Pine Grove Furnace and the American Revolution

Iron as a spark for the Revolution

In the decades before the American colonies fought for independence, Great Britain tried to promote the interests of iron manufacturers in the mother country by restricting specific aspects of iron production on the opposite shore of the Atlantic. This was not a ban on all ironworks: the colonies were in fact *encouraged* to produce pig iron and bars of wrought iron, which could be sent to Great Britain, transformed into finished (more expensive) products, then exported back across the ocean.

Iron furnaces such as Pine Grove (which started operations perhaps in the 1770s), making pig iron for this trans-Atlantic exchange, were not illegal. The furnace was sited in the remote mountains because that's where raw materials were to be found: iron ore, limestone, trees for charcoal, and water power off the steep mountainside. The furnace was not being hidden from government agents, as is sometimes mistakenly claimed.

As summarized in *Wikipedia*, "the **Iron Act of 1750** was one of the legislative measures introduced by the British Parliament [going back almost a century], seeking to restrict manufacturing activities in British colonies, particularly in North America, and encourage manufacture to take place in Great Britain… The Act was designed to restrict the colonial manufacture of finished iron products and steel. Existing works could continue in operation, but no expansion would be possible in the output of… knives, scythes, sickles and other edged tools… nor a steel furnace to make steel [but very little steel was produced in that era]…" nor nails and some other non-ferrous metal products. "This was a continuation of a long term British policy, beginning with the British Navigation Acts, which were designed to direct most American trade to England and to encourage the manufacture of goods for export" back to the colonies. This was part of the economic theory of *Mercantilism*.

The Iron Act of 1750 and its predecessors were poorly enforced. Nonetheless, the restrictions angered American ironmasters and other businessmen. It should come as no surprise that many ironmasters were supporters of the Revolution. Among them was Michael Ege, who became a part owner of this furnace near the end of the struggle for independence. Eventually the full owner of four furnaces including Pine Grove, he was a wealthy man when he died in 1815. Michael Ege's patriotism was described in a local obituary as follows:

> "For this country he felt all that zeal and warmth of attachment which exalts the citizen into the patriot; and his country's confidence in him was attested by the commission he held in the army of the militia during the revolutionary war for asserting the liberties and independence of the states."
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> (*Klines Weekly Carlisle Gazette*, September 6, 1815)

Pine Grove Furnace contributes to the fight for independence

All of this region's furnaces contributed to the Revolution. The following comes from the book *Beyond Philadelphia: The American Revolution in the Pennsylvania Hinterland* edited by John B. Frantz and William Pencak, Penn State University Press, 1998. Excerpt from Chapter 6, "Cumberland County" by Robert G. Crist:

> "In late 1776, Washington directed the opening of an artillery school at Carlisle, probably the first in the American army. Stored there were ordinance as big as 9-inch mortars and 24-pound cannon. At least four furnaces were part of the operation. Producing iron pigs was the Mary Ann furnace, run by the three brothers-in-law, George Ross, George Stevenson, and William Thompson… …The Boiling Springs furnace made cannon castings, Mount Holly bored cannon, and **Pine Grove produced cannon-balls and shot.** A boring mill at the works using LeTort spring power manufactured cannon of up to 3,000 pounds.
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> "It is not hyperbole to suggest Carlisle ranked near the top of the list of important ordinance and quartermaster bases in America."

Note that cannons were generally described by the weight of cannonball they fired, hence the "24-pound cannon" described above weighed several thousand pounds.

As noted above, ironworks in this area of Pennsylvania aided the Revolution by supplying a wide range of critical material. However, the manufacture of cannons was limited to the Carlisle Furnace in Boiling Springs (1st step, casting) and the Mount Holly Ironworks (2nd step, boring). Pine Grove Furnace did not make cannons.

This furnace did make tons of ammunition for the rebel army. An order in 1781 mentioned 8- and 10-inch shells and 18- and 24-pound shot. It has been suggested that some of the projectiles made at Pine Grove Furnace were used in the final battle of the Revolution, at Yorktown, based on purchase dates.

Charcoal from Pine Grove Furnace was supplied to "Washingtonburg," the revolutionary armory in Carlisle described above (today the Carlisle Barracks and U.S. Army War College). This was for the purpose of making steel from wrought iron. In that era, steel could only be made in small quantities, and was not produced at the local ironworks. This business interaction between Pine Grove Furnace and the new armory at Washingtonburg was likely arranged by George Stevenson, a former owner of the Pine Grove Furnace property (from 1762 to 1772). Stevenson was closely involved in managing the new armory in Carlisle. See *George Stevenson (1718-1783), Conservative as Revolutionary* by Roland Baumann (paper written 1976, published as a pamphlet by the Cumberland County Historical Society in 1978).

Background on making cannons

The following is not directly relevant to Pine Grove Furnace but may be of interest.

Cannons at the time of the American Revolution were made of either iron or bronze. Iron cannons often had thicker walls (and were thus much heavier) than an equivalent bronze cannon meant to shoot the same size projectile the same distance. Iron is more brittle than bronze, hence a thicker wall was needed to avoid rupture during the shock of firing the weapon. Due to their weight, iron cannons tended to be used for fixed positions such as forts or ships (though maritime environments meant faster rust!).

Why bother with iron? One reason was that the materials for making bronze cannons were harder to obtain than iron. On the other hand, bronze has a lower melting point and the metal could be remelted and recycled, something not practical to do with cast iron at that time. Also, financial considerations were important. Bronze cannons were considerably more expensive. Even the British, with the mightiest military at the time, used both iron and bronze cannons. It has been estimated that during the American Revolution about half the British cannons were bronze, half iron.

Iron cannons generally were cast with the hole down the center smaller than needed, then carefully bored to the actual projectile dimension. Less often, wrought iron was welded together, as described below. See www.melfisher.org/cannonsurvey/forgedguns.htm and www.melfisher.org/cannonsurvey/castguns.htm for a description of the process for each type of iron cannon. Making iron cannons was a very difficult job, and Americans with the required skills were few and far between. Thus, not every iron furnace could produce them!

Denning and wrought iron cannons

Another effort at iron cannon production in Cumberland County was by "Colonel" William Denning (sometimes spelled Dunning) of modern Pennsylvania State Park fame:

> "A well-known craftsman named William Dunning made 2 very successfully wrought iron cannon (and started but never completed a 3rd) at the Mount Holly iron works and forge, indeed one of his cannon was captured by the British at Brandywine. Dunning lived in Newville after the Revolution, died 1830 aged 93 years."

The reason to attempt to make an artillery piece of **wrought iron** welded together (instead of a conventional cast of pig iron) is that the resulting cannon required less metal and hence was lighter. Wrought iron is much less brittle than cast iron, and tends to bend rather than break under stress. The walls of the piece could therefore be thinner.

Denning's cemetery monument in Newville includes a carving of one of his cannons. It is indicative of how hard it was to make a wrought iron cannon that this accomplishment was included on his grave marker.

Photo from www.pajack.com/stories/pennsylvania/williamdenning.html

For more information see www.dcnr.state.pa.us/stateparks/thingstoknow/history/lifeofdenning/index.htm. Also see *Forges and Furnaces in the Province of Pennsylvania* (National Society of the Colonial Dames of America, 1914) page 174, available online via *Google Books*.