



Haverford Township Historical Society



NITRE HALL GUNPOWDER WORKS

By George H. Gibson

[Mr. Gibson, Research Assistant at the Eleutherian Mills, Hagley Foundation of Greenville, Wilmington, Delaware, prepared this paper and a presentation in 1963 for the Haverford Township Historical Society. The presentation and paper were based on research in the archival materials at the Hagley Foundation (DuPont), so it is to be somewhat expected that Mr. du Pont would have believed, and repeatedly stated, that all other gunpowder products were inferior to his own product. Gibson's spelling of "Wheelen" has been changed here to "Whelen," the way Israel Whelen himself signed his name.]

The Nitre Hall Gunpowder Mills existed in an important period for the gunpowder industry of America. They were built on Cobb's Creek, Haverford Township, Delaware County, Pennsylvania, shortly after 1800 and ceased operations about 1840.¹ The period from 1800 to 1850 was a transitional period for the industry, and the Nitre Hall Company was a good example of a mill trying to meet the changes and demands of the period.

There were many developments in this transitional period. The market for gunpowder changed from local to national. The United States imported powder from Europe during the first part of the period and was exporting powder to many countries at the end of the period. The uses of powder shifted from military and hunting to mining and engineering as well. Rule of thumb production techniques changed to precise scientific methods. New equipment outmoded the old.

According to the census of 1810, the first to include statistics of manufacturing, there were two hundred powder mills in sixteen states. Most of them were insignificant and intermittent in operation. They were operated by an owner and a couple of helpers who made, sold, and delivered the product to the local market. Most made less than a ton a year. One Connecticut mill made only twenty pounds and had a stock value of six dollars. Powder mills were set up wherever there was a demand, water power, and wood for charcoal. There were so many of them because transportation of the powder was hazardous and difficult.

The total national production in 1810 was about 1,500,000 pounds from two hundred mills. Pennsylvania, the state with the second largest production, made 286,000 pounds from twenty mills.

One of these two [hundred] manufactories was Nitre Hall. It was built shortly after 1800 by Israel Whelen. A few years later he formed a partnership with William Rogers, Jr. (sometimes spelling Rodgers), and they conducted the business jointly until Whelen's [Rogers'] death in 1839 or 1840 when the property was sold to Dennis Kelly, a successful manufacturer of cloth.

The best place to begin to describe the process by which gunpowder was made at the Nitre Hall mills is at the homes of the owner and workers. Israel Whelen called his home Nitre Hall. It was located quite close to the powdermaking operations because it was traditional for the owner of powder mills to take

the same risks as his workmen. Whelen owned ten houses, called tenements, which he provided at low rent for his workers. These too were adjacent to the powder yard.

The raw materials for gunpowder are 3/4 saltpeter (niter), 1/8 sulfur, and 1/8 charcoal. Although there were some natural deposits of saltpeter in the United States, most of the saltpeter for the manufacture of gunpowder came from India. Saltpeter was refined by boiling, washing, evaporating, and crystalizing in the Refinery. Sulfur, which came from Sicily, was purified by sublimation probably in the same building.

Charcoal, the only ingredient procured in the United States, was made at the Willow House where willow branches brought in from neighboring farms were peeled, baked, and changed into charcoal.

The ingredients were then pulverized, sifted, and given a preliminary mixing. The hazardous process of incorporating the three ingredients to make gunpowder took place in the Stamping or Pounding Mill. Here twenty-five pounds of ingredients, enough for one keg, were stamped by a pestle in a mortar for fourteen hours. A pear-shaped, thirty-eight pound, copper-shoed pestle pounded the ingredients in a wooden mortar. The Nitre Hall manufactory had two stamping mills in 1810. Each mill had twenty-four sets of mortars and pestles operated by water power. Once an hour workers stopped the action, added water, and stirred the ingredients by hand.

During this operation an explosion destroyed a stamping mill in 1831. Four workers and a superintendent had just finished their hourly check on the mill, and the last man was sweeping up the dust when he noticed another worker take a copper hammer from his pocket and pound on a copper-covered pestle to remove some caked-on powder. There was a spark and an explosion. Two died instantly and two others died from burns in a few hours. The force of the blast destroyed the machinery and the roof, but the superintendent and the thirty-two foot water wheel were protected by the thick walls of the mill.²

Workers removed the wet powder from the mortars and took it to the Press House. There screw presses squeezed much of the water out of the powder. It appeared and felt like slate.

This press cake, as it was called, was broken into pieces with wooden mallets or run between rollers. Workers dampened the pieces and rubbed them through leather sieves perforated for different sizes of grains of powder. The site of this process was the granulating or Graining Mill.

To remove more of the moisture, the powder was spread out on long wooden tables to dry outside in the sun or, as in the case of the Nitre Hall mills, placed on racks in a heated building known as the Dry House.

Sporting powder or other quality powder was further dried by tumbling it in rotating barrels for several hours. At the Barrel Mill or glazing mill the tumbling process created heat, rounded off the grains, and imparted a luster.

The next step was to remove powder dust by sifting through horse hair sieves and bolters. Finally the powder was weighed, put in barrels, kegs, or canisters, and stored in the Magazine. The strength of the gunpowder was tested in a Gunnery.

The quality and reputation of Nitre Hall gunpowder fluctuated considerably. Up to the time of the War of 1812, Nitre Hall powder was produced for local consumption; during the War of 1812 the company

sold all the powder it could possibly make; after the war the Nitre Hall Gunpowder Mills were in a favorable condition to compete successfully in an expanding national market.

Eleuthere Irenee du Pont, owner of a large gunpowder manufacturing company near Wilmington, Delaware, wrote to an agent in Boston in 1813 and said Nitre Hall “powder stands in the market next to ours, which is acknowledged to be Superior by everybody. The Nitre Hall powder will prove upon examination to be very Inferior to ours; the materials are not well mixed and Consequently it makes the guns very dirty.”³ Du Pont’s statements were probably true, for he had been trained by Lavoisier, French chemist and head of the French government monopoly on gunpowder and saltpeter. Careful attention to the purification and incorporation of ingredients would make du Pont’s company successful while the rule of thumb methods used in most other mills would cause them to close.

Apparently the Nitre Hall powder continued to be a strong competition for du Pont, because in 1815 he complained to an agent in Philadelphia that two thousand kegs of powder manufactured chiefly by Whelen and Rogers had been sold in Philadelphia for exportation.⁴ Two years later in writing to an agent in Baltimore du Pont related: “This morning we heard a very large sale of powder has been made in your place by the nitre hall manufactory. We have seen the owner of the said factory, Mr. Israel Whelen who told us that he sold 1600 bags. Mr. W. passes here for being a braging [sic] disposition and may not be candid with us about the price.”⁵

When in the summer of 1817 there was a shortage of du Pont gunpowder in Boston and New York, the Du Pont Company advised its agents to get “the remainder from the Nitre Hall Mills which we regard as the best after our own.”⁶ Competition must have been quite keen between the two companies in Philadelphia in 1817. Du Pont explained to his agents: “As to our prices in Philadelphia we are under an agreement with Mr. Whelen the owner of the Nitre Hall factory not to undersell one another and have agreed not to sell under \$7.50 credit and \$7.20 cash except for very large quantities.”⁷

According to the Census of 1820, the Nitre Hall works employed twenty persons and was valued at \$25,000. The largest production in a single year had been 800,000 pounds during the War of 1812. Annual production since the war had averaged 200,000 pounds and was sold at home and abroad.

In 1821 E. I. du Pont acknowledged that “the Nitre Hall mills [are] the largest after ours.”⁸ The same year he confidentially stated that “the Nitre Hall gunpowder is rather better than the common run from the small manufactories in the country but inferior to ours and irregular in quality.”⁹

On New Year’s Day 1825 the Barrel Mill exploded with no loss of life but considerable loss of property. On November 9, 1825, a large explosion wrecked the Barrel Mill again and destroyed 2,500 pounds of powder. The shock and report were felt and heard in Philadelphia.¹⁰ Also in 1825 Israel Whelen died. Because of the large financial losses and the loss of leadership, the year 1825 marked the beginning of a downward trend for the Nitre Hall company.

By 1830 E. I. du Pont was writing to a New York agent about his erstwhile competitor and saying, “as to Nitre Hall powder we have nothing to apprehend from that quarter, this powder is so inferior to ours that their sales are almost altogether for exportation and at a low price.”¹¹ The next year an explosion destroyed the Stamping Mill and took four lives.

For the next ten years the business declined. Large losses due to explosions sapped the financial strength of the concern, but the most important cause for the decline of the company was lack of technological improvement. When other companies were using large iron rolling wheels to incorporate

the ingredients, the Nitre Hall mills were still using the inefficient stamping mills. When progressive companies were improving the quality and reliability of their product, Nitre Hall was still using old, inexact methods. Nitre Hall gunpowder was no longer competitive and was pushed out of the domestic market.

The gunpowder mills on Cobb's Creek entered the gunpowder business in a transitional period for the industry and held a strong position for many years, but by failing to keep up technologically its position was usurped by more forward-looking concerns. With the death of its owner in 1839 or 1840, the Nitre Hall Gunpowder Mills closed.

NOTES

1. For a discussion of gunpowder mills in general before and during this period and the Nitre Hall Mills in particular, see Arthur Pine Van Gelden and Hugo Schlatter, History of the Explosives Industry in America (New York: Columbia University Press, 1927), pp. 3-107, 81-83.
2. New York Evening Post, July 20, 1831, quoting Philadelphia Party Advertiser.
3. E. I. du Pont to John Hancock, August 26, 1813, "Letter Book 1813-1815," Old Stone Office Records, Eleutherian Mills Historical Library, Wilmington, Delaware.
4. E. I. du Pont to Archibald McCall, March 28, 1815, "Letter Book 1813-1815."
5. E. I. du Pont to Briscoe and Partridge, April 8, 1817, "Letter Book 1815-1817."
6. E. I. du Pont to P.P.F. de Grand, July 29, 1817, and E. I. du Pont to William Cornell, August 24, 1817, "Letter Book 1815-1817."
7. E. I. du Pont to Briscoe and Partridge, September 8, 1817, "Letter Book 1815-1817."
8. E. I. du Pont to Bradford and Cooch, August 13, 1821, "Letter Book 1821-1823."
9. E. I. du Pont to John Vaughan, April 26, 1821, "Letter Book 1821-1823."
10. Wilmington American Watchman and Delaware Advertiser, November 11, 1825, quoting Philadelphia Democratic Press.
11. E. I. du Pont to Smith and Town, April 25, 1830, "Letter Book 1829-1831."

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