EARLY MANUFACTURING IN LANC. CO.

(Continued from Vol. LVIII, page 189)

PART II

By CARLETON O. WITTLINGER

CHAPTER III

MILLING, DISTILLING AND BREWING

There are many flour-mills on the large and small Conestoga creeks, where much flour is made for the Philadelphia market. The millers are very rich. —Cazenove, 1794

The term "mill" was applied during the period of this study to any type of grinding apparatus. It was also freely used to designate any one of a wide range of machine processes where the power was supplied by means other than hand. Thus the mill services of that day included not only the grinding of various substances such as grain, flaxseed, and plaster, but also the sawing of lumber, the breaking of hemp and flax, and the carding of wool and cotton. So defined, the mill industries of Lancaster County prior to 1840 were both numerous and varied. The local sources include references to the following types of early mills: grist, merchant, hemp, flax, oil, clover, plaster, fulling, carding, woolen, bark, saw, boring, rolling, sickle, paper, and snuff. This chapter will be limited to the consideration of those mill industries which are not discussed elsewhere.

Mills were built in the county at an early date in response to the needs of the settlers. Gristmills were among the first and relieved the pioneers of the necessity of the tedious journey to eastern mills, such as those on Brandywine Creek, when they needed flour. As the population of the area grew, the number and diversity of the mills naturally increased to serve the enlarged local market. Several other factors facilitated the rise of the mill industries. Abundant water power was one of the most important of these, for the numerous streams of the county abounded in fine mill sites as judged by the relatively simple technological requirements of the eighteenth century. The early discovery that good millstones could be manufactured from a rock formation which occurred north of Ephrata freed the millers from complete dependence upon imported stones. Furthermore, the raw materials for industries such as grain and saw milling lay near at hand to the sources of power, and, when the need arose, the local supplies of such materials were easily supplemented from the Susquehanna River trade.

Capitalizing upon these advantages, the mill industries of the county developed rapidly. Thirteen gristmills alone were located within five miles of Lancaster as early as 1763.[1] Within ten miles of the town in 1786, there were "eighteen grain mills, sixteen saw mills, one fulling mill, four oil mills, five hemp mills, and two boring and grinding mills for gun barrels."[2] The number of mills in the entire county was about 200 in 1773.[3] This rapid expansion of the local mill enterprises indicates that they represented essential and profitable lines of business. Cazenove notes the many flour mills on the Conestoga creeks in the late eighteenth century and adds: "The millers are very rich."[4] Mill improvements and potential mill sites were important considerations in determining the values of the properties upon which they were located. Two mill estates near Lancaster were valued at $28,000 and $35,000 respectively in 1836.[5]

Milling was frequently carried on in conjunction with farming, and it may be assumed that the former was commonly a subordinate part-time or seasonal enterprise. The transfer of title to a farm often included the transfer of ownership of one or more mills at the same time.[6] Different milling and other manufacturing enterprises were also commonly associated. As early as 1747, the German Seventh-Day Baptists at the Ephrata Cloisters operated saw, flour, paper, oil, and fulling mills.[7] One early nineteenth century industrial unit included grist, merchant, saw, and hemp mills, while another had grist, oil, bark, and saw mills.[8] Cooperages and distilleries were logical adjuncts of certain of the milling industries, and were sometimes carried on along with them.[9] The combination of several mill enterprises was especially practicable when the potential business in a single line of endeavor was insufficient to justify the development of a water power. It is evident that millers who carried on two or more different lines of business simultaneously possessed considerable versatility, although relatively unskilled labor was generally required as compared to many of the specialized workshop crafts. The occasional mill enterprise such as fulling, however, required a large measure of skill and experience. During the period of this study Lancaster County mills of all kinds were generally conducted as individual enterprises. Partnerships, often referred to as companies, were formed occasionally, but the unincorporated joint stock company and the corporation were rare. Thus the capitalization of most mill enterprises tended to be small.

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[1] *Votes of the Assembly*, V, 255.

[2] Coxe, *View*, p. 313.

[3] Lancaster County Assessment Lists, 1773, Public Records, Harrisburg, Pa.

[4] *Cazenova Journal*, p. 75.

[5] Minutes of the Select Council of the City of Lancaster, Feb. 22, 1836.

[6] *Pennsylvania Gazette*, Sept. 11. 1760; *American Staatsbothe*, Jan. 29, 1800; *Lancaster Journal*, Jan. 28, 1825, Feb. 3, 1826.

[7] *Chronicon Ephratense*, p. 211.

[8] *Lancaster Journal*, Aug. 26, 1808, Feb. 3, 1826.

[9] *Ibid.*, Aug. 26, 1808, June 24, Jan. 28, 1825; *Pennsylvania Gazette* Sept. 11, 1760.

The early lumber industry in Lancaster County was continually stimulated by an expanding local lumber market as more people settled in the area. Farmers who erected sawmills, and those who lived near enough to transport their timber to the saws, were enabled to supply their own lumber needs and, as the price of lumber rose, to reap some profit from the laborious task of clearing their lands. Sawing establishments were relatively numerous by the middle of the eighteenth century, and there were sixteen of them within ten miles of Lancaster in 1786.[10] Such mills were small individual enterprises which frequently sawed on toll. There were 123 sawmills in the entire county in 1810. These sawed a total of 2,790,500 feet of lumber in the year reported in the Third Census, or an average of less than 23,000 feet.[11] It is evident from these figures that the early nineteenth century sawmills were still relatively small enterprises, often engaging the attention of their proprietors during only a part of the year. Although the number of sawing establishments reported in 1840[12] and was somewhat smaller as compared to 1810, there is evidence of vast expansion in the size and capacity of the individual sawmill. Thus about 1838 Edward Coleman's sawmill on the Conestoga Creek cut at the rate of 1,000,000feet per year, working only during the day. This was more than one-third of the total production of the 123 mills reported in 1810, and the Coleman mill could have doubled production by operating at night, as was the practice of many sawmills.[13] By this time important technological changes were taking place in the American sawmill industry. Circular and belt saws were in use, having been introduced from Europe soon after the War of 1812. In the late 1830's or 1840's, the steam-powered sawmill appeared in Lancaster County.[14]

The lumber sawed from the Lancaster County forests was principally hardwoods. Conifers were scarce, but importations of white and yellow pine from the upper Susquehanna Valley supplied this lack.[15] In the late eighteenth century Columbia became the great distributing center for the lumber, shingles, and other produce descending the river.[16] When the Conestoga Slackwater Navigation was opened in 1829, large amounts of river lumber and other products were received directly in Lancaster City.[17] A local editor wrote enthusiastically: "Persons engaged in the lumber and coal trade, on the head waters of the Susquehanna would do well to try the Lancaster market, as a

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[10] G. D. Luetscher, "Industries of Pennsylvania after the Adoption of the Federal Constitution with Special Reference to Lancaster and York Counties," *Ger. Amer. Annals*, New Series, I, 149, (title of article omitted in subsequent citations); Coxe, *View*, p. 313.

[11] Coxe, *Arts and Manufactures*, p. 73.

[12] *Compendium of Sixth* Census, p. 140.

[13] *House Report* No. 168, 25th Cong. 3rd Sess.

[14] V. S. Clark, *History of Manufactures in the United States, 1807-1928*, I, 421 (cited hereafter as: Clark, *Manufactures*); Moody and Bridgens, *Map of the City of Lancaster*, 1850.

[15] *Lancaster Journal*, May 13, 1796; *Intelligencer, and Weekly Advertiser*, Oct. 30, 1799, Sept. 10, 17, 1800.

[16] Gilpin, "Journal," *Pa. Mag. Hist. and Biog.*, L, 76.

[17] *Lancaster Intelligencer*, May 12, 19, 1829.

great portion of Chester county will now depend upon Lancaster for shingles, boards, scantling, staves and heading, hoop-poles, etc . . . ."[18] This editor's prophecy pertaining to Chester County soon became a reality.[19] During a little over one month in 1830, seventy-nine rafts and ten arks of lumber products arrived in Lancaster, and one city firm imported 1,800,000 feet of lumber and 900 000 shingles over a period of three years.[20] These heavy importations of timber products to supplement local supplies reflected the strength of the market demands for such products in Lancaster County. In the light of this demand, it appears that the local sawyers found a ready market for their output at their very doors and had no incentive to seek an export market.

Oil mills were in existence in Lancaster County by the middle of the eighteenth century.[21] These were a natural complement to the production of flax, since oil which was used in paints, printer's ink, and other products was extracted from the seeds of this plant. Four oil mills were located within ten miles of Lancaster in 1786, and an oil mill was included among the Moravian industries at Lititz about that time.[22] Thirteen oil mills which produced 8,920 gallons in one year were reported in the county in 1810.[23] As the production of flax and hemp gradually declined thereafter, the number of oil mills decreased until only two were reported in 1840.[24] Lancaster County oil found a market in Baltimore and Philadelphia.[25]

With the development of clover culture in the county in the late eighteenth and early nineteenth centuries, clover mills were erected to hull out the seed. Twelve such mills hulled 4,900 bushels in the year reported in the Third Census.[26] The clover mills declined in number toward the close of the period of this study.[27] This decline is explained by the increased use of portable horse power threshing machines which freed farmers from their dependence upon the clover mills with their specialized hulling stones. Clover seed was one of the exports of Lancaster County. Its exportation to Philadelphia began as early as 1773, but it is unlikely that clover mills were in existence at that early date.[28]

The gypsum or land plaster which contributed so much to the wide sowing of clover gave rise to another specialized mill enterprise. This mineral was

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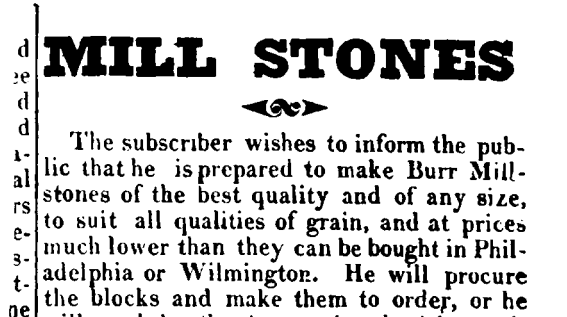
[18] *Ibid.*, May 12, 1829.
[19] *Lancaster Journal*, April 12, 1833.
[20] *Lancaster Examiner*, May 13, 1830; *House Report* No. 168, 25th Cong. 3rd Sess.
[21] Luetscher, *Ger. Amer. Annals.* N.S., I, 194. It is quite possible that these mills produced hemp oil as well as linseed oil.
[22] Coxe, *View*, p. 313; *Neue Lancaster Zeitung*, Sept. 12, 1787.
[23] Coxe, *Arts and Manufactures*, p. 58.
[24] U. S., *Compendium of Sixth Census*, p. 141.
[25] *Lancaster Journal*, May 7, 1830.
[26] Coxe, *Arts and Manufactures*, p. 72.
[27] Hazard *Register*, VIII, 42.
[28] *Pennsylvania Gazette*, April 14, 1773; *Lancaster Examiner*, May 17, 1831.
[34] *Lancaster Journal*, May 13, 1796. See also *Ibid.*, Nov. 25, 1796, Jan. 28, count Book, 1822-1824.

often imported in the stone and ground at local plaster mills.[29] As was the case with most mill industries involving grinding operations, specialized millstones were required.[30] Plaster grinding was commonly carried on along with other types of milling.[31] The general use of gypsum for dressing the soil in the Lancaster vicinity following the Revolution, suggests that plaster grinding was begun there before the close of the eighteenth century.[32] Eight plaster mills were reported in the county as late as 1838.[33]

Grain mills, grist and merchant, represented the most extensive branch of the Lancaster County mill industries. The former depended upon country custom. To them the farmers brough their grain or "grist" to be converted into meal or flour. The millers generally got their compensation for grinding



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by tolling, that is, by taking out for themselves a fixed portion of each bushel of grain which they ground. Merchant mills bought wheat and manufactured flour for a market outside of the immediate community. Grist and merchant milling were commonly carried on simultaneously. Thus, for example, a merchant still in Little Britain Township in 1796 had two run of stones, one of which was kept almost constantly employed on custom work.[34].

Judged by modern standards, the typical colonial grain mill was small, crude, and inefficient. Generally the expense of erecting a dam in a large river was prohibitive, so that only the more limited water power of the smaller streams could be utilized. Even then the dam was often dispensed with and water from the head of the falls conveyed directly to the mill. The undershot

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[30] P. B. Flory, L.C.H.S. *Papers*, LV, 136.

[31] *Lancaster Journal*, Jan. 28, 1825; George Darr Mill Account Book, 1822-1824.

[32] See Chapter II.

[33] *House Report* No. 168, 25th Cong. 3rd Sess.

[34] *Lancaster Journal*, May 13, 1796. See also *Ibid.*, Nov. 25, 1796, Jan. 28, 1825, Nov. 17, 1826.

water wheel set in the current without benefit of either dam or mill race was also freely used, but it was inefficient in the production of power as compared with the overshot wheel made possible by a dam. Inefficiency in the production and transmission of power often required more then one water wheel to operate several pieces of mill equipment.[35]

Most of the colonial mill machinery, including the water wheel, was made of wood. Many of the smaller grist mills had little equipment except the stones, and could neither clean the grain nor bolt the meal. Some mills had hand-operated bolters, while in others the bolting equipment was operated by water power.[36] All merchant mills, of course, had flour manufacturing equipment. Before the inventions of Oliver Evans revolutionized milling in the late eighteenth and early nineteenth centuries, the production of flour required much manual labor at best. Furthermore, unsanitary manufacturing conditions and careless grading were common.[37] In 1722 Governor Keith pointed out to the Assembly the necessity of recovering the lost credit of Pennsylvania bread and flour in the West Indies market.[38]

The mill machinery developed by Oliver Evans in the latter part of the eighteenth century transformed the flour manufacturing industry, and has been employed with many improvements ever since. Evans' objective was to apply the water power which drove the millstones to all of the manufacturing stages which required manual labor. His principal innovations were the elevator which moved the grain and meal to the floors above, the conveyor which moved the meal horizontally from one machine to another, and the hopper boy which spread the meal for cooling. Their net result was an automatic process of flour manufacture at a great saving of labor. Not only did these innovations mark a great technological advance, but their cost hastened the transformation of the industry to a capitalistic basis. Thereafter the large merchant mill equipped with these devices was to have a distinct advantage over the small mill utilizing traditional methods.[39]

It may be assumed that the rise and development of grain milling in Lancaster County conformed in a general way to the pattern outlined. The small, crude, inefficient gristmill built for limited custom business heralded the beginning of the industry in the area. However, some grain surpluses, particularly wheat, were realized by the farmers at an early date, and the grinding of grain for export began. As early as 1760 we have the example of an overshot grist and merchant mill in Donegal Township with two pairs of stones, three bolting cloths, and a capacity of 7,000 barrels of flour a year.[40] Obviously

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[35] C. B. Kuhlman, *The Development of the Flour-Milling Industry in the United States*, p. 95 (cited hereafter as: Kuhlman, *The Flour-Milling Industry)*; Clark, *Manufactures*, I, 175; *Lancaster Journal*, Nov. 25, 1796.

[36] Clark, *Manufactures*, I, 175; Kuhlman, *The Flour-Milling Industry*, pp. 95-96.

[37] G. and D. Bathe, *Oliver Evans; A Chronicle of Early American Engineering*, p. 12.

[38] Robert Proud, *The History of Pennsylvania*, II, 150-151.

[39] Kuhlman, *The Flour Milling Industry*, pp. 96-101; C. and D. Bathe, *Oliver Evans; A Chronicle of Early American Engineering*, pp. 13-14.

[40] *Pennsylvania Gazette*, Sept. 11, 1760.

considerable progress had occurred in the local grain milling industry by that time. Two or more runs of stones in a single mill was relatively common in the county during the period of this study.[41] Large mills were rare, however, for no example of one with more than four runs of stones has been found. The capacity of mills for enlargement was definitely limited by small stream waterpower, and there is no evidence of the application of steam power to Lancaster County grain milling before 1840.[42]

A few facts about some of the larger mills of the county may be of interest at this point. One in Caernarvon Township in 1777 was described as follows: "One of the best GRIST MILLS in America, having two waterwheels four pair of stones, five boulting cloths, on Conestogoe, a never-failing stream, with 15 feet fall, in a good wheat country; Also one of the quickest cutting sawmills."[43] In spite of its designation as a gristmill, this establishment engaged in merchant as well as custom work. One of the larger mills at the beginning of the nineteenth century was located near Wright's Ferry and known as Fair View Mill and Distillery. It had two water wheels, four pairs of buhrstones, and machinery for manufacturing large quantities of flour.[44] Since the French buhrs were generally employed in the manufacture of high grade flour, this mill appears to represent a specialization in that line. About the same time, another mill with two water wheels also had four runs of stones, but these were designed for different tasks and included French buhrs, chopping stones and shelling stones.[45] It will be noted that all three of these mills had two water wheels and four runs of stones, and they evidently represented relatively full utilization of their respective water powers.

Although the streams of Lancaster County furnished water power which imposed limitations upon mill development, technological advances contributed much to efficiency and economy of mill operation. The automatic devices invented by Oliver Evans, with their great labor saving and sanitation advantages, were introduced into the county in 1789 when David Witmer installed them in his mill on Pequea Creek.[46] Another important innovation in American milling occurred in the late eighteenth and early nineteenth centuries when furrows were introduced into the faces of the stones, thus enabling the millers to run them at far higher speeds.[47] While technological innovations increased the capital investment in grain milling, the mills of Lancaster County continued to be carried on as individaul enterprises through-

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[41] *Ibid.*, Mar. 19, 1777; *Lancaster Journal*, May 13, 1796, Jan. 25, 1805. Nov. 17, 1826; *Lancaster Examiner*, Oct. 24, 1833.

[42] At least one steam flour mill was in operation in the county by 1858. It was located in Mount Joy. J. R. Hoffer, *A Map of the Borough of Mt. Joy, Lancaster Co., Pa., 1858.*

[43] *Pennsylvania Gazette*, Mar. 19, 1777.

[44] *Lancaster Journal*, Mar. 28, 1801.

[45] *Ibid.*, Jan. 25, 1805.

[46] *Neue, Lancaster Zeitung*, Aug. 5, 1789.

[47] William Warder, "The Manufacture of Flour," *Report of the Commissioner of Agriculture for the Year 1862*, p. 424.

out the remainder of the period of this study. However, by 1838 many of the mill owners no longer operated their own establishments, but employed master millers to render this service.[48]

Many of the eighteenth century Lancaster County grain mills manufactured flour for export, and the total amount produced was very large.[49] Before the century closed, the mills of the area outgrew the local supply of raw materials and tapped the Susquehanna River trade in grain. Middletown, until the 1790's, was the lower terminus of the descending produce trade, and there the millers of Lancaster County had agents with ready cash to buy in the needed supplies of grain.[50] Later when the construction of arks and river improvements enabled the river produce to reach Columbia, much grain from the descending trade was distributed to the millers of Lancaster and Chester counties from that point.[51]

Measured by dollar value of product, flour milling was the second largest industry of Lancaster County in the early nineteenth century, for distilling alone exceeded it. In the year reported in the Third Census, 135 mills produced 99,159 barrels of flour valued at more than $787,000.[52] During the decade which followed, flour prices remained high, and the industry enjoyed great prosperity.[53] Then in 1819 heavy European harvests and currency depreciation at home caused the collapse of the American farm produce market. Flour prices fell to the lowest point since 1785.[54] The distress of the times is clearly registered in Lancaster County milling statistics. Mills of the area consumed 110,275 bushels of wheat in the year reported in the census in 1820. The flour manufactured in that year had a market value of only a little over $119,000, in striking contrast to the $787,000 value of the flour milled in the county in the year reported in the 1810 census.[55] This extreme crisis in the farm produce market converted the farmers of Lancaster County to a belief in the protection tariff through which they hoped to secure a more stable home market.[56]

The Lancaster County grain milling industry was able to surmount the severe difficulties of the 1820's. About 1831 there were at least 154 grain mills in the county, a considerable increase over the number of such mills in 1810.[57] In 1840 the flour mills numbered 128 and these produced 148,941 barrels of flour. There were at the same time 133 gristmills, but considerable overlapping of the two categories must be assumed.[58] Although the total amount of

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[48] *House Report* No. 168, 25th Cong. 3rd Sess.
[49] *Cazenove Journal*, p. 75; Ebeling, *Die Vereinten Staaten*, IV, 677.
[50] *Cazenove Journal*, p. 54.
[51] Gilpin, "Journal," Pa. *Mag. Hist. and Biog.*, L, 76-77.
[52] Coxe, *Arts and Manufactures*, pp. 58-59, 71.
[53] Hazard, *Register*, II, 221.
[54] *Ibid.*, II, 221, III, 148.
[55] U. S., *Digest of Accounts of Manufacturing Establishments in the United States and of Their Manufactures*, p. 16 (cited hereafter as U. S., *Manufacturing Establishments).*
[56] See Chapter II, L. C. H. S. *Papers*, LVIII, 186.
[57] Hazard, *Register*, VIII, 42.
[58] *Compendium of the Sixth Census*, p. 140.

flour produced annually about 1840 was nearly fifty per cent more than in 1810, the total dollar value of the 1840 production was actually lower than that of the earlier date.[59] This phenomenon is at least partially explained by the fact that the census in 1840 registered the prices of a period of depression and deflation. At the time of that census, however, Lancaster County was the leader in the manufacture of flour among the twenty counties of the Eastern Census District of Pennsylvania. Northampton and Philadelphia counties were the nearest competitors and Lancaster County, with a production of 148,941 barrels of flour, led them by about 13,000 and 35,000 barrels respectively. In number of flour mills, Lancaster County also headed the list with 128, Cumberland County coming next with a mere fifty-four. However, a study of the 1840 census statistics suggests that some of the mills in counties such as Northampton and Philadelphia were much larger than any known mills in Lancaster County at that time.[60]

Flour was one of the chief county exports during the period of this study, and Philadelphia, Wilmington, Newport, and Baltimore were the important market centers for this product.[61] The volume of the trade was very large. During one month in 1840, a single commission warehouse in Lancaster City forwarded a total of 2,369 barrels of flour, forty-six barrels of rye flour, and fifty-four barrels of corn meal.[62] This item is of special interest in that it indicates that, at least toward the close of the period under consideration, rye and corn were milled to some extent for export.

When the period under consideration came to a close about 1840, powerful forces contributing to change were being brought to bear upon grist and merchant milling in Lancaster County. One of these was the westward movement of the wheat growing industry and the subsequent erection of large western flour mills. In the 1830's and 1840's Pennsylvania and Ohio were the two leading wheat producing states in the nation, but by the close of the next decade the former had already fallen to sixth place as the wheat belt advanced forward.[63] During these decades the gradual deforestation of the countryside was also having its inevitable effect upon the regularity of the water supply in the "never-failing streams" which turned the water wheels of the mills. Thus floods and droughts became increasingly serious problems for the harassed millers of the area, along with the ever greater competition from the western mills. As water supplies dwindled, the local mills were forced to install expensive new steam power equipment or go out of business, and many of them chose the latter alternative.[64] It is interesting to note, however, that

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[59] The combined annual production of the grist, merchant, saw, and oil mills was valued at $724,257 by the census of 1840, while flour manufactures alone, in the year covered by the 1810 census, were worth $787,272.

[60] *Compendium of the Sixth Census*, p. 140.

[61] *Pennsylvania Gazette*, Jan. 2, 1772; Ebeling *Die Vereinten Staaten*, IV, 677; *Cazenove Journal*, p. 75; *Lancaster Examiner*, July 16, 1830, May 10, 1831.

[62] *Intelligencer and Journal*, Feb. 18, 1840.

[63] W. H. Brewer, "The Cereals," *Tenth Census*, 1880, III, 61, 62.

[64] Samuel Evans, L.C.H.S. *Papers*, I, 322.

the water power gristmill industry survived on a small scale in the county well into the twentieth century.[65]

The grain milling industry of Lancaster County gave rise to various specialized manufactures of mill equipment. Thus a manufactory of patent silk bolting cloths was begun in the town of Lancaster in 1797 by Robert Dawson who had previously operated a similar establishment in Wilmington, Delaware.[66] Bolting cloths were an essential part of the sifting machinery of the flour mills. In the colonial period they were generally made of wool, but at the end of that period the more advanced mills were adopting silk cloths imported from Holland.[67] Dawson's Wilmington manufactory which was in operation in the 1790's appears to have been the first in this country to produce silk bolting cloths.[68] The transfer of his establishment from Wilmington to Lancaster is another indication of the important place Lancaster County occupied as a flour milling center in the late eighteenth century. Dawson prospered in his new location as a result of the liberal encouragement given to him by the millers.[69] He had agents to handle his cloths in Wilmington and Brandywine, Delaware, and in Philadelphia, Middletown, Carlisle, and Washington, Pennsylvania.[70] Upon Dawson's decease, William Boys carried on the business, and also handled imported European bolting cloths. He maintained agents in various towns in Pennsylvania.[71] Silk bolting cloths imported from Holland continued to find a market in the Lancaster vicinity as late as 1817.[72]

Another special advantage enjoyed by the Lancaster County mill industries was a local supply of good millstones. These were the so-called "Cocalico" stones manufactured from a hard conglomerate sandstone found in the mountains north of Ephrata. The industry began prior to 1753, for in that year Lewis Evans wrote: "There is a Quary of Excellent Mill Stones about 6 Miles north of Ephrata."[73] Christian Bowman manufactured millstones in the Ephrata vicinity at least as early as the 1750's.[74] William and Joseph Konigmacher of Ephrata advertised themselves in 1832 as the "exclusive lesees of the Real Cocalico Quarries." The varied output of their manufactory indicates that the native millstones were adapted to many uses. These included the hulling of clover seed and the grinding of corn rye, plaster, paints, drugs, bark, snuff, rubber, and flaxseed.[75]. Many of the Cocalico stones were trans-

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[65] A. I. Jonas, and G. W. Stose, *Topographic and Geologic Atlas of Pennsylvania, No. 178, New Holland Quadrangle, Geology and Mineral Resources*, p. 36; P. B. Flory, L.C.H.S. *Papers*, LV, 84.

[66] *Lancaster Journal*, July 1, 1796, May 26, June 3, 1797.

[67] Kuhlman, *The Flour-Milling Industry*, pp. 25 96.

[68] La Rochefoucault, *Travels*, II, 252, 256.

[69] *Lancaster Journal*, Oct. 31, 1801.

[70] *Ibid.*, May 26, 1797, Nov. 26, 1800.

[71] Ibid., Sept. 25, 1802, May 20, 1808

[72] *Ibid.*, Nov. 7, 1817.

[73] Lewis Evans, in Gipson, *Lewis Evans*, p. 105.

[74] Deeds Books, H, p. 329, O, p. 62. All deeds cited hereafter may be found in the office of the Lancaster County Recorder of Deeds.

[75] *Lancaster Examiner*, Aug. 30, 1832.

ported in the rough to manufactories in other parts of the county for finishing.[76].

While the native millstones of Lancaster County were excellent for many purposes, the imported French buhrstones were superior for the production of the best grades of flour. A buhrstone was made up of a number of separate sections of a colorful silica-quartz material securely bound with iron to produce a highly efficient millstone with excellent wearing qualities.[77] Buhrstones were widely used in Lancaster County mills, having been introduced into the area at least as early as 1789.[78] One mill in the early nineteenth century was equipped with four pairs of buhrs, but a combination of one or two pairs of buhrs with one or two pairs of native stones was more common.[79]

Johanna Funk was one of the early Lancaster County manufacturers of the French buhr millstones. He imported the stones in pieces and assembled and bound them at his Strasburg manufactory at least as early as 1780.[80] A Philadelphia millstone maker, Jacob Hassinger, operated a subsidiary manufactory of buhrstones at Columbia in 1804.[81] and a number of other buhrstone manufactories, some of which supplied Cocalico stones as well, were operated in Lancaster County in the early nineteenth century.[82] It is thus evident that the French buhrs were widely used in the area, having been introduced prior to 1790.

Millstone makers frequently merchandised other types of mill equipment such as bolting cloths and screens for cleaning wheat and flaxseed.[83] Sometimes they personally manufactured such equipment in their own shops along with millstones. Thus wire weaving and millstone making were carried on simultaneously by various craftsmen of the county. The market for the wares of the wire weaver was, however, broader than that provided by the mills. Among the articles he produced were rolling and standing screens, riddles or sieves of all kinds and sizes, and window wire.[84]

Distilling was another very important grain-consuming industry of Lancaster County before 1840. Its prominence is easily understood. Large quantities of alchoholic beverages were required for home and tavern consumption in an age when the use of such beverages was almost universal. Furthermore, it was more profitable to transport the coarser grains such as corn and rye in the concentrated distilled form. Even the residue which remained after the extraction of the spirits could be put to good use as food for swine.

Distillation had its beginnings in the county as an aspect of farm indus-

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[76] *Lancaster Journal,* Dec. 24, 1824, Sept. 6, 1832.

[77] P. B. Flory, L.C.H.S. *Papers,* LV, 82 83, 125.

[78] *Neue Lancaster Zeitung,* Oct. 21, 1780.

[79] *Lancaster Journal,* Mar. 28, 1801, May 13, 1796, Jan. 25, 1805, Nov. 17, 1826

[80] *Neue Lancaster Zeitung,* July 7 1790.

[81] *Lancaster Journal,* Mar. 17, 1804.

[82] *Ibid.,* Dec. 24, 1824; *Lancaster Examiner,* Sept. 6, 1832; *Bethania Palladium,* July 6, 1832.

[83] *Neue Lancaster Zeitung,* July 7, 1790; *Lancaster Journal,* Dec. 24, 1824: *Lancaster Examiner,* Sept. 6, 1832.

[84] *Lancaster Journal,* Dec. 24, 1824; *Lancaster Examiner,* Sept 6, 1832.

try. When carried on in a small way, it did not require a large capital. Thus it represented one of the few ways by which the farmer of moderate means could turn manufacturer. As a result, the stillhouse became a familiar feature among the farm buildings of Lancaster County.[85] However, it should not be assumed that the average or typical farmer had his own still, for there is no evidence that the total number of distilleries in the county ever exceeded 316, the number reported in 1810.[86] Obviously 316 represented but a small fraction of the farms at that time, for only ten years later there were 6,736 persons engaged in agriculture in the county.[87] We may conclude, therefore, that many farmers sold their grain to neighboring distillers or had it distilled on a custom basis.[88] Some of the distilleries were carried on in conjunction with mills.[89] This combination of mill and distillery enabled the miller to convert his toil of the coarser grains into a product with a higher market value. Some mills made a point of buying up grain for resale to distillers.[90]

Spirits were distilled from various forms of produce. These included fruits, which were made use of at an early date. In 1733 a group of Lancaster County inhabitants prayed the Assembly for liberty to: ". . . distil Corn, Apples, Peaches, etc. raised upon their own Plantations, for the Use of themselves and their Families, or of such of their Neighbors as may apply for the same, without paying any Excise or Duty . . . ."[91] Custom distilleries in the area ground and distilled fruit in the early nineteenth century.[92] Experiments with the distillation of potatoes were described in a Lancaster newspaper in 1796, but it was not stated that these were conducted in the county.[93] There is no conclusive evidence that the local distillers used potatoes, although it was rumored in 1836 that they were doing so. A local editor, much exercised by these reports, roundly condemned such a practice ". . . when scarcity is written on every field, when 'high prices' and 'hard times' are the general complaint, and when want stares so many of the poor and destitute of our fellow-creatures in the face."[94]

It is unlikely that wheat was ever distilled to any extent in Lancaster County during the period of this study. Compared to the coarser grains such as corn and rye, it had a higher market value per unit of volume and hence could be transported more profitably. Furthermore, the bulk of the wheat could be reduced and its value increased by converting it into flour. Corn

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[85] *Pennsylvania Gazette*, Sept. 11, 1760; *Lancaster Journal*, June 24, 1795, Aug. 26, 1808, Jan. 28, 1825; *Intelligencer, and Weekly Advertiser*, Oct. 23, 1799, Jan. 15, 29, Feb. 5, 1800.

[86] Coxe, *Arts and Manufactures*, pp. 58-59.

[87] *Fourth Census*, 1820.

[88] Andrew Miller, Distillery Account Book, 1809-1826; *Paradise Hornet*, Oct. 19, 1822.

[89] *Americansche Staatsbothe*, Jan. 29, 1800; *Lancaster Journal*, Mar. 28, 1801, Aug 26, 1808, Jan. 28, 1825.

[90] *Lancaster Journal*, Jan. 16, 1829.

[91] *Votes of the Assembly*, III. 200.

[92] *Paradise Hornet*, Oct. 19, 1822.

[93] *Lancaster Journal*, Feb. 5, 1796.

[94] *Lancaster Union*, Nov. 8, 1836.

and rye, therefore, became the great staples of the distillation industry. In the year reported in the census of 1829, the distilleries of the county consumed 145,112 bushels of rye and corn, an amount considerably greater than that of the wheat consumed by the flour mills in the same year.[95] Since 1820 was a depression year, it is evident that the annual consumption of corn and rye at the distilleries was normally much larger than the figures for that year indicate. In 1833 one source speaks of the "immense quantity of rye" used by the Lancaster County distillers.[96] Like the flour milling industry, Lancaster County distillation outgrew the local supplies of raw materials and

Still Made By Francis Sanderson, Lancaster, About 1770
Courtesy Henry J. Kauffman

supplemented them with grain purchases from the Susquehanna River trade.[97]

Whiskey was one of the main Lancaster County exports. As was the case with most export commodities of the area, the principal whiskey markets were located in Baltimore and Philadelphia.[98] One county farm distillery sold $2,533 worth of whiskey in one year in the Baltimore market about 1829.[99] The first ark to reach Baltimore from Lancaster by way of Conestoga Creek

[95] U. S., *Manufacturing Establishments*, p. 16.
[96] Hazard, *Register*, XII, 57.
[97] *Ibid.*
[98] *Lancaster Journal*, Aug. 20, 1819.
[99] Hazard, *Register*, IV, 112.

in 1829 had on board thirty-five hogsheads of whiskey, and other arks laden with the same product followed.[100] A single commission warehouse in Lancaster City dispatched 149 hogsheads and sixteen barrels of whiskey in one month in 1840.[101]

An important part of the profits in the county distilling industry was made by fattening hogs on the distillation residue. In fact, James Buchanan, whose Congressional district included Lancaster County, asserted on the floor of the House in 1828 that the main profits of distillation at that time were realized on the sale of hogs. He said: "The distiller receives little more for his labour than food for his hogs. It is by feeding stock, and not by distillation, that he makes his profit."[102] This was a bit exaggerated, for Buchanan was trying to show that the benefits of tariff increases on distilled spirits would accrue to the farmers rather than the distillers. However, it is certainly a fact that distillers went in for hog raising on a large scale.[103] The Manheim distillery which had ". . . large Hog Pens so situated as to have running water passing through them," had an asset which was sure to attract the attention of prospective buyers in 1825.[104]

The Burgesses of Lancaster in the early nineteenth century were troubled by the presence of swine at the distilleries within the borough. Repeated complaints came to them from inhabitants residing near the distilleries, especially during the summer season. Finally the Burgesses were moved to action, and the following was spread on their minutes:

> Resolved that the Distillers within the Borough of Lancaster be notifyd [sic], that by reason of many complaints of the Inhabitants, against their keeping and feeding so many swine during the summer season, thereby occasioning great nuisances and inconveniences to their Neighbors, they be requested for the future to prevent such complaints as the Law will certainly be informed against all so offending. (105)

These thunderings of the City Fathers did not permanently resolve the difficulty. When, in 1832, the fear of cholera epidemic precipitated a movement to clean up the sanitation nuisances of Lancaster, the swine problem again came to the front. At that time there were ten or twelve distilleries in full operation in the city with their hog pens emitting a stench which annoyed inhabitants in almost all parts of town, and it was asserted that the filth of the pens was a menace to the public health.[106] An exasperated correspondent of the *Lancaster Journal* urged that if the sanitation problem could not be solved otherwise, the removal of the hog pens from the city ought to be insisted upon and enforced.[107] In August, 1832, the Select and Common Councils of Lan-

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[100] *Lancaster Intelligencer*, Jan. 8, 1829; *Lancaster Journal*, April 10, 1829.

[101] *Intelligencer and Journal*, Feb. 18, 1840.

[102] *Congressional Debates*, 20th Cong., 1st Sess., p. 2108.

[103] Michael Krafft, *The American Distiller, or the Theory and Practice of Distilling . . .*, chap. 15 (cited hereafter as: Krafft, *The American Distiller).*

[104] *Lancaster Journal*, Jan. 28, 1825.

[105] Lancaster Corporation Book, Dec. 27, 1811.

[106] *Lancaster Journal*, June 29, 1832.

[107] *Ibid.*

caster were duly notified of the seriousness of the situation when the city Board of Health recommended that the distilleries within the city be compelled to remove their "pig pens" or to make provision for the sanitary disposal of the manure.[108] An investigating committee named to look into this matter reported that 100 to 150 hogs were kept constantly about each distillery. The committee was of the opinion that this stock represented such a large capital investment that the distillers could hardly be expected to remove their hog pens at once.[109] Since there were ten or twelve city distillers, it appears that there were 1200 to 1300 hogs in the distillery herds within the city of Lancaster at that time.

The data presented clearly indicate the importance of the stock-raising phase of the distilling industry. Although no examples have been found in Lancaster County, some American distillers in the early nineteenth century preferred cattle to swine. Herds of the latter appear to have been much more common at the distilleries, however.[110] The author of the *American Distiller* has considerable to say about the location and construction of the hog pens, and the care and feeding of the herds. A farm operated in connection with the distillery was held to be a decided advantage, for the strength of the distillery food was too strong for sows with young and hogs under sixty pounds. These required special food and attention such as they could receive under the fostering care of a farmer. It was generally calculated that a distillery working raw grain could feed fifty hogs for every five bushels of grain worked daily, but much depended upon the size of the hogs and the manner of working the grain. The same distiller recommended that, previous to killing, each hog should be fed in a separate pen, with at least two bushels of raw Indian corn, to harden the pork. With the necessary attention, he thought that each distillery should turn out annually three sets of hogs fattened for slaughter.[111] Thus it is clear that hog raising was big business in the distilling industry.

During the latter part of the eighteenth century, whiskey stills were numerous in Lancaster County, indicating that distillation reached considerable proportions there at an early date.[112] George Ross who represented the county in the Assembly in 1760 felt it necessary to issue a public denial of a rumor that he had suggested taxing Lancaster County stills. He presented a certificate to this effect signed by members of the Assembly, and thus presumably retained the goodwill of his constituents.[113] In 1810 the census reported 316 distilleries in the county. These produced in one year 1,438,484 gallons of whiskey valued at more than $800,000.[114] Judging from

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[108] Minutes of the Select Council of the City of Lancaster, Aug. 7, 1832.
[109] *Ibid.*, Aug. 11, 1832.
[110] Krafft, *The American Distiller*, p. 152.
[111] *Ibid.*, chap. 15.
[112] Luetscher, *Ger. Amer. Annals*, N. S., I, 204.
[113] *Pennsylvania Gazette*, Oct. 26, 1769.
[114] Coxe, *Arts and Manufacture*, pp. 58-59.

the number of gallons produced, the amount of grain consumed exceeded 500,000 bushels.[115] At this time Lancaster County led in whiskey production in Pennsylvania. Philadelphia City ranked second with 817,722 gallons, and York County placed third with 590,560 gallons. Measured by the dollar value of the total annual product, distillation was the most important industry of Lancaster County at that time, even flour milling and iron manufacture falling into second and third places respectively.[116]

The depression ushered in by the Panic of 1819 hit the local distilling industry very hard. Only seventy-six stills were reported in operation in 1820, as compared to the 316 distilleries in 1810. The consumption of corn and rye in 1820 was limited to 145,112 bushels, and the whiskey produced was valued at a mere $120,400.[117] The striking contrast in the statistics for 1810 and 1820 is accounted for primarily by the collapse of the farm produce market. There is also evidence that the county distillers felt the burden of taxation in this period. They held a meeting in November, 1815, after which the following item appeared in a local paper:

> The object of the meeting being understood to be, to have a petition prepared to circulate throughout the county, for signature, to be sent on to Congress, praying a repeal of the Law laying the *additional* duty on spirits distilled; and that if Congress, think it proper to continue a duty on stills, it may be laid upon the *capacity* of the still *only*; and if the present duty on the capacity should not be considered sufficient that it may be increased; but that there may be none on the *product* of the stills . . . . [118]

Within the two decades following 1820, the local distillation industry recovered and flourished. The 1840 census reported 102 distilleries in the county,[119] although it seems evident that the figures did not include some existing establishments which were not in operation at the time.[120] If the number of distilleries in 1840 is compared with the number in 1810, it appears that there was a marked decline in the industry between the dates indicated. This, however, is a misleading comparison, and a different picture emerges when attention is fixed on the whiskey produced rather than on the number of producing establishments. Then it is seen that the decrease of the distilleries was more than counterbalanced by the vast increase in the productive capacity of the smaller number in 1840. The 102 distilleries reported in 1840 produced 1,459,232 gallons in one year, or about 21,000 gallons more than the total production of the 316 distilleries in 1810. Stated differently, the average annual production per distillery in 1840 was 14 306 gallons as against an average of 4,552 gallons per distillery in 1810.[121] It also appears that some of the establishments in 1840 were not operating at full capacity[122]

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[115] Hazard, *Register*, I, 170; *Lancaster Intelligencer*, May 13, 1828

[116] Coxe, *Arts and Manufactures*, pp. 49-52, 71.

[117] U. S., *Manufacturing Establishments*, p. 16.

[118] *Lancaster Journal*, Nov. 20, 1815.

[119] *Compendium of the Sixth Census*, p. 138.

[120] *House Report* No. 168, 25th Cong. 3rd Sess.; C. B. Trego, A *Geography of Pennsylvania*, p. 270.

[121] *Compendium of the Sixth Census*, p. 138; Coxe, *Arts and Manufactures*, pp. 58-59.

[122] C. B. Trego, *A Geography of Pennsylvania*, p. 270.

This great increase in the productive capacity of the distilleries is to be accounted for by technological progress in the industry. Between 1805 and 1834 residents of Lancaster County alone were granted nine separate patents for distillation improvements, and all but one of these fell in the period after 1810.[123] There is evidence that the distillers were alert to technological change. Jacob Weitzell of Lancaster City patented a still on January 30, 1834, which saved fuel and increased the amount of spirits distilled from a given quantity of grain.[124] Within a little over a month, he had letters from four county distillers stating that they had used the apparatus with good success.[125] The advertisements of the manufacturers of distillation equipment also reflect the technological progress of the period. Thus one craftsman in 1832 was prepared to furnish "Distilling Apparatus of every kind, Stills with double heads, Patent Steam Works of the latest and most approved kinds."[126]

By 1843 the Lancaster County distilling industry had definitely passed its zenith and was in decline. Of the more than 100 distilleries, perhaps not over fifteen were in constant use. Only two of the twenty-eight in the City of Lancaster were in actual operation and those only upon a limited scale. The contemporary writer who reported these figures attributed the decline of distillation to the general prevalence of temperance.[127] Consequently an effort has been made to evaluate the strength, of the local temperance movement in the period to determine what effect this movement may have had upon the distillation industry.

Concerning the advance of temperance in Pennsylvania generally by the late 1830's, one writer states:

> The progress of the movement in the state as a whole as measured by the increase in the number of societies, by the establishment of temperance hotels, by the disbanding of breweries and distilleries, and by the signing of individual total abstinence pledges was phenomenal. (128)

Lancaster County, however, does not appear to have conformed very closely to the picture as drawn. There was no temperance society in Lancaster City in 1829, and the efforts of an agent of a state temperance organization to stir up enthusiasm for such a society at that time met with "chilling discouragement." Even those ministers and others friendly to the subjects of the agent's mission were unwilling to organize to promote them.[129]

There were several temperance societies in the county in 1831, but only one at Columbia was properly organized and active. Temperance advocates admitted in that year that no local distillery had discontinued operations.[130]

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[123] U. S. *Patents and Designs*, pp. 103-106.

[124] *Ibid.*, p. 106; *Lancaster Examiner*, Mar. 6, 1834.

[125] *Lancaster Examiner*, Mar. 6, 1834. See also, *Lancaster Journal*, Jan. 1, 1836.

[126] Lancaster Journal, Jan. 6, 1832.

[127] C. B. Trego, *A Geography of Pennsylvania*, p. 270.

[128] A. E. Martin "The Temperance Movement in Pennsylvania Prior to the Civil War," *Pa. Mag. of Hist. and Biog.*, XLIX, 204.

[129] Hazard, *Register*, IV, 60.

[130] Ibid., VIII, 236.

Taverns in Lancaster appear to have increased rather than decreased between 1831 and 1837.[131] However, temperance advocates were active at this time. Lectures were delivered and literature published.[132] There was a temperance hotel in Lancaster City in 1834.[133] Mr. Haines, proprietor of a country store at Quarryville, discontinued the sale of spiritous liquors in 1841 because of moral conviction. He was the first storekeeper in that section of the county to take this step, a revolutionary one in an age when the sale of liquors in grocery and general stores was common practice.[134]

It is evident from these data that the local temperance movement had some slight economic affects upon Lancaster County toward the close of the period of this study. However, there is very little to prove that the county distilling industry was seriously affected. Of course, it must be recognized that the advance of temperance in the country generally may have depressed the market for Lancaster County whiskey and in this way contributed to the decline of local distillation. However, it is very doubtful if the growth of temperance enthusiasm in Lancaster County specifically, or in the country generally, adequately explains the changes which took place in the county distilling industry about the close of the period of this study. Distillation had developed in part as a result of transportation difficulties. These, so far as Lancaster County was concerned, were largely resolved by the completion of the Columbia and Philadelphia Railroad in 1834 and the Susquehanna and Tidewater Canal in 1841.[135] Hence the local distilleries simultaneously felt the impact of the temperance movement and improved transportation. Any attempt to explain the decline of the distillation industry in the area must take both factors into account.

To complete the story of the grain consuming industries of Lancaster County before 1840, brief attention must be given to brewing. This industry had its beginnings in the eighteenth century. There were malt kilns in Lancaster Borough as early as 1745,[136] but since malt was used in distilling as well as brewing, this does not conclusively prove the existence of breweries at that time. Johannes Frick, carpenter and brewer died in Lancaster in 1760, and Isaac Whitelock had a "Brew House" there in 1772.[137] The following year the borough had two breweries.[138] Beer brewed in the borough enjoyed a considerable reputation in 1787. When the Moravian Brethren at Lititz considered starting a brewery in that year, they decided against it, because they felt they could not soon equal the good beer made in Lancaster.[139]

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[131] Hazard, *Register*, VIII, 236; *Lancaster Intelligencer*, July 25, 1837.
[132] *Lancaster Journal*, Mar. 6, 1835.
[133] *Ibid.*, Nov. 28, 1834.
[134] G. W. Hensel, *Reminiscences*, pp. 20-21.
[135] See Chapter IX'
[136] Lancaster Corporation Book, Feb. 1, 1745.
[137] Burial Records, Trinity Lutheran Church, Lancaster, Pa.; Lancaster Corporation Book, Sept. 14, 1772.
[138] Pennsylvania Archives, 3rd Series, XVII, 454-465.
[139] H. H. Beck, "Town Regulations of Lititz, 1759," Moravian Hist. Soc. Transactions, XI, 170.

County brewing never developed on a scale comparable to distilling. The number of brewers in the town of Lancaster only increased from two in 1773 to five in 1814.[140] Porter was also made there at the later date, as is evidenced by the presence of porter bottlers among the town artisans.[141] In 1810 four county breweries manufactured 770 barrels of brewery products.[142] The number of breweries increased to eight in 1840. These produced 100,018 gallons in one year, thus reflecting an expansion of the producing capacity of the individual brewery somewhat comparable to that previously noticed in connection with distilling.[143] There is no evidence of the export of brewery products, and it may be inferred that these were disposed of locally. Thus a Columbia brewery in 1833 supplied beer to that borough, two or three neighboring villages, and the surrounding countryside.[144]

It is evident that the mill industries occupied a very prominent place in the early economic life of Lancaster County. Their services and productions supplied many of the needs of the expanding local market for consumer goods, and contributed largely to the export trade of the county. Distilling was also very important throughout the period studied and, along with brewing and flour milling, filled a role of special significance in helping to absorb the grain surpluses of this predominantly agricultural region.

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[140] Lancaster Borough, Return of Assessment, 1814, Lancaster County Archives (cited hereafter as: Lancaster Borough Assessment, 1814).

[141] *Ibid.*

[142] Coxe, *Arts and Manufactures*, p. 59.

[143] *Compendium of the Sixth Census*, p. 138.

[144] *Lancaster Journal*, June 28, 1833, Jan. 8, 1839.

CHAPTER IV

CHARCOAL FURNACE AND FORGE INDUSTRIES

There were in 1786 also, within thirty-nine miles of the town [Lancaster], seventeen furnaces, forges, rolling mills and slitting mills . . . —Tench Coxe, 1794

Lancaster County enjoyed many natural advantages for the development of an iron industry in the eighteenth and early nineteenth centuries. Iron ores of commercial value occurred at several places within the present boundaries or close at hand. Of special interest to this connection, are the famous Cornwall magnetic iron deposits in what is now the southern part of Lebanon County, which have been in continuous production since the first half of the eighteenth century. Cornwall ore and pig iron were utilized in a greater or lesser degree by a number of the ironworks erected before 1840 within the present boundaries of Lancaster County, although ores scattered over the county were also used.

Prior to the canal and railroad eras, iron smelting establishments were of necessity located within convenient wagon haul of the ore beds. Thus, the exploitation of the iron deposits of Lancaster County and vicinity required the construction of blast furnaces in the neighborhood. Local streams provided adequate water power facilities for furnace and forge, while the heavy forests and surface rocks supplied the essential charcoal fuel and limestone flux. Forges naturally tended to be erected at or near the furnaces which supplied the pig metal, although the former works were somewhat less directly affected by the problem of transportation and could therefore be located with more freedom. An expanding population in the interior counties of southern Pennsylvania created a local market for iron, and Conestoga wagon freighting, canals, and the Columbia and Philadelphia Railroad solved the problem of lack of convenient natural means of transportation to city markets.

According to the traditions of the area, the progenitor of the iron industry in Lancaster County was a man named Kurtz who established a bloomery forge on the Octoraro Creek in 1726.[1] However, proof is lacking, and the Kurtz forge must be relegated to the category of unknowns. The first significant developments in the local iron industry occurred in the north soon after the opening of the famous Cornwall mines by Peter Grubb about 1740. On his Cornwall estate, Grubb built Hopewell Forge whose echoing hammer helped to fix the appropriate name of Hammer Creek upon the stream on

[1] Hazard, *Register*, VII, 150, VIII, 128; W. H. Egle, *History of Pennsylvania*, p. 816.

which it was located.[2] This forge, one of the earliest ironworks within the present boundaries of Lancaster County, marks the beginning of a group of iron manufactories which collectively embraced what may be called the northern charcoal iron region. By the close of the eighteenth century, three forges and three blast furnaces had been erected among the wooded hills of this region which stretched eastward along the northern boundary from the lower reaches of Conewago Creek to Furnace Run in Elizabeth Township.[3] Economically these works were a part of the great system of iron manufactories which was oriented around the Cornwall mines.

One of the furnaces in this northern group is of special interest. Erected about 1750 by John Jacob Huber on a stream subsequently known as Furnace Run, this works marks the beginning of blast furnace operations in the county. Here soon appeared the legendary figure of Henry William Stiegel in search of mate, fame, and fortune. With some partners he acquired Huber's furnace and replaced it with another named Elizabeth. Later came the young Robert Coleman to acquire an interest in Elizabeth Furnace and apply his genius for organization and finance to the task of layig well the foundation for his career as the foremost ironmaster of his day.

A second important group of iron manufactories occupied what may be designated as the eastern charcoal iron region of the county. These works, consisting of forges only, were scattered along a crescent with its northern tip near Churchtown and its southern terminus below Christiana.[4] They were erected during a period extending from the 1740's to the first decade of the nineteenth century.[5] The concentration of iron works in this area was due to the attraction of the excellent water power sites in the headwaters of Conestoga, Pequea, and Octoraro creeks.

A third group of iron manufactories was spread between the lower course of Pequea Creek and the mouth of the West Branch of Octoraro Creek.[6]

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[2] For the dates of the erection of the various eighteenth century ironworks, see the list in A. C. Bining, *Pennsylvania Iron Manufacture in the Eighteenth Century*, pp. 187-192. The locations of most of the works mentioned in this chapter will be found on one or both of the following maps: Joshua Scott, *Map of Lancaster County, Pennsylvania*, 1824, and Joshua Scott, *Map of Lancaster County, Pennsylvania*, 1843.

[3] Hopewell Forges, Speedwell Forge, and Elizabeth, Mount Hope, and Mount Vernon Furnaces. The last-named furnace was erected in 1800 to complete this group of works. In the Supreme Court for the Middle District of Pennsylvania, Coleman v. Coleman, Appeal of R. and G. D. Coleman, p. 11, *Alden's Appeal Record*. This particular pamphlet is missing from some copies of *Alden's Appeal Record*.

[4] Windsor, Poole, Spring Grove, Buckley's, Ringwood, Duquesne, and Sadsbury Forges.

[5] Ringwood Forge which completed this group of works was erected prior to 1808. *Lancaster Journal*, Dec. 23, 1808.

[6] Martic, Mount Eden, Conowingo, and Rock Furnaces; Martic, Pine Grove, Rock, Colemanville, and White Rock Forges; Martic, Conowingo, and Colemanville Rolling and Slitting Mills.

Here in the southern charcoal iron region the first efforts were made to work native Lancaster County ores. Martic Furnace, the pioneer southern ironworks, was erected soon after the middle of the eighteenth century in the lower valley of Pequea Creek. Its ore bank lay within easy teaming distance. A large forge was soon erected about four miles from the furnace, and the first rolling and slitting mill in the county was operated at this forge in 1783.[7] No more works were erected in the southern charcoal iron region until 1800, but from that year to 1840 nine new furnaces, forges, and rolling and slitting mills were erected.[8] Neither of the other charcoal iron regions showed early nineteenth century growth at all comparable to that which took place in the south. The expansion of the southern iron industry in this period is to be accounted for by the discovery and exploitation of new iron ore deposits, the existence of good undeveloped water power sites, the cutting off of British iron imports during the period of the Embargo, Non-intercourse, and the War of 1812, and the protection granted to the iron industry in the tariffs of the 1820's.

Measured by the number of works erected, the eighteenth century growth of the county iron industry was registered largely in the northern and eastern charcoal iron regions. By the latter part of the eighteenth century, the town of Lancaster was situated near the center of perhaps the greatest inland industrial concentration in the nation. Within a radius of thirty-nine miles around the town in 1786, there were no fewer than seventeen furnaces, forges, and rolling mills and the number was increasing.[9] About half of these actually lay within the county boundaries.

In the early nineteenth century, numerous busy ironworks made Lancaster County a leader in the iron industry. The night skies glowed in 1810 from the fires of four blast furnaces, and the hills recounted from the hammer strokes of eleven forges. Furnace production in that year amounted to 4,200 tons, while forge output totaled 2,270 tons. At the time, Lancaster County ranked second among the three leading forge counties of Pennsylvania in number of works, being topped only by Berks County with twenty-two forges. However, the production records of the Lancaster County forges were far superior to those of their Berks County competitors, for eleven of the former produced only slightly less bar iron than twenty-two of the latter. This shows that the Lancaster County works were relatively large and active.[10]

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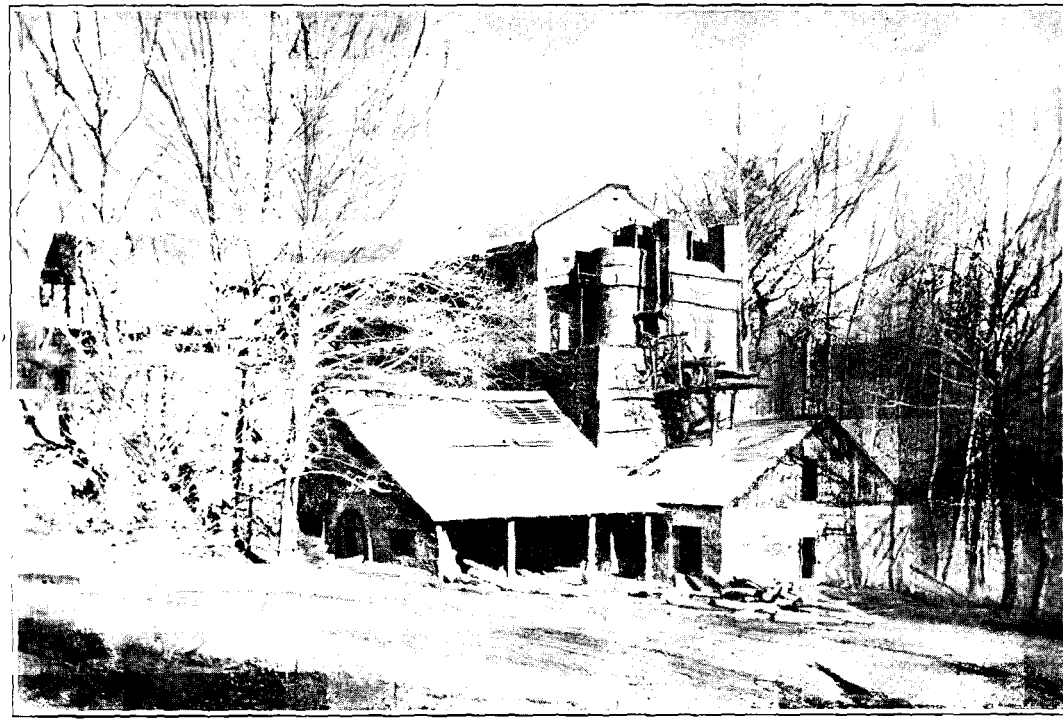
[7] *Pennsylvania Gazette,* April 6, 1769; S. G. Hermelin, *Report About the Mines in the United States of America, 1783,* pp. 73, 75.

[8] Joshua Scott, *Map of Lancaster County, Pennsylvania,* 1843; Appendix to the Report of the Committee on Statistics, *Documents Relating to the Manufacture of Iron in Pennsylvania* (cited hereafter as: *Pennsylvania Iron Documents.*

[9] Coxe, *View,* p. 313.

[10] Coxe, *Arts and Manufacturers,* pp 49-50. Chester County ranked next below Lancaster County with ten forges in 1810.



Mount Hope Furnace — Built By Peter Grubb In 1785
Converted To Hot Blast By A. Bates Grubb.

The sheet iron and tin plate industry had reached fair proportions in the county by 1810, for six trip or tilt hammers were employed in the local plating mills.[11] No slit iron was produced during the census year, but Martic Rolling and Slitting Mill manufactured 220 tons of rolled iron.[12] There was also a small blister-steel industry with an annual output of 110 tons. A steel furnace was located in Little Britain Township at this time, and steel was also made at Martic Forge at least as early as 1817.[13] About 1810 the annual value of the total products of the ironworks mentioned thus far was $436,000. Since distillery and flour mill manufactures had a value of approximately $810,000 and $787,000 respectively for the census year, it is evident that primary iron manufactures ranked a poor third.[14]

The year 1808 marks the end of a period of relative quiescence in the southern charcoal region of the county, the only one of the three which registered significant growth in the early nineteenth century. Martic Furnace, the first works erected in the south, fell into financial difficulties in the 1760's and was permanently out of blast at the close of the Revolution.[15] Although Pine Grove Forge was erected near the mouth of the West Branch of Octoraro Creek about 1800, no new smelting establishment was built to utilitize the southern county ores until about 1808 when George Withers and Company constructed Mount Eden Furnace on a branch of Octoraro Creek in the present Eden Township.[16] With the erection of this furnace, the first of two major periods of early nineteenth century development in the southern charcoal iron region began.

The early appearance of manufactures in southeastern Pennsylvania created a situation favorable to the rise of protectionist sentiment. Along with other industrialists who felt their interests threatened by the unrerestricted importation of foreign goods, especially British, the iron manufacturers gravitated naturally toward the tariff principle and helped to supply the dynamic for the early protectionist movement. Thus Lancaster County ironmasters such as Robert Coleman, David Jenkins, and James Old, along with iron industrialists of Pennsylvania, sought in the 1780's to persuade the Pennsylvania General Assembly to pass protective legislation favorable to the state iron industry.[17] The protectionist movement, however, never became strong and general in the state prior to the War of 1812, due to the relative indifference of the farmers who constituted the majority of the population.

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[11] Gun barrel boring mills commonly employed trip hammers also, and one such mill was reported in the county in 1810.

[12] *Lancaster Journal*, Feb. 28, 1817.

[13] Little Britain Township Assessment List, 1810, Lancaster County Archives; *Lancaster Journal*, Feb. 28, 1817.

[14] Coxe, *Arts and Manufactures*, pp. 49-52. 58-59, 71.

[15] Deed Book O, pp. 177-178; *Pennsylvania Gazette*, April 6 1769; S. G. Hermelin, *Report about the Mines in the United States of America, 1783*, pp. 72-75.

[16] Bart Township Assessment List, 1808, Lancaster County Archives.

[17] *Minutes of the General Assembly of the Commonwealth of Pennsylvania*, Nov. 30, 1785, 10th Assembly, 1st Sess.; J. M. Swank, *A History of the Manufacture of Iron in All Ages*, pp. 371-372.

Referring to conditions in Pennsylvania toward the close of the eighteent century, Eiselen concludes: "Protection, as a general principle, was supporte by the industrialist, tolerated by the farmer, and regarded with hostility an suspicion by the merchant."[18]

The cutting off of British imports in the early nineteenth century as consequence of the Embargo, Non-intercourse Act and War in 1812 was great boon for the Pennsylvania iron industry. Prosperity was the rule an new iron manufactories were thrown into operation. In Lancaster Count this period marks the first major expansion in the southern charcoal iro region where several new works including Mount Eden and Conowingo fu naces, Conowingo Rolling and Slitting Mill, and at least one forge wer erected.[19] Following the Peace of Ghent, the long restrained flood of Britis goods began, to the dismay of American manufacturers who now saw them selves threatened with disaster. As passed by Congress the tariff of 181 imposed higher duties on cotton and woolen goods, and iron, all of which i was designed to protect, although it failed to do so. Its defects quickly becam apparent to the Lancaster County manufacturers of iron and other products Their sentiments reflected in the following newspaper announcement of meeting of the friends of domestic manufactures:

> The exertions that are making by our trans-atlantic brethren [sic] to suppress the manufacturing of every thing, from a hobnail upwards in this country, calls [sic] loudly for counter exertions on our part.
>
> Policy — patriotism & self-interest demand effort. The example set by our fellow-citizens of New York, Philadelphia, Baltimore Pittsburgh, Washington, & other places, ought to be followed; and it is earnestly hoped, that in the county of Lancaster, where so many useful manufacturing establishments are in operation, the citizens will not be backward in giving countenance to the exertions of their brethren in other parts of the United States. ([20])

The "counter exertions," in which local ironmasters such as Robert, James and Edward Coleman played an active part, took various forms. In 1817 the friends of the tariff formed an organization known as the American Society of Lancaster County for the Promotion of Domestic Manufactures and National Industry to give local voice to the cause of protection and to co-operate with similar groups throughout the nation.[21] Lancaster newspaper editors and others urged the use of domestic manufactures in preference to imported goods on the grounds of both patriotism and self-interest, and in 1819 a public meeting for the promotion of domestic manufactures named a committee to prepare a petition to Congress for "the effectual and permanent protection of every essential domestic manufacture."[22] This early tariff movement, sparked

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[18] Eiselen, *Pennsylvania Protectionism*, p. 25.

[19] Lancaster County Assessment Lists, Bart Township, 1808, Drumore Township, 1812, Colerain Township, 1813, 1817, Lancaster County Archives; Deed Book, 7, pp. 580-593.

[20] *Lancaster Journal*, Feb. 28, 1917.

[21] *Ibid.*, Mar. 5, 28, 1817. See also, *Ibid.*, Oct. 8, 1819.

[22] *Ibid.*, Feb. 28, 1817, June 25, Oct. 8, 1819; *Intelligencer, and Weekly Advertiser*, July 10, Aug. 21, 1819.

by the county industrialists and strongly supported by the press, publicized the tariff issues and facilities the subsequent conversation of the farming majority to the protectionist position.

By the time of the Panic of 1819, the Lancaster iron industry was in great distress. Only six forges were in production in 1820 as compared to eleven in 1810. The annual forge consumption of pig iron in 1820 was 1200 tions, and the forged iron had a market value of $80,000.[23] Thus forge production by weight was only about half of what it had been ten years before, while the dollar value of the total annual output was less than one-third of its former amount. Difficulties for the ironmasters were paralleled in this period by serious problems for the farmers. As a result of the collapse of their market, the latter were rudely jolted out of their complacent tolerance of the tariff to become its ardent advocates. Protection, which in Lancaster County had previously been an objective sought by an industrialist minority, now became the rallying ground for the rank and file of the population.[24]

Backed by the active goodwill and support of their agricultural neighbors, the county ironmasters and other industrialists were now in a much stronger position to plead their case for protection. In James Buchanan, their national representative, they found an able exponent of the American System. Speaking in 1823, Buchanan pointed out that many ironmasters had been ruined by foreign competition. Some, he admitted, were prospering, but these were men who had acquired sufficient wealth to survive the recent crash and who had good local markets at some distance inland where transportation costs placed imported British iron at a disadvantage. He asserted that, as a result of decreased domestic competition, inland iron manufacturers had monopolized local markets to the disadvantage of the farmer who had to pay higher prices for his iron. Hence Buchanan was decidedly in favor of a small additional duty upon foreign iron at this time.[25] Since his constituency was predominantly agricultural, however, he was opposed to any prohibitory duty upon iron, for this would have unduly elevated its price in the domestic market. The increased protection of the iron interests in the tariff of 1824 pleased Buchanan, the ironmasters, and the people of Lancaster County generally, and the same may be said for the new iron duties in the tariff of 1828 which was so enthusiastically endorsed in the area.[26] In the favorable atmosphere created by this protection, a further expansion of the iron industry occurred in the southern charcoal iron region of Lancaster County where Colemanville and White Rock forges and Colemanville Rolling and Slitting Mill were erected.[27]

During the high tide of protectionist sentiment in the early 1830's, the local ironmasters were alert and vocal with regard to their interests. In October, 1831, while a free trade convention was in session in Philadelphia,

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[23] U. S. *Manufacturing Establishments*, p. 16.

[24] See Chapter II.

[25] *Annals of Congress*, 17th Cong. 2nd Sess., pp. 903-904, and see also, *Ibid*, 18th Cong. 1st Sess., pp. 1709-1710.

[26] See Chapter II.

[27] *Pennsylvania Iron Documents.*

Lancaster County friends of American industry met to appoint delegates to a pro-tariff gathering of mechanics, manufacturers, and agriculturalists scheduled for New York City. The inclusion of a number of prominent ironmasters such as James Hopkins, Cyrus Jacobs, and James Sproul in the delegation to represent Lancaster County at the New York tariff meeting testifies to the activity and influence of these men in the local protection movement at that time.[28]

The tariff act of 1832 removed the abominations of the preceding tariff but retained the protective system. Thus it was generally acceptable to Pennsylvania protectionists. Then came the rude shock of the compromise tariff of 1833 with its plan for drastic reductions on various articles including iron. This naturally aroused the resentment of the friends of the tariff. However, several factors cushioned the impact of the new rate schedules. The scheme of graduated downward revision spread the effects of the changes over a number of years in such a way as to postpone the most painful blow until after the close of the period under discussion. Furthermore, business conditions remained stable for a number of years following 1833. When the financial crisis of 1837 broke, banking and currency problems were in the foreground and tariff tended to be in eclipse. While the Lancaster County iron industry was somewhat depressed in the year of the Sixth Census this is readily explained by reference to the economic dislocations caused by the panic, and no casual connection with tariff changes prior to that time can be shown.

The iron ring which was being forged about Lancaster in 1786 had become more pronounced by 1840, at which time the city lay near the center of the principal iron region of eastern Pennsylvania. Within a radius of fifty miles, there were 102 furnaces, forges, and rolling and slitting mills.[29] However, the picture of the iron industry within the limitations of the Lancaster County boundaries was not radically altered from what it had been in 1810, except in one important respect. The innovation was the appearance of the cupola foundry signifying the rise of a new branch of the casting business destined eventually to limit the operations of the blast furnaces to the production of pig iron. Eleven furnaces were reported in the county by the 1840 census,[30] but since not more than four or five blast furnaces were in operation at that time, it is evident that the census figure includes a number of cupola foundries which had been erected in the 1830's in Lancaster and along the route of the Columbia and Philadelphia Railroad.[31] Thus the number of the county blast furnaces was about the same in 1840 as it had been thirty years earlier. Forges and rolling and slitting mills in 1840

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[28] *Lancaster Journal*, Oct. 14, 28, 1831; *Lancaster Examiner*, Oct. 27, 1831.

[29] *House Report* No. 168, 25th Cong. 3rd Sess.

[30] *Compendium of Sixth Census*, p. 130.

[31] Only Elizabeth, Mount Hope, Conowingo, and Rock, or Black Rock furnaces were in operation in 1838. *House Report* No. 168, 25th Cong. 3rd Sess. The cupola foundries will be discussed in the next chapter.

numbered only fourteen as compared to twelve in 1810.[32] The small gain in total number of blast furnaces, forges, and rolling and slitting mills over the thirty-year period under consideration is less than might be expected, in view of the marked expansion of the iron industry in the southern charcoal iron region after 1808. The explanation lies in the fact that a number of the works counted by the census in 1810, or erected thereafter, did not remain in continuous operation until the close of the period under discussion, and the net gain in number of works as registered by the census in 1840 was therefore small. Capital investment in the ironworks in 1840 was relatively heavy. amounting to $420 500, or somewhat more than one-third of the total capital invested in all of the county manufactures at that time. Including mining, the iron industry employed 784 men. In eastern Pennsylvania, only Berks County exceeded Lancaster County in men employed and money invested in the iron business at that time.[33]

Apart from the cupola foundry which began to take over the casting business from the blast furnaces in the 1830's, there were no important technological changes in the county iron industry during the period of this study. Power for blast and hammer continued to be supplied by the patient water wheels. The furnaces which universally ran cold blast, employed only charcoal fuel. As the period closed, however, a veritable technological revolution was at hand. Within a decade, the steam engine, hot blast, and anthracite fuel would all be used on a considerable scale, increasing iron yields and decreasing production costs. Freed from dependence upon the streams and charcoal forests, new furnaces would seek out the sites offering the greatest economies in transportation of coal, ore, and marketable iron. Columbia and vicinity, with excellent water and rail connections, and surrounded by brown hematite deposits including the famous Chestnut Hill ore banks, would attract most of these new furnaces as a magnet to become by the middle of the nineteenth century the anthracite iron capital of Lancaster County. It was indeed a new iron age which in 1840 was waiting to be born.[34]

Much of the iron produced during the period under consideration found an outlet in the local market. Its abundance fostered the rise of numerous secondary iron manufactures, and a wealth of iron products poured from the shops of the blacksmiths, gunsmiths, nailsmiths, locksmiths, tin plate and sheet iron workers, and other craftsmen in iron.[35] The steady increase of population had the effect of constantly enlarging the local market for iron goods, which in turn stimulated both the primary and secondary phases of the iron industry. Toward the close of the period studied, the new local uses made of iron in agricultural and railroad equipment, and the rise of the cupola foundry and machine shop industries, also had a stimulating effect. The furnaces and forges supplied much more iron than the local farms, homes, and shops could consume, and it was necessary for the ironmasters

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[32] *Compendium of Sixth Census*, p. 130.
[33] *Ibid.*
[34] *Pennsylvania Iron Documents.*
[35] Secondary iron manufactures will be discussed in Chapter V and VI.

to seek export markets. Hence in the eighteenth and early nineteenth centuries the huge Conestoga wagons laden with Lancaster County pig and bar iron rumbled along the roads to Baltimore, Wilmington, and Philadelphia.[36] Completion of the Conestoga Slack-water Navigation in 1829 and the Columbia and Philadelphia Railroad in 1834 offered new and cheaper facilities for the transportation of the iron of the county.

The financing of the iron works often presented difficult problems. Capital was secured from a variety of sources, merchant capital being one of the most important of these. Thus Charles and Alexander Stedman, two of Stiegel's partners in Elizabeth Furnace, were Philadelphia merchants, as was Daniel Benezet who held the mortgage against the furnace when Stiegel failed.[37] Local merchants also made funds and credits available to the ironmaster. William McCord, Lancaster merchant in the eighteenth century, engaged freely in the money lending business. During a period of several months in 1765, he made several cash advances to James Old and the latter eventually settled his account in full with bar iron.[38] McCord's books also show that he advanced considerable merchandise and cash to the operators of the Martic works. Thus on February 9, 1764, he loaned £21-0-0 to the company.[39] Frequently the ironmasters gave orders for McCord to pay cash or merchandise to others, much as checks are written today. Sometimes the accounts involved were small as, for example, the payment on February 2, 1767, of £0-10-0 to Samuel Reese on the order of Curtis Grubb.[40] In other instances considerable sums were involved. Thus over a period of two or three years, McCord paid hundreds of pounds to Curtis Grubb on the orders of Nathaniel Giles, and the latter settled his account with bar iron.[41] That transactions of his type were common, is suggested by the large amounts of iron which came into the possession of McCord and Charles Hamilton, a Lancaster merchant contemporary of McCord. This iron was sent down to Philadelphia to be applied on the Lancaster merchants' accounts with their city agents.[42] During May, 1775, Robert and William Coleman sent more than 600 iron bars to Philadelphia to be applied on Hamilton's account with his agent, John Mitchell.[43] From the nature of these transactions, it may be inferred that the Lancaster merchants were supplying the ironmasters with short-term capital for current operations, rather than with long-term investment funds.

Wealth accumulated in pursuits other than merchandising and trade also found its way into the local iron industry. Agricultural capital occasionally

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[36] William McCord, Ledger and Daybook, 1763-1767; *House Report* No. 168, 25th Cong., 3rd Sess.; *Lancaster Intelligencer*, Mar. 20, 1838; *Pennsylvania Iron Documents*; Ebeling, *Die Vereinten Statten*, IV, 679-680.

[37] Deed Books, E, p. 294; P, p. 55.

[38] William McCord Ledgers, 1761-1766, 1764-1767.

[39] William McCord Ledger and Daybook, 1763-1767.

[40] *Ibid.*

[41] William McCord Ledger, 1764-1767.

[42] *Ibid.*; Hamilton to Mitchell, Feb. 22, April 9, June 20, Sept. 17, 1774, Mitchell Correspondence, 1773-1776.

[43] Robert and William Coleman statements of bar iron shipped. John Mitchell Correspondence, 1773-1776.

made its contribution.[44] John Barr, one of Stiegel's partners in Elizabeth Furnace, was an inn keeper in Lancaster, and James Hopkins who bought an interest in Conowingo Furnace in 1825 was a lawyer in the same city.[45] Later the iron investments of the Hopkins' family were expanded by the purchase of the Conowingo Rolling and Slitting Mill.[46]

Earnings and profits made in the iron business represented another important source of capital. Some men who became ironmasters were able to work their way up from the bottom of the ladder where they began as mere employees at furnaces and forges. As such men accumulated some savings, they were able to buy into the iron business on a small scale. Then by turning profits into additional investment, a process strikingly illustrated in the rise of Robert Coleman, they gradually built up their estates. Sometimes their financial progress was accelerated by advantageous marriages. Henry William Stiegel married Elizabeth, daughter of John Jacob Huber, while Robert Coleman and Cyrus Jacobs both married daughters of James Old. Such marriages offered inheritance and other benefits pertaining to capital.[47]

All of the Lancaster County ironworks prior to 1840 were operated as individual enterprises or partnerships. Much use was made of the latter form of business organization which permitted two or more persons to pool their capital and credit resources. A three-man partnership operated Martic Furnace and Forge in 1769, but even their combined means provided inadequate to stem the tide of disaster and their furnace and forge properties were seized by the sheriff.[48] Another partnership acting as George Withers and Company operated for a time both Mount Eden and Conowingo furnaces in the southern charcoal iron region.[49] A good example of one of these partnership agreements is that formed in 1813 by the four men who built Conowingo Rolling and Slitting Mill. This estate in Drumore Township, together with water rights, was held by the partners in common or undivided. John Neff and Francis Kendig owned one-third of it jointly, and Thomas Crawford and George White each owned an additional one-third. It was agreed that capital should be provided according to the same schedule, but to start the project Neff and Kendig advanced all monies, and Crawford and White each became debtor for one-third of the sums invested.[50] This enterprise underwent at least two reorganizations before the mill passed into the hands of Robert Coleman in 1824.[51]

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[44] Will Book P, vol. 1, p. 481, Office of Lancaster County Register of Wills.

[45] Deed Books, E, p. 294; vol. 5, p. 153; Lancaster Borough Assessment, 1814.

[46] Deed Book U, vol. 6, p. 75.

[47] Jasper Yeates to Edward Burd, Mar. 27, 1788, Potts Manuscript Collection.

[48] Deed Book O pp. 177-178; *Pennsylvania Gazette*, April 6. 1769

[49] Lancaster County Assessment Lists, Bart Township, 1808, Drumore Township, 1812, Lancaster County Archives.

[50] Deed Book 7, pp. 580-593.

[51] *Lancaster Journal*, Jan. 30, 1818, Jan. 7, 1820; Deed Book C, vol. 5, pp, 224-227.

The partnership interest could be transformed or sold, provided that the legal requirements of the agreement were not disregarded. Examples of such transactions are not uncommon in the early Lancaster County iron industry. Thus James Sproul purchased a one-fourth interest in Sadsbury Forges from Michael Withers in 1825, and Robert B. Cobeen of Bristol, Bucks County, bought a one-fourth share in Rock Furnace in 1840.[52] Toward the close of the period under discussion, Rock Furnace represented an interesting pooling of capital from different localities. In 1837 it was sold by Amzi Babbit, Philadelphia ironmaster, to three partners Charles Brooke, Jr. of Lancaster County, Clement Brooke of Berks County, and Matthew Brooke Buckley of Philadelphia.[53] These names suggest family connections between the partners, and the furnace was evidently carried on as a joint family enterprise for some time thereafter. The purchase of a share of this works by Robert B. Cobeen, of Bristol, added Bucks County capital to the investment list.

Several of the important Lancaster County ironmasters have been referred to in the preceding pages. The one who stands out above all others is Robert Coleman. Beginning at the bottom of the scale as an ironworks employee he worked his way upward to become the foremost and wealthiest ironmaster of his day. Joshua Gilpin, who met him in Lancaster in 1809, refers to his as ". . . one of the most respectable men in Pennsylvania & one of the wealthiest in the United States." Coleman told Gilpin that he made annually 2,000 tons of pig and 1,100 tons of bar iron.[54] In 1814 the assessor found that Robert Coleman owned fifteen houses and shops in Lancaster Borough and fixed their value for taxation at $38,000.[55] When this great ironmaster died in 1823, his Lancaster County ironworks included Elizabeth Furnace, Hopewell, Speedwell, and Martic forges, and Conowingo Rolling and Slitting Mill. In addition, he owned Cornwall and Colebrook furnaces in Lebanon County and Spring Forge in York County. Upon his decease, these vast estates passed into the hands of his four sons, William, James, Edward, and Thomas, who kept the Coleman name and tradition alive for many years in the county iron industry.[56] Another later ironmaster worthy of special notice is James Sproul who came into prominence in the eastern and southern charcoal iron regions of the county in the early nineteenth century. He was styled an ironmaster in Sadsbury Township at least as early as 1815.[57] In 1828 he purchased Conowingo Rolling and Slitting Mill from the heirs of Robert Coleman and operated it for about thirteen years.[58] He was primarily

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[52] Deed Books, O, vol. 5, p. 280; R, vol. 6, pp. 143-146.

[53] *Ibid.*, I, vol. 6, pp. 299-301.

[54] Gilpin, "Journal," *Pa. Mag. of Hist. and Biog.*, L, 74.

[55] Lancaster Borough Assessment, 1814.

Wills; Deed Books, C, vol. 5, pp. 224-227; I, vol. 5, p. 368.

[56] Will Book O, vol. 1, pp. 347-351, Office of Lancaster County Register of

[57] Deed Book 13, p. 4.

[58] *Ibid.*, I, vol. 5, p. 368.

a forge master, however, and when he died in the 1840's his estate included Sadsbury. Ringwood, and White Rock forges.[59]

Today only a few dam sites and buildings remain to mark the location of the charcoal iron plantations of Lancaster County. Slowly but surely the iron manufactories which once dominated these estates were forced to yield before the inexorable march of technology and economic change. From about the middle of the eighteenth century to the close of the period studied, however, the smoking blast furnaces and reverberating forge hammers of the charcoal iron era proclaimed the presence of a manufacturing industry of the county, and one which alone among the three leading manufactures in the early nineteenth century did not draw its raw materials from the productions of the farms.

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[59] Deed Book 13; *Pennsylvania Iron Documents.*