

A Survey of 19th Century Iron Industry in Lancaster County

BY JACK WARD WILLSON LOOSE

The romance of eighteenth century iron industry has appealed to many historians, novelists and artists. Mention of this dramatic enterprise immediately suggests lovely stone mansions surrounded, plantation-wise, by servants' quarters, household auxiliaries, stables, carriage-houses, and within view, the massive stone stack of the furnace and its related structures. The ironmaster, resolute and heroic in his role as lord, proprietor and leader — benevolent or villainous, with his gracious lady brought to the activity an air of elegance and aristocracy. Fortunes were made and lost in a blaze of excitement. This was the scene in which we usually find the early Grubbs, Colemans, and the fabulous Baron Stiegel.

That the energies of historians and writers should have been exhausted in the century of our Republic's birth seems imprudent. Not until iron- and steel-making became "big business" in the latter part of the nineteenth century did an air of drama once more surround the blast furnace—and then from the perspective of the financier's ornate Victorian drawing room! Let us then consider the period of iron industry in Lancaster County between the Panic of 1837 and the Revulsion of 1884—The Anthracite Furnace Period.

The ironmaster of this time more likely was a fairly modest businessman who was sufficiently adventurous to stake his or another person's fortune on the least stable industry, and who would not hesitate to enter the political arena to protect his

interests. Frequently the "ironmaster" was a group of investors located in Philadelphia or New York; their manager operated the iron works, hired the employees, and returned the profit when any was earned. Of the later furnaces in our county, those at Marietta retained more than others the master-employee relationship typical of the early iron plantations.

Iron industry in the nineteenth century consistently and alternately flourished and withered in response to enactments and reductions of protective tariffs. Continuation of tariffs was a matter of grave concern to the ironmasters. To pursue this policy the protectionist element of the Democratic Party gradually deserted the predominant Jacksonian faction, throwing support to the Whigs and Republicans. Pennsylvania was the center of the tariff struggle; a protectionist convention in Harrisburg in 1827 attempted to solve the intra-party problem.

The charcoal cold-blast furnaces which characterized Lancaster County as the "Eighteenth Century Pittsburgh" continued to produce iron well into the nineteenth century despite the rising costs and increasing scarcity of forests from which charcoal was made. In 1885 a ton of anthracite iron cost \$19.17 while charcoal iron cost \$20.41 per ton. Labor costs were \$13.95 and \$15.25, respectively, or 73 to 74 per cent. A ton of foreign iron could be delivered dockside at \$10.45, or less than the labor cost in America. Freight from Glasgow to New York per ton of iron was 50 cents, and the duty was \$6.72, or a total of \$17.67 on the New York dock. The foregoing data, issued by the American Iron & Steel Association in Philadelphia in November, 1885, was compiled as an argument for increased duties.

The use of charcoal was not without its benefits, for vast areas of land were thus cleared for agricultural purposes. Charcoal iron was quite desirable for boilermaking; its resistance to sulphur attack in the burning of bituminous coal created a demand for this iron long after anthracite iron was available.

To overcome the increasing costs and foreign competition, and to meet the exigencies of general economic conditions, technological improvements were essential. Although the ironmasters could not control effectively the tariff legislation nor the rising costs of labor, they could seek new ways to reduce the cost of production, especially by increasing production while using less

labor and fuel. The introduction of the hot blast and anthracite coal fuel in the late 1830's made possible great economies in production. However, these changes were costly to effect, and before sufficient capital and confidence could be acquired, the Panic of 1837 struck the industry.

The rapid construction of canals and railways, creation of too many banks, President Jackson's Specie Circular, distribution of surplus revenue amongst the states, and lowering of duties in the 1833 tariff all contributed to a serious depression beginning with the Panic of 1837.

According to A. M. Provost, quoted by J. B. Pearse,¹ Lancaster County had in 1833 five charcoal furnaces, which produced 5000 tons of pig iron; two rolling mills which rolled 500 tons of bar iron each; and eleven forges which hammered out 2350 tons of blooms. Actually, only three furnaces and one rolling mill were in Lancaster County. In 1840, a corrected account by the same authority lists eleven forges, three furnaces and one rolling mill. The furnaces were the Colebrook, Elizabeth and Mount Hope; the rolling mill was the Coleman works at Martic.

The market for pig iron was quite unstable, especially in early 1837. Simon Cameron's correspondence with his partner, Thomas McNair, revealed that in October, 1837, pig iron sold for \$35 per ton in Pittsburgh.² Despite the market conditions, prudent ironmasters kept large inventories of pig iron on hand for rapid movement whenever the price became proper.

The following letter from Eckert and Stine's factors in Baltimore, dated 1852, depicts the iron market at that time:

Baltimore, Sept. 21, 1852

Messrs. Eckert & Stine [Donegal Furnace]

Marietta, Pa.

Gentlemen

Please send us a boat load of your No. 1 and a load of No. 2 Pig Metal, and about half a load of No. 2 B — We are entirely out of your iron, and will send account of sales in a day or two, or as soon as the iron is taken from our yard.

The nominal price has got up to \$22 for No. 2 and \$24 for No. 1 — but sales are made at less than that. We suppose those prices may be realized before long, but as there is no certainty of it, have preferred to sell at the actual going rate rather than hold iron a little above the reach

¹ John B. Pearse, *Iron Manufacture*, p. 220.

² James B. McNair, *Cameron's Adventure in Iron*, p. 48.

of buyers. We sold your No. 1 iron today at \$23 and No. 2 at \$21½, and shall try hard to get a dollar more for the next we receive.

Scotch Pig No. 1 we see is quoted in New York at \$25, but we had it offered us today here at \$23½. The price of Scotch Iron however is not much criterion for Am [erican] Iron, being sometimes much above and then much below, according to relative supply.

Respy. Yours,

Ballord, Chadbowren & Co.

By saving both honor and the economic life of Pennsylvania in 1841, Governor David R. Porter brought about an economic and industrial rebirth during which time the iron industry gradually adopted the technological improvements. The tariff of 1842 provided the impetus which caused the number of anthracite furnaces to double. In 1846 the duties were altered thereby resulting in a slight drop in furnace construction. The new tariff was not harmful to domestic manufacturing as had been feared, and before long the iron industry was enjoying a period of considerable prosperity which lasted until 1855.

The Hot Blast

Prior to the introduction of the hot blast in 1838, which had been developed ten years previously by Neilson, blast furnaces were operated by cold blast which worked satisfactorily with charcoal. Not only was the efficiency of the furnace increased with a blast of heated air, but anthracite fuel could be used with excellent results. While reducing the consumption of fuel in half, the use of hot blast increased production up to 50 per cent. The hot gases leaving the stack were collected and passed through tubes or stoves, and boilers; this heat was transferred to the air blown into the base of the furnace, through the tuyeres. The blast originally was produced by huge bellows, and later by blowing tubs or blowing engines. It is to be remembered that the hot exhaust gasses cannot be used for the actual blast—only the heat of those gases can be used to heat a fresh air blast.

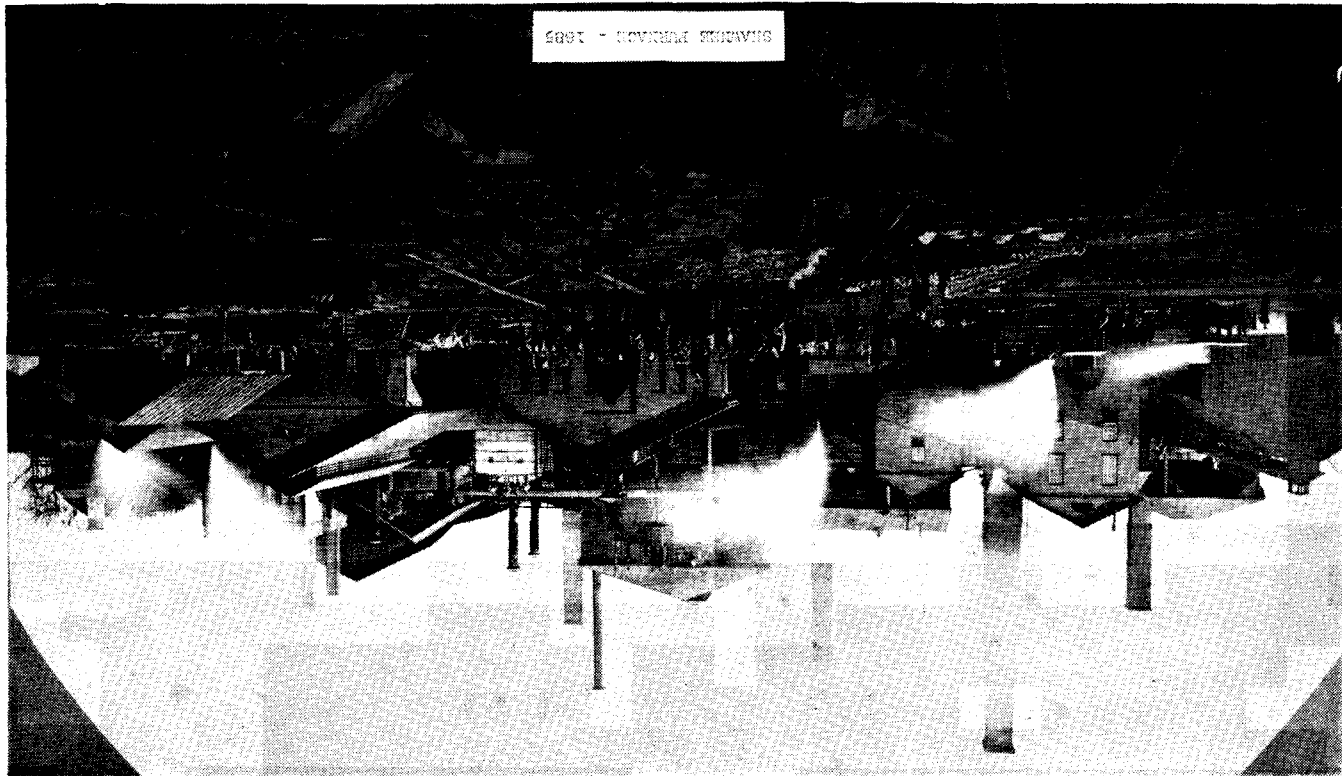
Anthracite coal was available in abundance, and was easily transported at low freight rates by canal to the furnaces of Lancaster County. The steady growth of canals and railroads lowered the cost of iron production; the railroads also provided a market because iron was used extensively in railway-building.

In Lancaster County the first furnace to employ the hot blast and anthracite coal was that of the Shawnee in Columbia.

This furnace, consisting of a stack, 46 feet high and 16 feet across the boshes, was built in 1844 by Robert and James Colvin. It was located north of Shawnee Run, and south of Union Street, between Fifth and Sixth streets. Insufficient capital compelled the owners to yield the furnace to James Myers and a Mr. Holmes in 1846 who were no more successful. Archibald Wright and Nephew succeeded operating the furnace, and in 1854 a second furnace, also 46 x 16, was erected. In 1851 five financiers, including August Belmont, from New York; Simon Cameron, Samuel Schoch, Jacob M. Haldeman, James Mehaffey, Philip Dougherty, Dr. Edwin Haldeman, George Eckert, Daniel Stine, Henry Fry, Daniel Herr and Archibald Wright formed the Chestnut Hill Iron Ore Company. This company was organized solely to mine ore at Chestnut Hill, but Wright and Nephew became hopelessly indebted to the ore company. Wright's Shawnee Furnace was sold by the sheriff, and the Chestnut Hill Iron Ore Company was repaid; a prior judgment given by Wright obligated the ore company to purchase the Shawnee Furnace in order to protect their interests. In 1868 they erected a third stack, 46 x 11, and changed the name to Chestnut Hill Furnaces. Stack #2 was enlarged in 1881 to 61 x 13½; stack #3 was increased in the boshes from 11 feet to 17 feet. The total annual capacity was 20,000 tons. C. J. Nourse was superintendent during the period of peak production. The great cinder banks of the three furnaces were purchased for ballast in 1904 by the Pennsylvania Railroad when the low-grade line was built. The ore workings in the vicinity of Lake Grubb in West Hempfield Township supplied the Chestnut Hill furnaces.

The second anthracite furnace in the county was built by Peter Haldeman in 1845. He named it "Henry Clay" in honor of that great statesman. It was originally 39 feet high and 11 feet across the boshes, but when C. B. Grubb & Son bought the furnace in the late 1870's it was enlarged to 56 x 12. The Henry Clay Furnace was located one mile above Columbia on the Pennsylvania Canal and railroad. In 1857 the furnace was purchased by a Mr. Grubb, of New Jersey, and James McCormick of Harrisburg, who never operated it. Finally, in 1863, it was taken over by Henry McCormick, John Q. Denney and John Haldeman; McCormick's interest later was bought by Jeremiah G. Hess. In

SHAWNEE FURNACE IN 1885



SHAWNEE FURNACE - 1885

1877, Clement B. Grubb & Son purchased the Henry Clay, and operated it under Major Edward B. Eckman's management until 1901. Until 1875, the ore was hauled to the furnace from Chestnut Hill by six- and eight-mule teams, although rail facilities were available after 1866.

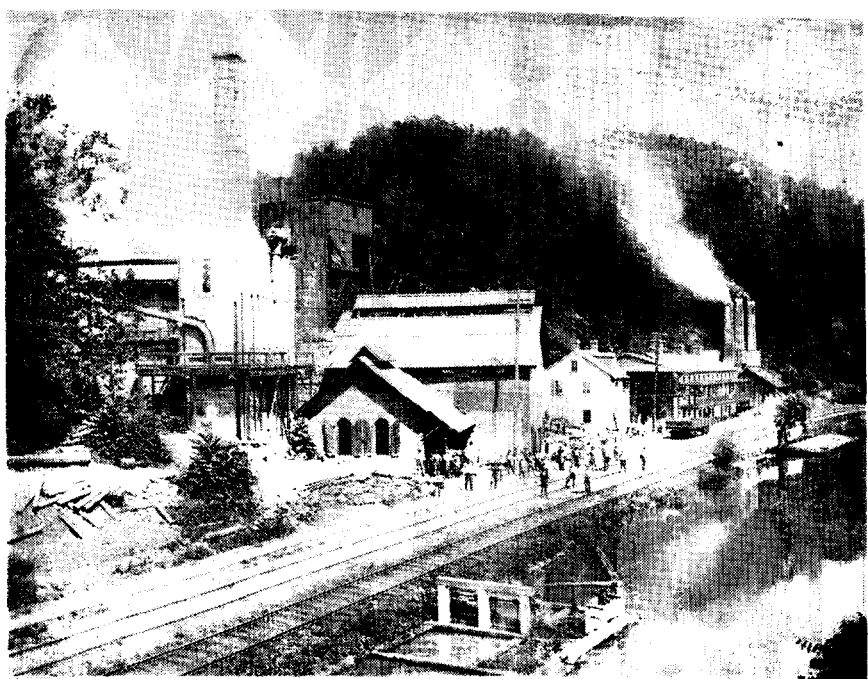
Chickies Furnace #1, built by Henry Haldeman for his sons, Dr. Edwin and Professor Samuel S. Haldeman, in 1845 was next in order. Its stack was 45 x 11. This furnace was located on the north side of the Pennsylvania Canal, close to the mouth of Chickies Creek. In 1869 Stephen Eagle's furnace was purchased by the Haldemans, and renamed Chickies #2. This furnace, located south of the Pennsylvania Railroad, and north of Chickies #1, was built by Eagle in 1854 with the following dimensions: 45 x 13. In 1876 the Haldeman interests were grouped in the Chickies Iron Co. under Paris and Horace Haldeman.

In 1846 Robert and James Colvin—the builders of Shawnee—and George Ford erected at South Prince and Furnace streets in Lancaster, a charcoal furnace named Conestoga Furnace. It was originally 38 x 10 with an annual production capacity of 6500 tons. Peacock and Thomas converted it to anthracite. Part of the works still exists as a hide and tallow warehouse.

Marietta Furnace #1 was built in 1847 by Henry Musselman, and its size was 47 x 12 with an annual capacity of 5000 tons. Later it was enlarged to 50 x 12½. Henry and Ethelbert Watts later operated the furnace.

Marietta Furnace #2 was built in 1849 by Henry Musselman, with the stack 45 feet high and 12 feet across the boshes. Its annual capacity was 5000 tons. William M. Watts became its owner after Musselman and Henry M. Watts' proprietorship. According to Horace Haldeman, Dr. Peter Shoenberger was a partner of Musselman in the erection of both furnaces. The late Bertha Sue Gramm explained in detail (L.C.H.S. Papers, Vol. 52, No. 6) the succession of owners of the furnaces. The Marietta furnaces were located between Vesta and Donegal furnaces.

Rough and Ready Furnace, or Cordelia Furnace as it was later named, was built in 1848 by Cross and Waddell. It was located near Ironville, in West Hempfield Township. Its size was 36 x 14, and it had an open top. Annual capacity was 6500



HENRY CLAY FURNACE - 1883

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HENRY CLAY FURNACE IN 1883

tons. In 1856 the furnace was rebuilt, giving it an annual capacity of 8000 tons. After the panic of 1873 it stood idle several years until 1881 when again it operated a short time.

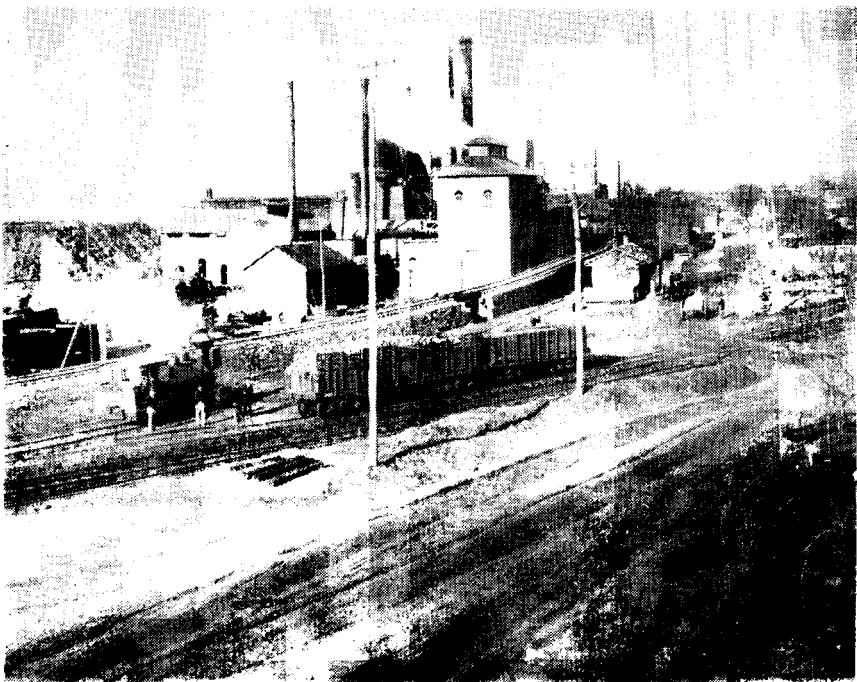
Sarah Ann Furnace, built in 1839 by John Gamber, was a charcoal furnace until its conversion to anthracite in the 1840's by Governor David R. Porter. Sarah Ann Furnace was along the Big Chickies Creek two miles northwest of Silver Spring. This furnace was never profitable.

Donegal Furnace, erected in 1848 by James Myers, Dr. George Eckert and Daniel Stine, was located between the Marietta furnaces and Chickies #2. Its size was 36 x 12, with annual production of 6500 tons. From bill heads, journals and ledgers in the author's archives, many of the business transactions of Donegal Furnace can be noted. In the 1850's the furnace was owned by

Eckert and Stine; by Myers and Benson in the 1860's; and by 1883, by Benson and Cottrell. Its ores came from the banks of Ebert & Kohr, Fritz, Musser, Lauck, (York County), Shirk, Groh, Silver Spring, Chestnut Hill Iron Ore Co., Cornwall, New Jersey Ore Co., Dillsburg, Mt. Holly, and Knaub.

St. Charles Furnace, built in 1852 by Clement B. Grubb, was located immediately north of Columbia along the canal. The stack was originally 42 x 14, but later was changed to 53 x 14.

Vesta Furnace, built in 1868 by Henry Musselman, was the last furnace built in Lancaster County. In 1881 it was rebuilt. The original size was 41 x 14; after rebuilding, 60 x 14. Annual production was 15,000 tons. Vesta Furnace was built to allow the hot gases to escape through the top, as in the case of Cordelia Furnace, rather than using the gases for heating the blast.



CHICKIES No. 2 FURNACE

Built in 1854

Rebuilt in 1889

Safe Harbor Furnace was built in 1848, in conjunction with the Safe Harbor Rolling Mill, by Reeves, Abbott & Co. The stack was 45 x 14 and had an annual production of 8000 tons. It went out of blast in 1865.

In 1855 railroads stopped nearly all construction in the wake of frauds exposed in that business. The unparalleled prosperity culminated in other disturbing factors all of which caused the panic of 1857. Again the iron industry was hit severely. Out of the ashes of this depression came the infant Republican Party and its traditional policy of protective tariffs.

Added to these troubles was a 5 per cent lowering of duties in the tariff of 1857.

The iron industry found a ready market during the Civil War. Tariffs of 1861 and of each congressional session afterwards until the end of the Civil War raised duties until by 1865 the average duties were nearly 50 per cent. Following the war, the iron industry expanded and prospered at an unprecedented rate. In 1864 Bessemer process was being used for making steel, and in 1868 the open-hearth process was introduced. By 1873 the inevitable signs of depression had appeared to cast gloom over this mighty activity, and the iron industry, as usual, was staggered. The price of pig iron per ton dropped from \$53 in 1872 to \$6.50 in 1878, and more than half of the furnaces and rolling mills were closed the entire year. By 1880 the depression was replaced by a new prosperity founded on a sound gold dollar. More railroads were built, and to meet the demand for iron and steel rails and plate, additional furnaces and rolling mills were erected. Four years later another depression was upon the nation, but fortunately, it was not permitted to disrupt the economic life quite so severely as previous revulsions. The iron and steel industry was most seriously affected, and the price of rails dropped from \$70 per ton in 1880 to \$33 per ton in 1883. Foundry Iron (No. 1) sold for \$18 per ton in December, 1879; one month later it sold for \$33.50 per ton.

Rolling Mills Operation

Eight rolling mills were in operation in Lancaster County between 1837 and 1883. A brief description of the machinery

and processes will aid in understanding the functions of the rolling mills.

The product of the blast furnaces was called pig iron which was classified as No.'s 1, 2, 3, 4, Grey Forge, Mottled, White and Bessemer pigs. Coarse-grained foundry iron included No.'s 1 through 3; the finer-grained grey forge and white pigs were used for puddling; and Bessemer pigs were used for steel-making. Stock records of the furnaces³ indicate the ratio of ores and fuel (called the "burden") and flux, which was limestone, required to produce the various grades of pig iron.

Foundry iron was remelted in foundry cupolas in the proper mixture for making cast iron. The fine-grained pigs were remelted in the puddling furnaces of the rolling mills. This furnace was a squat brick structure in which a hot coal fire was made to pass its hot gases over, and down unto, the bed of pig iron, and thence out a chimney. The oxidizing action of the furnace tended to convert the carbon, sulphur, silicon and phosphorous into gases or slag which would escape, leaving a spongy mass of purer, malleable iron. The long rows of tall chimneys protruding from the roof, or from the side of the building, were the most conspicuous feature of the rolling mill. The operator of each furnace, called the puddler, took a stirring rod and gathered a molten ball of the iron, and by squeezing it under a forge hammer, "crocodile" squeezer, or steam hammer, formed a bloom⁴. After reheating the bloom was passed through the roughing rolls, which were the primary rolls for reducing the bloom to a workable bar or slab. The "puddle bar" was then ready for further rolling and finishing into bars, rods, wire, sheets, plates and rails. Since iron is more difficult to roll when cold, heating furnaces were used for reheating the blooms and puddle bars when necessary. These furnaces differ from puddling furnaces chiefly in the absence of the deliberate oxidizing action.

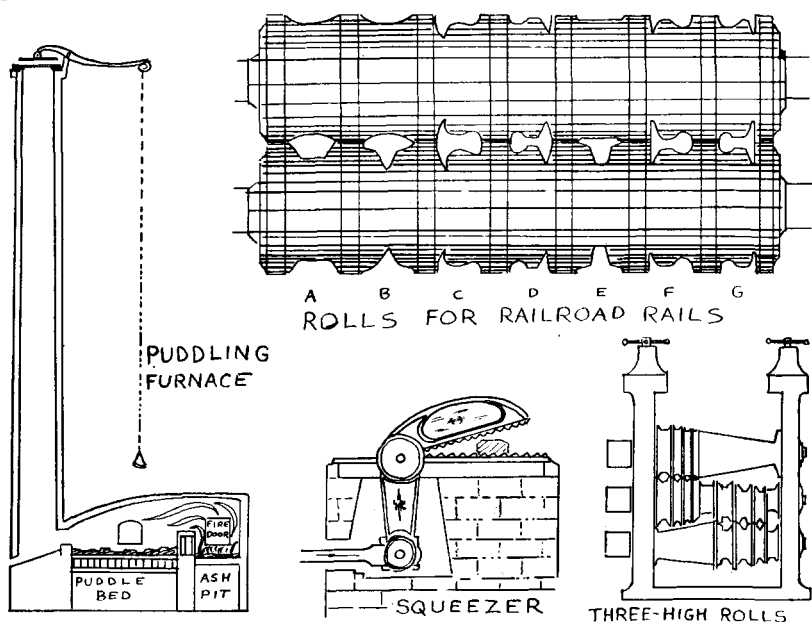
The rolling mills, i. e., the rolling machinery, consisted of rolls arranged in stands or frames somewhat in the manner of a clothes wringer. When two rolls were set in the stand, the description, "two-high" stand was used; these were the earliest known. Three-high, and four-high, with three and four

³ Donegal Furnace Records, collection of the author.

⁴ The bloom was a crudely rectangular bar, ofttimes called a muck bar.

rolls, respectively, were the invention of the noted John Fritz; the three-high stand resulted in a thirty per cent saving in time over the two-high stand. The four-high stand was used only for flat sheets and plates. In the three-high stand, the first pass of the bar was made between the upper and middle rolls, and the second pass returned between the middle and bottom rolls. By dividing the rolls into working areas, e. g., the left sides of the top and middle rolls mated, and the right sides of the middle and bottom rolls mated, the rolls could be run continuously without reversing. The middle roll was the working or driving roll.

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Stands of rolls arranged end to end were called trains of rolls; stands arranged one behind the other were tandem mills. In order to diminish the space between the rolls, and thus roll the iron thinner, heavy screws operated by hand-wheels, called the screw-down, forced the top roll down upon the lower roll.

The rolls which shaped bars, rods, and rails were grooved. Each depression was mated to a depression in another roll, and

each groove was progressively smaller, more refined, and more similar to the shape of the finished product.⁵ In irregular shapes, such as railroad rails, the depressions, while mated, were not always symmetrical, because rolling strengthens as well as shapes the product. If the thinner edges of the rail were not firmly rolled from thicker flange material the thinner edges would be weak.

Five men were required to operate the rolls: the *head roller* who was the "boss"; the *catcher*, who caught the bar on each pass and turned it into the return pass; the *lever-boy*, who guided the bar for the catcher; the *screw-down boy*, who opened or closed the space between the rolls; and the *steam engine operator*.

It should be remembered that the steel industry, which followed the iron rolling developments, made use of similar machinery, processes and terms, for which a *present tense* description would be appropriate.

Much of the data herewith listed has been compiled from many sources, such as Ellis and Evans' *History of Lancaster County*, the reports of the Pennsylvania Department of Internal Affairs, and John Swank's Reports, *American Iron & Steel Institute*.

Rolling Mills Locations

Colemanville Rolling Mill, Slitting Mill, and Forge.

These works were erected in 1828 by Edward Coleman on the Pequea Creek, several miles below Martic Forge. The plant was equipped with three forge fires, a run-out fire, a hammer (water-powered), and other crude machinery for rolling and working iron. Its chief product was charcoal iron (blooms) for boiler plate. Nails were also made.

Safe Harbor Iron Works; Reeves, Abbott & Co.

In 1848 the immense rolling mill at Safe Harbor was built for the singular purpose of rolling railway rails. The works operated in conjunction with the Safe Harbor Anthracite Furnace which was under the same management. The installed capacity was 12,000 tons per year. The last rails were rolled in 1861 upon the advent of steel rails. After the Civil War the mill was closed;

⁵ Bars, flats, rounds, and squares in sizes up to approximately six inches are standard products of the rolling mill, and the smaller sizes of these are termed merchant bars.

at this time it was owned by the Phoenix Iron Co. The rolling mill re-opened in 1879, and operated for several years after which part of it was converted into a match factory.

Two trains of rolls.

250 employees.

Two steam engines, one 100 horsepower, one 45 horsepower.

Two single puddling furnaces (one added in 1879).

Eighteen double puddling furnaces (two added in 1879).

Eight heating furnaces (originally seven).

Sixteen 40-foot boilers, all using waste gases from furnaces.

During the Civil War, the works made wrought iron cannon. John Fritz, the "father of modern iron and steel industry," received here much of the training which made him the genius of the Cambria Works of the Bethlehem Steel Co. He had charge of erecting the rolling mill and the blast apparatus for the furnace. *Shawnee Rolling Mill* (Columbia Rolling Mill)

In 1854, Smith, Bruner, Sourbeer and Co. erected a rolling mill at the foot of Fifth Street, Columbia, a short distance downstream from the Shawnee Furnaces. The plant originally cost \$160,000. It operated a short time.

By 1860 economic conditions in Columbia had deteriorated to the extent that a committee of business men and civic figures banded together in an attempt to secure someone to operate the Shawnee Mill. This committee became the Columbia Board of Trade, and bringing new industries to town was its first and foremost project.⁶ Before long, William Case and C. S. Maltby were induced to purchase the mill and set it in operation. The new owners added \$100,000 worth of improvements, including a \$3500 punch and an upright steam engine valued at \$15,000. Additional railroad sidings, and a spur line from the Pennsylvania Railroad were laid to the works. Eventually the plant was to be served by two more railroads; the Reading & Columbia (1864 to 1945), and the Columbia & Port Deposit (built 1876). Other improvements were replacements of a rotary squeezer by a crocodile squeezer (wherein puddle blooms were squeezed between crocodile-shaped jaws), and installation of a train of quite unusual rolls which would roll two sizes and patterns of rails without changing the rolls—a feature never before in use. John Q.

⁶ "The Columbia Spy," March 24, 1860.

Denney machined the rolls which were cast at the Columbia Iron Foundry (John A. Hook & Co.).⁷

Nine days after the burning of the Columbia Bridge to halt the Confederate forces, the citizens of that town were startled early in the morning by a tremendous crash, as if a heavy mortar shell was heaved into Columbia's midst. The 23-ton flywheel of the Shawnee Rolling Mill had broken while turning at top speed; its fragments flew in all directions "with the speed of lightning."⁸ More than a month was required to repair the damage. "The mill has been rather unfortunate of late, having had several accidents by the breaking of machinery within a short time," lamented *The Columbia Spy*.⁹

Maltby and Case operated a general store in downtown Columbia, called appropriately, The Rolling Mill Store. Accounts in the *Spy* would indicate the sale of gingham, dishes and groceries was far more lucrative than the business of rolling iron with unpredictable machinery.

In 1873, when the railroad panic occurred, the works closed and remained idle to 1880. During this period it was under the control of Maitland, Audenreid & Co. and was known as the Columbia Steel & Iron Co. It was leased in 1880 to the Catasauqua Iron Co. who made a feeble attempt to operate part of the works.¹⁰ By this time the Pennsylvania Railroad had a \$20,000 mortgage on the plant; the railroad then purchased the works for \$40,000 and sold it for \$45,000 to the Chestnut Hill Iron Ore Co.¹¹ Messrs. John Q. Denney, Michael Schall and John Keller purchased the mill in 1885 for \$20,000. They rebuilt much of the building and put it into operation, employing "several hundred men and boys".¹² In 1898 it was again sold, this time to the Susquehanna Iron & Steel Co.

The capacity originally was 25 tons of rail daily; additional facilities raised the output to an average of 40 tons per day.

⁷ *Ibid*, July 21, 1860.

⁸ "The Columbia Spy," July 11, 1863.

⁹ *Ibid*, August 8, 1863.

¹⁰ *Ibid*, March 7, 1885.

¹¹ John Q. Denney, John W. Steacy and J. E. Schall operated the works as a skelp mill with considerable success for the Chestnut Hill Iron Ore Co. after 1881.

¹² "The Columbia Spy" March 7, 1885.

Four trains of rolls.

Sixteen puddling furnaces (nine added during Civil War).

Four heating furnaces.

The products were rails, bars and rods. Much of the rail was sold to the Northern Central Railroad of Pennsylvania, now part of the Pennsylvania Railroad. In 1880, there were 140 employees.

Lancaster (or Rohrerstown) Rolling Mill

Built in 1858 at Hempfield, now Rohrerstown, this mill seemed doomed to failure from its beginning. It was located northeast of the intersection of the Columbia and Philadelphia Railroad and the Rohrerstown-East Petersburg Road; the site is now occupied by Miller and Bushong, Inc. At one time it was known as the *Franklin Iron Works*.

From 1861 to 1865, the mill was owned by Michael H. Moore, grandfather of Messrs. Levi and Michael G. Moore of the Moore Dairy. During this period it experienced some prosperity due to war time conditions. On June 17, 1865, the works were sold to William Eagle, Matthias Maag, A. J. Hindmeyer and David Patterson, who were not able to operate the mill successfully. David Patterson, who seemed to obtain control of the property, sold the works to Jacob Jamison in 1871. The following year Manual McShain of Philadelphia purchased the mill, and in 1873 he turned it over to Henry Coyle and William McDevitt.¹³ In the early 1880's the plant was acquired from the sheriff by the Coleman interests, and eventually was acquired by Henry Eckert, Reading.

Prosperity in the iron business depended chiefly upon demand for iron and high tariffs; costs of transporting raw and finished materials, however, were a salient factor to consider. It was hardly coincidence that the most prosperous iron industries of this area were those served by excellent railroad and canal facilities. Coal and pig iron were carried with least expense by canal. The Rohrerstown mill had only a single railroad connection. The mill, furthermore, was enlarged by McShain in 1872 to include costly machinery economically imprudent for a

¹³ *Lancaster County Records*, Deed Books: M-9-102, P-9-518, E-10-61 and N-10-19.

rolling mill of modest proportions. It was able to produce 3000 tons of merchant bar in 1872.

Its facilities included:

Two trains of rolls (one for merchant bar, one for guide iron).

Five single puddling furnaces.

One double puddling furnace.

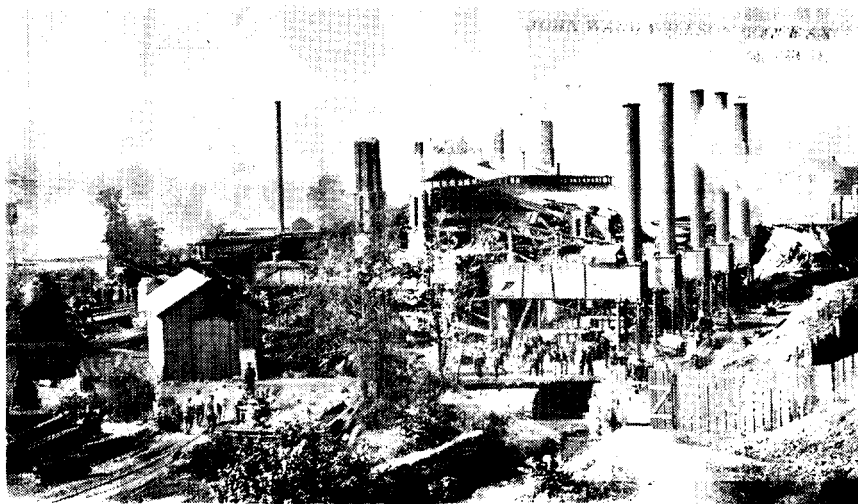
Two heating furnaces.

One steam hammer.

One rotary squeezer.

Chickies Rolling Mill

Close by Chickies Furnaces, east of Marietta and near the mouth of Chickies Creek, was John Becker's iron rolling mill, built in 1865. The facilities of this mill were few in number and small in size, but sufficient for an annual production of 4000 tons of muck bar, which is iron roughly formed into crude bars for further rolling.



SUSQUEHANNA ROLLING MILL

Showing Damage Caused by the Hurricane of 1896

Two trains of rolls (one 9" wide, one 16" wide).

One single puddling furnace.

Three double puddling furnaces.

Forty-nine employees.

Susquehanna Rolling Mill

Four months after the founding of the ambitious Board of Trade in Columbia, in July, 1860, its president, J. G. Hess, and a member, George Mitchell, announced that they would erect a new rolling mill for the production of boiler plate if Columbia citizens would subscribe \$15,000 to the enterprise.¹⁴ Hess and Mitchell offered to underwrite the balance required, and lease the plant for five years at 6 per cent on the cost. Accordingly, the mill was built, and it was located along the river front. In 1864 a company was formed consisting largely of the original members. George Bogle was president; J. G. Hess, treasurer; H. S. Hershey, secretary; Isaiah Richards, superintendent; Christian S. Kauffman, Ephraim Hershey, Michael M. Strickler and Robert Crane, directors. Samuel Evans, Esq., stated that the mill continued to operate through depressions despite the absence of profit.¹⁵ In the early 1870's the company was reorganized, with General William Patton as general manager. The name was changed to the Susquehanna Iron Co. In 1898 it was purchased by the Susquehanna Iron & Steel Co. Its facilities included:

Three trains of rolls. 184 employees.

Twelve single puddling furnaces.

Three heating furnaces.

Its annual capacity was 10,000 tons of bar iron.

Penn Iron Company

The rolling mill of Penn Iron Co. occupied the vacant buildings of the Norris Brothers' Lancaster Locomotive Works, in the square bounded by Fulton, North Plum and East Chestnut streets, and the Pennsylvania Railroad, in Lancaster. This rolling mill began as the Lancaster Manufacturing Co. under C. August Bitner, whose interests eventually turned chiefly to the manufacture of bolts and spikes and other railroad hardware. The production commenced 1873 with three rolls, sufficient furnaces, and two steam hammers. The railroad panic and subsequent depression of that year hit the brave new enterprise, and in 1875 the mill was obliged to cease operations. About 1877 the mill re-opened, more furnaces were installed, and it was re-organized

¹⁴ "The Columbia Spy," July 14, 1860.

¹⁵ Ellis and Evans, *History of Lancaster County*, p. 307.

as the Penn Iron Co., with A. J. Steinman as president; W. G. Mendenhall, secretary; C. S. Foltz, treasurer; and W. B. Middleton, superintendent. The capacity was increased from 3600 tons per year to 15,000 tons. Penn Iron Co., Limited, ceased operations at the conclusion of World War I, prior to which the explosive disintegration of the main flywheel caused extensive damage. Its facilities included:

Four trains of rolls, one 18" puddle roll
 one 16" bar roll
 one 8" guide roll
 one 9" guide roll (installed 1880)

Eight single puddling furnaces.

Two double puddling furnaces (installed 1880).

Seven heating furnaces (four added in 1880).

Two steam hammers.

Five nail machines.

Its products included bar, splice and guide iron, bolts, spikes, axles, forgings and railroad hardware. In 1880, there were 347 employees.

Union Street Rolling Mill

Little is recorded concerning this rolling mill other than it was built in the 1870's, and it was located at the foot of Union Street, at Front Street, in Columbia. It had three trains of rolls, and eight furnaces. It was dismantled during the 1930's.

OCCASUS

In 1885 the Columbia Iron Company was formed for the manufacture of bar iron. A rolling mill was erected and production was fairly constant for a dozen years. Its officers and directors included A. J. Kauffman, A. J. Yocum, Col. C. S. Kauffman, S. A. Bennett, H. M. North, James Perrottet, Milton Wike and Hiram Wilson. William McDivett (who once owned the Rohrerstown Rolling Mill), William Mattern and Arthur Hollis were superintendents in the order given. The East End Mill was built by the Janson brothers in 1893, having been moved to Columbia from Hamburg, Pa. It had two trains of rolls, and three heating furnaces. Scrap iron, rather than puddle blooms, was used.

In 1898 the Susquehanna Iron and Steel Company was formed¹⁶ for the purpose of buying all the iron furnaces and rolling mills in the Columbia-Marietta-York area. A number of Philadelphia capitalists financed the arrangements while local persons carried out the negotiations. Their acquisitions included the Shawnee (Columbia) Rolling Mill Co., Susquehanna Iron Co., Columbia Iron Co., Union Street Mill, East End Rolling Mill, York Rolling Mill, Aurora Furnace at Wrightsville, and Vesta Furnace at Marietta. Inasmuch as the Columbia Rolling Mill produced only skelp iron which is used to make pipe, the combine or holding company decided to erect a pipe mill adjacent to the Columbia Rolling Mill, on the site of the Shawnee Furnaces, in 1902. The Susquehanna Iron and Steel Co. experienced several properous years but then it passed into receivership. The bondholders formed a committee which leased the mills to operators. Edward T. Edwards leased the Columbia Rolling Mill and the East End Mill from 1912 to 1915, and in the latter year the Columbia Mill and Pipe Mill were leased to A. M. Byers Co. of Pittsburgh, who operated them two years. Edwards continued his lease of the East End Mill to the end of World War I. About 1920 the Columbia and Susquehanna Mills were bought by the Reading Iron Co. who operated them a short time, and then razed them. The Pipe Mill was bought by the Susquehanna Tube Co. of Ohio who made extensive renovations, and never operated the works. The Pipe Mill and the other mills remaining, except Janson's new mill, were torn down about 1931. The Janson New Mill was moved to Columbia from Oxford, Pa., in 1906, and was scrapped about 1947.

¹⁶ Data from the Collection of John Jay Wisler, Sr., whose aid and inspiration have made this account possible.

APPENDIX I

Table Of Daily Wages ¹⁷

LANCASTER COUNTY

<i>Blast Furnaces</i>			1878		1881
Foundrymen			2.11		2.92
Keepers			1.40		1.75
Fillers			1.15		1.66
Cindermen			1.16		1.43
Barrowmen			—		1.31
Hot-Blast Men			1.26		1.62
Weighmen			1.40		1.55
Engineers			1.24		1.69
Foremen			2.00		2.66
Labourers			.96		1.15
<i>Rolling Mills</i>	1873	1875	1876	1878	1881
Puddlers ¹⁸	4.00	3.60	2.78	2.40	3.03
Puddlers' Helpers	2.25	1.57	1.51	1.27	1.60
Heaters ¹⁹	5.00	4.60	3.26	3.03	3.81
Rollers ²⁰	5.00	4.00	3.68	3.12	4.69
Roughers	2.50	2.45	1.88	1.60	2.56
Catchers	2.50	2.33	1.88	1.51	2.06
Hookers	1.90	1.75	1.23	1.15	1.25
Shearmen	—	1.43	1.67	1.40	1.50
Labourers	—	1.12	1.20	1.00	1.15
Boys ²¹	—	.75	.80	.57	.69

(The working day was eleven hours long)²²

¹⁷ *Annual Report*, Secretary of Internal Affairs, Comm. of Pa., 1881.

¹⁸ Wages reckoned on basis of production, or approximately 2450 pounds of iron puddled per day's work.

¹⁹ Wages reckoned on approximately 8 tons of iron heated per day.

²⁰ Wages reckoned on approximately 10 tons of merchant bar daily.

²¹ Lever and Screw-Down boys.

²² Retail prices of workers' needs: Fresh beef, 13c per lb.; ham, 14c per lb.; sugar, 12c per lb.; monthly rent, 5 room house, \$6.00. Statistics for Lancaster County in 1881.