Tillinghast Gas Cylinders of his own design.

Donal Galbraith's recollection of his grandfather as a man is most revealing. He remembers B. D. Tillinghast as a man of honor. He tells one story of an accountant for the Tillinghast Machine Shop stealing \$40,000. B. D. Tillinghast fired the man, did not report this incident to the police, and never told anyone outside of the family what had happened. When asked about the ex-accountant, B. D. Tillinghast would say, "he is a good man, but you need to watch over him." He also remembers his grandfather as a man of humor, something which does not show up in his photograph. Mr. Galbraith said that when it came time to take a picture, they would be sitting around laughing and when the photographer said that he was going to snap the picture, all their faces would go dour. Finally Donal remembers him as a loving grandfather.



Donal Galbraith and his Barrett Dyer Stand in front of a restored Tillinghast Gas Engine

Often times when we view our engines we see only the engineering. But there is much more to it than that. There were the men who made them, their ideas and their businesses. In going from the 19th to the 20th Century, we see in B. D. Tillinghast much of what the 19th Century held as a successful businessman. A man who primarily thinks of himself as a craftsman and all that that entails. As he moved into the 20th Century he adopted to a more engineering approach, the approach that we all accept as common today. B. D. Tillinghast was an exceptional man who made a real positive impact on our hobby. It is truly a shame that so much of what he did is forgotten and will remain forever lost in the past.

References:

Earle R. Forrest, History of Washington County Pennsylvania, Clarke Publishing Company, Chicago, 1926.

McFarland, Twentieth Century History of the City of Washington and Washington County Pennsylvania and Representative Citizens, Richmond-Arnold Publishing Company, Chicago, 1910.