The First Steam Engine in New England

The Cranston Ore Beds at the northwest corner of Phenix Ave and Hope Rd are a 10-minute walk from my house. As kids, we used to ice skate there on the mine where ore was extracted. The history of the ore beds starts in 1740 when Israel Wilkinson, a Smithfield farmer, built the Amity iron smelter in Cumberland Hill in what is now Manville on the Blackstone River. He mined iron from Glocester and Diamond Hill. The furnace made pig iron and iron bar. Although successful, the titanium in the ore made it difficult and refractory to process.

In 1765, a large deposit of bog iron was discovered in Cranston. Israel Wilkinson arraigned to pay John Burlingame 3£ and a promise of 6d per ton of ore extracted. He them formed a partnership with several members of the Brown family and Stephen Hopkins. A furnace was built nearby along with workers housing. The furnace was operated for 2 years but then abandoned because of lack of waterpower and a new furnace was built four miles west in Scituate where power was more plentiful. The new furnace was named Hope after the daughter of one of the partners. Ore was dug at the beds, partly by slaves, and transported to Hope by oxen. As the ore bed mine became deeper water became a serious problem and in 1780, as John Brown had a large contract for producing cannons, Peter Curtenius of New York was hired to build a steam engine to pump the water, the first in New England and only the 3rd in America. A French officer stationed in RI had trained the workmen in the art of casting and boring cannon and this experience was used to make the engine cylinder.

The engine was based on an invention of Thomas Newcommen, an English iron merchant who in 1712 devised a machine to pump water out of the deep mines in England. It is more correctly called an atmospheric engine because it uses atmospheric pressure to push a piston when condensing steam on the other side of the piston creates a vacuum. The boiler, which provides the steam, operates at just slightly above atmospheric pressure. Although these engines were very inefficient, they did the job. Engine builders exploited materials that were available at the time. The Cranston boiler was essentially a gigantic copper teakettle.

The engine had a beam 4' wide by 20' long, made from an oak tree, and pumped 7 hogsheads of water per minute from a mine 80' deep and 23' wide. It used 2 cords of wood per day and ran automatically. The Browns sold the Hope furnace in 1805 but records state the Hope furnace ran until about 1855. A Newcommen engine can be seen at the Ford museum in Detroit and an interesting video can be seen by Googling "Discovery Channel Newcommen"

Improvements in efficiencies had to wait for a better understanding of the steam cycle and better materials. The first major improvement was by James Watt who invented the separate condenser and used higher steam pressure. This improved the efficiency from 1% to 3% cutting fuel use by 2/3rds. The next great invention was by George Corliss that allowed the governor to control the amount of steam admitted to the engine cylinder. This coupled with the use of higher steam pressures cut steam consumption by another 2/3rds. Israel Wilkinson ultimately sold his tools in 1790 to his relative Oziel Wilkinson who had set up shop in Pawtucket. Oziel's son, David, made the first cotton mill equipment based on the design supplied by Samuel Slater in 1792.

In 1792, David and Elijah Ormsbee fitted out the boat Abigail with a Newcommen type engine created by borrowing a 200 gallon copper still to use as the boiler and making a home made cylinder. In a trial, the boat travelled 3 to 4 miles on Narragansett Bay from Providence to Weaver's cove and back. Although they eventually abandoned the boat, Robert Fulton did visit them and perhaps their concepts helped him to create his own ideas that were ultimately successful.

We can be very proud of this energetic craftsman who learned from the latest developments of their time and thought ahead to help themselves and their people prosper. It wasn't easy, no materials were handy, little science was known, but they persevered and made a success of their adventures.

Fred Jaggi

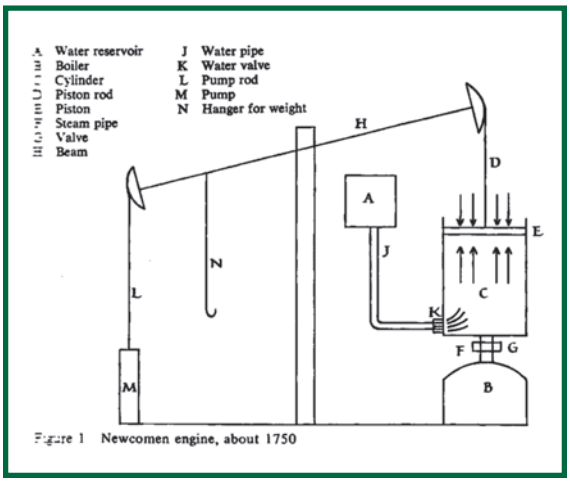

Figure 1 Newcomen engine, about 1750

2014 Carol Sing

Our museum's traditional CAROL SING will take place from 5 to 6 PM on Sunday Dec. 14. Mr. James Essex will lead the singing. Mrs. Bonnie Smith will play the Hammond organ and your lusty voices will do the singing. Afterwards we will gather in the front for Christmas cookies, mulled cider, Christmas punch etc. Come join us and share your Christmas cheer with us.

Merry Christmas,
Bob Merriam

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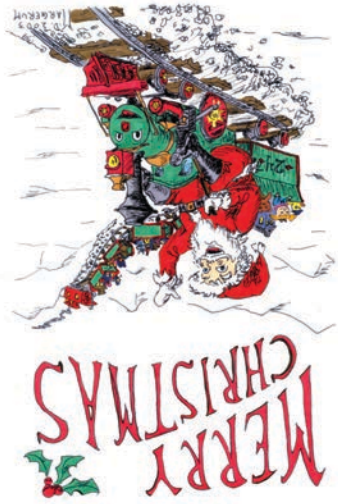

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