JENKINS BRICK COMPANY, PLANT NO. 2
Furnace Street
Montgomery
Montgomery County
Alabama

HAER No. AL-185

HAER
AL-185

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C St. NW
Washington, DC 20240

HISTORIC AMERICAN ENGINEERING RECORD

JENKINS BRICK CO. INCORPORATED

HAER No. AL-185

Location:	Furnace Street UTM: 16.564360.3584340 Quad: Montgomery, Alabama
Date of Construction:	1906, 1922, 1926, 1941
Designer/Engineer/Fabricator	Kilns: Minter System, Columbus, Georgia
Present Owner:	Jenkins Brick Company
Present Use:	Architectural Stone Products
Significance:	The most distinctive feature of the site today is the set of twelve remaining Minter System down draft kilns. Constructed in 1923, 1925, and 1941, the kilns are part of a waste-heat reuse system that brought heat from cooling kilns back to the dryer tunnels and to other kilns in various stages of the burning process. In use in various parts of the United States and Canada, Minter kilns were most popular with Southern brickmakers. These are some of the last of the Minter System kilns still in existence.
Historian:	Richard O'Connor, 1999

Project Information:

This project was part of the documentation of the industrial south that has been part of the HAER program since 1992.

Chronology

1899	Jenkins Brick Company established, Wetumpka, Alabama
1906	Jenkins incorporates and constructs Plant #2 (Montgomery plant)
1910	JBC purchases the Holt Brick Company, Montgomery
1912	Decides to make tile at Wetumpka
1912	Plant #1 (Wetumpka plant) closes
1924	Plant #3 (old Holt plant) closes
1923-25	Minter System kilns (9) and dryer tunnels installed at Plant #2
1926-27	Minter System expanded to 19 kilns
1937	Kilns converted from coal to natural gas
1941	Two additional Minter System kilns added
1959	Coosada Plant opened
1966	New Montgomery Plant opened
1970s	Minter Kilns converted from natural gas to coal
1976 ?	Montgomery plant #2 closed

Introduction

Jenkins Brick Company was founded in 1901 in Wetumpka, Alabama, a small community in Elmore County approximately 10 miles north of Montgomery, the state capital. According to legend, John Michael Jenkins I, an engineer on the Louisville and Nashville railroad, bee-keeper, and bee-hive maker, wanted to expand his bee-hive factory, replacing a wood-frame building with a two-story brick structure. Either unable to find sufficient brick, or unwilling to pay the price demanded, he purchased a used brick-making machine and made his own, burning them in a clamp kiln. "The local market and adjacent territory bought liberally of us," Jenkins later recalled, "and we soon became interested, began to improve the plant and install first class equipment, including kilns for burning."[1] As the business grew, he sought a larger market and source of clay, purchasing an old brickyard and clay pit on the Alabama River in Montgomery and constructing a new plant that opened in 1906 and continued in operation until the mid-1970s. Jenkins Brick Company still makes brick at two other sites, one just three miles north of the original Montgomery site, and the other in nearby Coosada. It is one of the few locally-owned brick manufacturing operations remaining in the United States.[2]

Since its founding, the company has supplied a variety of clay construction products to builders throughout central and south Alabama, Georgia and Florida. During much of its history, Jenkin's main product was common building brick, described by the company as "90% hard, and...as good a uniform red color as you can get."[3] When shipped as unloaded from the kiln, they were known as "kiln run," but

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[1] J.M. Jenkins, "Brick." Paper read before the Rotary Club, Montgomery, Ala., 4/21/15 (typescript in files); obituary information on his father supplied by John Michael Jenkins II to T.A. Randall & Co., publisher of *The Clay-Worker*, 5/25/11 (typescript in files).

[2] "From Bee Hives to Brick Kilns," *The Clay-Worker* (October, 1927), 261-265; "Jenkins Brick Co. Dries Hollow Tile by Radiation with Less than 1% Loss," *Brick and Clay Record* (October, 1948), 53-56.

[3] JBC to J.A. Blunt, 2/18/16.

when drawn from the center of the kiln – which burned most uniform – they were called "Select Reds."[4] In the early 1920s, the company began production of face brick, distinguished from common building brick by its extra hardness, sharp edges, smooth or custom finished face, and specific color, and, by 1937, displayed ten different varieties of brick at the Architect Sample Room in the Federal Warehouse in Washington, DC.[5] In addition to common and face brick, Jenkins also produced lower quality "salmon" brick, which was not as hard and was not recommended for outside construction, and "clinker" brick, which was over-burned with a rough texture. The company also made a variety of tile, beginning with drain tile, chimney flue lining, and common partition and load-bearing building tile, but later moving into specialty building tile, such as the Denison Interlocking. Although shipping to Georgia and throughout Alabama, the abundance of good-quality clays in these states encouraged competition, and the company focused its market on central and southern Alabama and Florida. High freight rates also restricted the scope of the market. Customers ranged from the Federal, State and local governments, to construction companies and subcontractors, to building supply companies, to individual consumers. Well-known local architect Frank Lockwood was an important client.

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[4] J.M. Jenkins II's explanation of the "Select Reds" sheds light on the evolution of this market:

> The development of this grade was gradual, but sometime back we found a large part of our trade was calling for selected commons, and were charging $1.00 per thousand more than for the kiln run grade. The average purchaser was not content with just an extra good grade of commons, such as the brick really are, but had in his mind that he was buying face brick. The brick were expected to measure up to face brick in every respect, and in order to satisfy the trade, we were having to go through each kiln, select out the center, which left the lighter colors and extra hard burned near the fire on our hands. This not only cost considerable extra money, but resulted also in some dissatisfaction with our common brick customers, who were getting what was left... JBC to Clanton Building Supply Company, 11/20/36.

[5] J.M. Jenkins II wrote fellow brickmaker Hugh Bickerstaff: "We call our dark brick with the red panels in them Copperfield brick. While this name is a product of my own brain, I don't know that I can give you any reason for picking it out, except that the dark brown color suggested it." JBC to Hugh Bickerstaff, 2/15/22. In addition to Copperfields, the company also made popular lines of "Colonials," "Bluefields," and "Rugbys," among others. See also JBC to Roy M. Johnson, 8/10/37.

By industry standards, the Jenkins Brick Company was a large plant. JBC employed approximately 40 men at the Furnace St. site in 1912, compared to the U.S. average of 18 workers per plant just three years earlier. In the 1920s and 1930s, when directly comparable employment data is available, the difference between Jenkins and the average U.S. brick plant was substantially larger: Jenkins employed seventy-five workers in 1925, ninety-five in 1929, and forty-seven in 1935, compared with U.S. figures for the same years of thirty-eight, thirty-seven and twenty-four, respectively. (See Appendix II) Output patterns reinforce this data. In his introduction to Miriam E. West's 1939 study of the brick and tile industry, WPA Administrator Col. F.C. Harrington noted: "The brick and tile manufacturing industry saw its all-time production peak 30 years ago. Despite the growth in the demand for construction materials since its first decade of this century, the displacement of brick and tile by other types of materials kept the volume of production below former peaks even during the height of the construction boom around 1925."[6] During the company's first few years, 1907-1909, kiln problems, heavy rains and the economic downturn of 1908 undermined brick production and sales, nearly closing the plant. Just as production was rising, the restriction of building activity caused by World War I depressed output steadily until, by 1917, only the Furnace St. plant (#2) operated on common brick, shipped directly to Tennessee Coal & Iron for use in its war-related steel making operations at Fairfield and its shipbuilding plant at Mobile. The 1920s were a boom period, particularly for new lines of building tile and face brick, and output rose steadily, reaching its historic peak in 1928 at 1,648,000 common brick, although output of both face brick and building tile were higher the following year. By 1932, at the nadir of the depression, output was but one-quarter of 1928 levels, rising steadily thereafter until World War II, when

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[6] Miriam E. West, *Productivity and Employment in Selected Industries: Brick and Tile.* Report No. N-2 (Philadelphia, PA: Works Progress Administration, National Research Project, 1939), v.

all brick and tile was used for war-related construction. Within a decade of the War's end, the company was four months behind filling existing orders, and had ceased accepting new accounts, precipitating construction of the new Coosada plant.[7]

Profits accrued from a variety of sources. In no small measure, the Company's vigilance on plant and equipment insured constant brick quality and enhanced sales prospects.[8] But JBC also used its access to brick to generate profits in other ways. At different times, it bought back stock with brick, raising the value of individual shares. It supplied the brick ("second quality that had accumulated in the yard") and sand for ten tenant houses on its property at the Holt site, but also paid the Clanton Lumber Co. in brick "at market prices" for building them.[9] The company also closely followed the sales of other brickmakers and trends within the southern construction industry. Both John Michael Jenkins I and II held high positions in the southern section of the National Brick Manufacturers Association, and John M. Jenkins II headed up the NRA's southern brick section, which wrote and enforced codes of fair competition during the depression. The company even joined owners of the Excelsior Brick Company, also of Montgomery, to purchase the dormant McIntyre plant and keep it idle, lest it be started by interests from Columbus, Georgia, and add additional competition.[10] During most of this period, the company paid a 4% dividend on outstanding common stock.

Much of interest in the evolution of brick manufacture, brickmaking machinery, and kiln

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[7] This paragraph is based on information presented in tabular form in Appendices I and II. Sources are listed there.

[8] "We have spent several thousand dollars for permanent improvements," Jenkins told the Board in 1913, "and our aim at all times is to keep all the property up to the highest point of efficiency, which will enable us to make the best brick at the lowest cost." (Min., Board, 1/8/13, 81.)

[9] Min., Board, 1/13/15, 93; 7/14/15, 98

[10] Min., Board, 1/11/11, 63.

construction and operation can be found in the rich, well-documented experience of the Jenkins Brick Company. At Wetumpka, Jenkins initially produced repressed bricks on an old machine he bought used; soon after, when he began the Montgomery plant, he purchased auger/extrusion machines for both, a process the company has used to this day. Again, at Wetumpka, he burned his first brick in a clamp kiln, and later added three down-draft periodic kilns. At the Montgomery plant, he bought the plans for a fifteen-chamber, semi-continuous kiln from a well-known engineering firm, but redesigned it by removing the crowns and adapting the draft and flue system. He purchased the Holt plant, also in Montgomery, in 1910, burning brick in a producer-gas fired Youngren kiln. At the original Montgomery plant, J.M. Jenkins II, replaced the modified semi-continuous kiln in 1922 with a battery of nine patented Minter-system down-draft kilns, to which he added ten more in 1926, and two more in 1941. This variety of experiences with shaping and burning technologies offers insight into the technologies, their proliferation and modification, and the relative success with which they were employed.

Of more specific interest, the experience of Jenkins Brick Company reveals the extent to which brickmakers and makers of machinery and equipment for the industry cooperated in the design and modification of pug mills, extruding machines, cutters, dryers, and kilns, in the decades before the establishment of formal ceramics research centers. Close correspondence between brick and machine makers was not a practice restricted to JBC. Lamenting the absence of "fundamental data...as a basis for the intelligent design and operation of continuous extrusion machines for molding plastic materials," Paul C. Grunwell of the Bureau of Standards noted in 1928 that "improvements that have been made, in the absence of fundamental data, have resulted mostly from 'cut-and-try' methods through cooperation

between machine builder and machine user."[11] The company's long relationship with J.C. Steele & Sons of Statesville, North Carolina, manufacturers of brickmaking equipment since 1889, which still provides Jenkins' machines today, reveals numerous instances of suggestions and modifications passing between the two companies. For example, Jenkins told his Board of Directors that the first Steele machine at the Montgomery plant wore poorly, and Steele "proposed to exchange for the nominal sum of $300 cash difference, and build a machine after our (Jenkins') own ideas. The result is as good a machine as can be built, and one that is running smoothly and doing good work with ease."[12] The intense negotiations between Jenkins and ceramics engineers Richardson & Lovejoy over the construction and operation of the company's semi-continuous kiln, and the nurturing relationship between Jenkins and kiln builder M.M. Minter, also reveal the brick company's involvement with equipment design. In large measure, the "hands-on" operating styles of John Michael Jenkins, Sr. and Jr., account for the success of this method. The company's founder described himself as something of a natural mechanic, with a tendency to modify equipment until it operated correctly, and his son made brick his entire working life. Running the company for over fifty years, from its founding at the turn of the century until the 1950s, both men learned the fundamentals of shaping and burning through trial-and-error at the company's Wetumpka and

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[11] Paul C. Grunwell, "Studies of Machines for Extruding Clay Columns: Augers, Spacer, and Dies for Brick Machines," Bureau of Standards, *Journal of Research* (December, 1928), 1024.

[12] Minutes, Board of Directors, JBC, 1/13/09, 45. Brickmaking machinery at the new Montgomery yard was purchased from J.C. Steele & Sons, which had supplied the Wetumpka plant as it expanded, and which continues to provide equipment for Jenkins Brick Co. to this day. "We contracted the 'Steele' habit about seven years ago," Jenkins wrote Steele in 1910, "and have seen no reason for changing our habits in that respect. We have used the No. 2, No. 3, No. 4, and the No. 5 brick machines, and other machines of your make, with great satisfaction." JBC to J.C. Steele, 2/28/10. Jenkins did use equipment by other manufacturers, especially that he inherited at the old Holt plant. But of Chambers' Brothers, he told Steele "There is too much MACHINERY about Chambres' (sic) machinery." JBC to J.C. Steele, 1/15/12. The relationship was reciprocal: "...(N)ot meaning to flatter," Steele wrote JBC, "it is proper that we should say that you and your company are the most appreciated customers we have ever had." J.C. Steele & Sons to JBC, 5/7/07.

Montgomery plants, and were not reluctant to share the lessons from this experience with their equipment suppliers. Their successor, H.M. Meek, was at the company over forty years.

The Jenkins Brick Company history also offers valuable insights into the character of the southern building supply industry and the circumstances in which southern manufacturers carried on their business. Jenkins bought most of its brickmaking machinery from one of the South's only equipment suppliers, J.C. Steele & Sons, of Statesville, North Carolina. The company's original Scott drying system was also developed by a Southern equipment maker, and the still-extant Minter kiln system was a product of nearby Columbus, Georgia. Like nearly all brick makers, Jenkins Brick Company sold primarily to a local market. Orders came from local builders, general contractors, building supply firms, architects, and other brickmakers. The company has maintained records that permit tracing many of the residences and other buildings constructed of its brick, although that has not been done for this study. J.M. Jenkins I and II, on whose correspondence much of this history is based, developed extensive relationships with other brickmakers, and with equipment providers, revealing an industry characterized by a high degree of regional cooperation and mutual assistance. This report will touch on these broader concerns from time to time.

Making Bricks

There are three processes for making bricks: soft mud, dry press, and stiff mud. Jenkins Brick Company has used the stiff mud process throughout its entire history, which J.M. Jenkins I described in 1916:

> (T)he clay is dug and loaded on cars by steam shovel, pulled up an incline with a cable and winding drum, dumped into a feeder, thence by gravity through a disintegrator to reduce the lumps and clods. Thence into a pug-mill where it is well mixed and the necessary water added, and from this machine into the brick machine proper where is further ground and mixed. The clay is forced out of the brick machine under heavy pressure in a continuous bar onto a delivery belt to the cutter which automatically cuts the bar into lengths necessary to make brick. Up to this point

> no hand work is involved, all done by machinery. Now the brick are taken off the belt and stacked on cars, 650 to the car, and placed in the dryer. They dry in about twenty-four hours, and then are set in the kiln in such a manner that in the burning, requiring about a week, the fire reaches every brick to complete the process of manufacture...[13]

In strong testimony to the enduring stability of the industry's technology, improvements notwithstanding, the process is relatively unchanged to this day, carried out at two plants: one several miles from the original site, in North Montgomery, and another in nearby Coosada,

Despite the important role of machinery in the stiff-mud process since the 1860s, brickmaking remained labor-intensive. In the clay pit, JBC's use of power shovels (steam and, later, internal combustion) for mining, and locomotive and cable drum to move clay to the plant, required few men other than operators and a few helpers. This was also true of grinding, crushing and brick shaping operations. Once the off-bearing belt-conveyor moved the brick from the cutter, though, the process was highly labor intensive. In the Scott Drying System, used in the plant until the early 1920s, hackers moved each brick individually from the off-bearing belt to the conveyor belt carrying them to the kiln. There, tossers and setters moved and stacked approximately 100,000 brick per kiln chamber, filling all fifteen chambers in the course of a run. Once the bricks were dried and burned, they were again tossed onto the conveyor that took them to the rail car, where they were tossed and stacked a final time. The installation of the Minter System in 1923 actually increased the labor required after the brick forming process. Now, hackers off-loaded bricks onto dryer cars that were wheeled on tracks to waste-heat tunnel dryers. Transfer men then wheeled the cars to the kilns, where tossers and setters stacked the bricks for burning. Tossers drew bricks from the kiln and stacked them on special wheel-barrows and rollers moved these down runways to rail cars, trucks or wagons, on which loaders placed them for shipping. If they were not

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[13] J.M. Jenkins, talk before the Rotary Club, 1916, copy in Jenkins papers.

immediately shipped, bricks were hand stacked for storage. In the 1960s, Jenkins Brick began to palletize bricks as they came from the drying tunnels, using tow motors to move pallets into and from kilns.[14]

Although Jenkins tended to list most employees as "laborers," they possessed varying degrees of skill that directly affected the quality of the clay they worked and the brick and tile they made. The clay pit consisted of several varieties of clay, and the company relied on the skill of the shovel operator to select appropriate consistencies for each car load. On the pug mill operator, brickmaker Anton Vogt warned readers of the industry's most respected trade journal, "depend(ed) the quality and quantity of brick you make. If he runs the clay too soft, the bar of clay, as soon as it leaves the die, swells and the brick become spongy, too large and higher in the center, and as a result cannot be set in the kiln. When the clay runs too stiff it will break the auger and cause a heap of delay."[15] Hackers and tossers moved enormous quantities of bricks, requiring great speed and agility to work in close coordination with catchers and setters, who required the same talents, but also needed to know intricate setting and stacking patterns. Of course, the skill of the burner, who tended the kilns and observed the progress of bricks under fire, was among the most skilled positions at the plant.

The jobs of brickworkers were very dangerous.[16] As the statistics reveal, the most dangerous jobs were in the kilns, where over one-third of the accidents took place. (See Table I below). Most of this work involved the tosser taking two dried bricks at a time from the transfer car and tossing them to

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[14] Information on the labor process at Jenkins Brick Company has been gleaned from numerous documents cited throughout the text. Other sources to consult on the labor process in the stiff-mud brick industry are: West, *Brick and Tile*, 7-12;

[15] Anton Vogt, "The Art of Brickmaking," *Brick* (February, 1903), 87.

[16] Information in this paragraph is gleaned from a compilation of over 400 accident reports, from 1907 - 1954, in the company's files. These form the basis of Table I, which follows.

the setter, who slowly built up the brick bench until it approached the top of the kiln or, conversely, loaders taking down the bench and stacking burned brick on a buggy or wheel barrow, for shipping or storage. The potential for injury was great, particularly from brick falling from the stack and striking head or limbs, brick or sand particles lodging in eyes, or from the constant mashing of fingers and hands between two bricks. Buggies and wheel barrows also overturned, and strains from lifting and moving heavy loads were frequent. The mill area was also a risky place to work, with over one-fifth of the accidents. Here, the abundance of machinery, much of it unguarded, led to numerous injuries. Accidents around the cutter, from wires breaking and puncturing feet and hands, occurred most often, but cuts and scrapes from pug mill knives and clay grinders, and bruises from disengaging high-torque clutches, also took place. Three types of accidents plagued workers around the dryers: burns from the hot cars, cars breaking loose and running up on feet and legs, and movable shelves on the cars dropping on hands. Shipping accidents were similar to those in the kilns, because tossing and stacking bricks were the main activities; breaking runways and capsizing loads also took place. In the clay pit, where the fewest accidents took place, injuries from the cable and drum that dragged loaded cars from the pit to the mill were the greatest danger, but moving shovel track around and collapsing banks also hurt workers. Around the yard, injuries occurred from falls, dropping heavy parts like shafts, nail punctures, and regular maintenance activities.

Table I

Accidents at Jenkins Brick Company, 1907-1954		
Department	# accidents	% of total
clay pit	18	4
mill area	88	22
dryer tunnels	62	15
kilns	140	34
shipping	57	14
general	44	11
Total	409	100

J.M. Jenkins I and II expressed deep concern for the safety of their employees. The plant's founder, himself, was the victim of an industrial accident, having lost part of a leg during his thirty years with the Louisville & Nashville Railroad. In constant communication with the Birmingham Artificial Limb Company, he frequently purchased prosthetic devices for his employees and others in the community, particularly children, who suffered similar injuries. He also railed at brick equipment makers, imploring them to make their equipment safer, and was not averse to vividly describing the outcome of their failure to do so. "Please, for God's sake, people, house all your gears. Box 'em up so a man will have to get a wrench and work his way into 'em."[17] In typical fashion, he suggested a design for a guard for the cutter responsible for a serious accident. Beginning in the World War I era, the industry demonstrated an

[17] JBC to J.Steele & Sons, 2/14/12; 2/19/12. Emphasis in original.

increasing awareness of the dangers of open machinery. A special article in *The Clay-Worker* graphically depicted guard designs for heavy crushing rolls, pug mills, and cutters, and extolled the use of natural light in the workplace and the implementation of systems for the safe use of tools and equipment.[18] Beginning in 1923, the American Mutual Liability Insurance Company, of Boston, Massachusetts, with whom Jenkins had a company policy, regularly inspected the plants and recommended safety changes. In an inspection that year, the insurance company advised enclosing belts, pulleys, gears, couplings and line shafts. Two years later, standards had become more stringent, and the insurance company sent a list of seventeen safety recommendations, including guard railings, additional belt and shaft guards, of which the JBC complied fully with thirteen, and deemed three to be unnecessary. The next year, the Insurance Company requested six more safety measures, which JBC performed.[19] The company received premium reductions at several times, suggesting that its accident rate fell within or below industry norms.

The Early Years of Jenkins Brick Company

Despite humble origins, Jenkins steadily improved the Wetumpka plant's machinery and equipment, paving the way for the company's expansion to Montgomery. The specific vintage of the "old Sword machine," on which John Michael Jenkins I began making brick, is not revealed in existing sources, but Porter L. Sword, of Adrian, Michigan patented two different brick presses in the mid-nineteenth century that were eventually manufactured and marketed by the H. Brewer Company of Tecumseh, Michigan, and it is possible that Jenkins purchased one of these from the Holt Brick Company, of

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[18] "Safety in Brickmaking," *The Clay-Worker* (November, 1917), 596-599.

[19] American Mutual Liability Insurance Co. to JBC, 2/27/23; 12/30/24; 11/2/25; 11/30/25; 12/4/25; 6/11/2; 1/15/29; JBC to American Mutual Liability Insurance Co., 2/21/25; 12/30/24; 1/12/28.

Montgomery, (a plant he later acquired).[20] Both were mold-wheel machines, varieties of the stiff mud machines employed by Jenkins Brick throughout the twentieth century, but used a vertical forming and pressing sequence rather than the horizontal, auger-extruded, die-shaped column later adopted by nearly all machine makers.[21] Although effective, the machines were much slower than the extruder machines growing in popularity at the time the Montgomery plant opened. Jenkins closed the Wetumpka plant in 1910, but at some point prior replaced the Sword machine with a No. 4 auger-extrusion machine made by J.C. Steele & Sons, supplier of most of JBC's brick making equipment.[22]

The Wetumpka plant utilized a progression of drying and burning systems that suggest a continuous process of "learning by doing." After shaping the brick in the Sword machine, Jenkins dried them outside on pallets and burned them in a primitive clamp kiln. Outside drying is highly unreliable, even though free heat from the sun may suggest its economy: it is seasonal, risks destruction of the green bricks in rain and, at best, can remove only as much water as ambient humidity permits. After drying, bricks were built into a clamp kiln, the cheapest kiln possible, since it was constructed of the green brick it was designed to burn. "I built my first kiln," Jenkins remarked, "from notes and figures made in a vest-pocket memorandum."[23] They were up-draft kilns, so-called because the fires are lit at the bottom and the heat moves upwards through the brick. "The defects of this type of kiln lie primarily in the burn,"archaeologist Karl Gurcke notes, where bottom bricks receive more and the top bricks receive less

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[20] "From Bee Hives...," 262.

[21] The first machine, patent no. 43,162, was patented by Sword and a colleague, George Tifffany, on June 14, 1864; the second, patent no. 304,283, by Porter L. and Charles D. Sword on 26 August 1884. George S. Tiffany, "Reminiscences of Brick Manufacturing and Brick Machines," *The Clay-Worker* (October, 1910), 394-396.

[22] A brick sample presented to the author by Susan Clark, of Jenkins Stone Creations, and marked "Jenkins" on one side, and "Wetumpka" on the other, bears all the marks of an extruded, end-cut brick.

[23] JMJ I to J.C. Steele & Sons, 4/27/06.

heat, resulting in burned bricks on the bottom and around the arches constructed for firing, and salmon brick on the top and sidewalls, as the draft carrying the heat is deflected to the center. On the other hand, for a beginning brickmaker like Jenkins, the clamp kiln made tremendous economical sense: it could be built alongside railroad tracks to facilitate loading, could be set and drawn at minimal expense, since it was open and rectangular, and permitted bricks to be stored inside until sold, eliminating double handling.[24] Later, Jenkins built eight round down-draft kilns at Wetumpka.[25]

By 1905, Jenkins' business had so expanded that he bought a second piece of property, on the northern outskirts of Montgomery. Comprised of twenty-nine acres on the alluvial plain of the Alabama River, part of the land had belonged to the Davis Brickyard in 1887, and to the Riverside Brick Co., owned in part by L. and T.A. Davis and incorporated in 1891, for $15,000.[26] On 31 January 1906, Riverside Brick Co. was enjoined from "trespassing upon, or excavating, removing, or hauling away the clay or soil on any lands... owned by the Montgomery Land & Improvement Company," developer of the wide tract of river front land. Jenkins Brick Company bought the land soon after.[27]

Jenkins financed his new venture by incorporating and issuing stock, encouraging equipment firms to buy into his new plant through deferred payments and reduced prices, and by cutting costs wherever possible while still building "the best designed and equipped brick plant in America."[28] A

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[24] The term "clamp" kiln, carried a specific meaning in the British context, but is here interchangeable with "scove" kiln. See Karl Gurcke, *Bricks and Brickmaking: A Handbook for Historical Archaeology* (Moscow, ID: University of Idaho Press, 1987), 32; R.B. Morrison, *Brickmakers' Manual* (Indianapolis, IN: T.A, Randall & Co., 1890), 99; Ellis Lovejoy, *Burning Claywares* (Indianapolis, IN: T.A. Randall & Co., 1920-1922), 153-155.

[25] JBC to J.E. Carson, 6/4/07.

[26] Little is known about the Davis or Riverside Brick companies.

[27] Sources located in various acts of title filed in the Jenkins Brick Company files.

[28] Minutes, Board of Directors, Jenkins Brick Co., 2/10/06, 13. (Hereafter, Min., Board, JBC)

primary goal, he told the Board, was "to build the kiln and plant and get it into operation without borrowing money."[29] Eighty percent of the stock, at $100/share, of the newly-incorporated Jenkins Brick Company was subscribed and fully paid-in.[30] Nor did Jenkins want to sell more stock than was "absolutely necessary to begin operation, holding the balance...in the treasury."[31] He also sought credit from the companies from whom he purchased equipment, but not always without some difficulties.[32] Jenkins used the resources of the Wetumpka plant, particularly workers and brick, for the kilns (which, for the most part, were not built of firebrick), and was able to reduce his set-up costs by half when he ordered new steam shovels for both sites.[33] He declined the opportunity to pay kiln construction supervisors from the Richardson-Lovejoy Engineering Company.[34] Aside from a machinist employed four days, two "cheap

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[29] JBC to the American Blower Company, 3/5/06

[30] JBC to the American Blower Company, 3/5/06.
The Jenkins Brick Co. incorporated as a general building supply company, for "the manufacture, buying and selling of brick. The manufacture, buying and selling of lumber, lime, cement, sand and other building materials. The buying and selling of coal." Of the 596 shares subscribed, Jenkins himself held 340 shares, and with his family controlled 400, or over 67%. The other major shareholder, with 50 shares, was W.L. Lancaster. The enterprise was backed overwhelmingly by Wetumpka capital, with residents subscribing 539 of the 596 charter shares; Montgomery residents owned just 18 shares. Min., Board, JBC, 1/1/06, 1-2.

[31] JBC to the American Blower Company, 3/5/06

[32] The American Blower Company, which supplied the kiln fans, was reluctant to grant Jenkins an extended payment plan, and sought reassurances of Jenkins' creditworthiness from other suppliers. In exchange for deferred payments, Jenkins offered notes on the Jenkins Brick Company, cosigned by himself and W.L. Lancaster, the largest stockholder after Jenkins, president of the Bank of Wetumpka (of which Jenkins was vice-president), and a large local land holder. He noted the high quality of the Montgomery site, its good clay, and the fact that the land was owned by JBC free and clear. Altogether, Jenkins estimated his deferred payments at $2500, and calculated full repayment to take six to twelve months. Alex. A. Scott, developer of the "Scott System" Jenkins purchased, agreed "to take (his) part of the profit, which was small, out of the last payment" to persuade the American Blower Company to grant the extended payment schedule. Richardson also visited the ABC to help resolve the matter. JMJ I to Alex. A. Scott, 1/15/06; JMJ I to Alex. A. Scott, 1/19/06; JBC to the ABC, 3/5/06.

[33] Workers from Wetumpka were boarded at the yard for $.25/day.

[34] This didn't sit well with Richardson. "We naturally feel quite anxious about the kiln," he wrote Jenkins, "since it is not under our supervision and we have had no questions from you in reguard(sic) to anything." W.D. Richardson to JMJ I, 6/27/06.

carpenters" who framed up the buildings, and the bricklayers (who were in chronic short supply), all work was done by "common labor." Indeed, workers performing the general labor associated with plant construction gave Jenkins eleven hours for a $1 day while other Montgomery employers received only ten, though even he lacked sufficient help on Mondays. "I have given the work my closest personal supervision, and saved all I could on expert help of every kind," he reported to the Board.[35] This attention to cost cutting was a hallmark of the company throughout its first half century of operation and extended to the office as well. "The President and Secretary (J.M. Jenkins I and II, respectively) do all the executive and office work, including traveling, selling, collecting, bookkeeping, etc.," Jenkins told the Board in 1916, just eight months before he finally hired a bookkeeper.[36]

When Jenkins opened his Montgomery plant, the industry was in the process of extensive mechanization, from the clay banks to the kiln. Steam shovels, locomotives, and cable pulls moved clay from pit to plant; pug mills, dry pans, and other grinders and mixers prepared and tempered it; extruders and presses turned out brick and tile; and conveyors like the Scott System moved brick to and from dryers and kilns, as did a plethora of cars and hauling devices also available. In each instance, Jenkins selected the most recent products by well-known firms that would give him the most up to date brick plant in the South, if not the United States.

Jenkins began the Montgomery plant with "29 acres of land, with good clay 15 to 20 ft. deep..."[37] By the 1920s, J. Michael Jenkins, II reported that the company owned seventy-five acres on the Alabama river in north Montgomery, "there being 45 to 50 acres of available clay...averaging about 15 feet in

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[35] Min., Board, JBC, 2/10/06, 13.

[36] Quote, Min., Board, 1/12/16, 100; Mon., Board, 1/10/17, 107.

[37] JBC to American Blower Company, 3/5/06.

depth."[38] These beds were richer than most; experts like W.D. Richardson considered "river deposits...generally quite shallow, seldom more than 10 or 12 ft. in depth and often not more than 6 or 8 ft." Clay of good quality was a prerequisite for making good brick and, by extension, succeeding in the brick making business. Experts like Richardson considered river bottom, or alluvial clays, "good quality for building brick or drain tile, though sometimes rather difficult to dry."[39] Noting that "all is not gold that glitters," Jenkins quizzed a potential brickmaker on the quality of his clay: "Will it work through the machines allright? Will it dry without checking? Will it burn without cracking, undue shrinkage, or fusing? All these are vital points the failure in either of them means a failure in the commercial success of the enterprise."[40] Jenkins' clay was "grey to light red river bottom clay,"[41] that he considered "a very nice plastic clay."[42] J.M. Jenkins II later noted that "the nature of our clay is such that we have to mine it in a dry state in order to properly grind and mix it for brick and tile manufacture."[43] By the late 1920s, Jenkins had acquired several additional tracts of clay land, and was making "brick and hollow tile from a mixture

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[38] JBC to William Vogelback, 9/17/27.

[39] W.D. Richardson, "Some Problems in Clay Winning," *Brick* (August, 1910), 52.

[40] JBC to J.B. Warrior, 2/29/12.

[41] Clay Products, 1919, Supplemental Schedule, Dept. of Commerce, Bureau of the Census, Dept. of the Interior, United States Geological Survey, copy of draft schedule of responses, in company files.

[42] JBC to D.G. Loomis & Sons, 1/28/08.
Plasticity is a highly desirable quality in clay, and was defined by contemporaries as "a property developed in a clay by water, by virtue of which the clay can be molded, without crumbling, into shapes which remain stiff and unchanged after removal of the molding force....Plasticity is the property which enables a body, soft enough to be molded without cracking, to retain its shape permanently after it has been subjected to a deforming pressure." From the *Journal of the American Ceramic Society*, as quoted by T.W. Garve in "Factory Design and Equipment," *The Clay-Worker* (November, 1927), 352.

[43] JBC to L.L. Stephenson, Jr., 7/27/36. In the same letter, Mike Jenkins, Jr. noted that the Alabama River flooded periodically – every five or six years – and that the plant had to stop production and drain the clay pit before resuming operation. Even then, Jenkins "found the clay bank so saturated with water that we operate under difficulty for some time."

of clays, one being somewhat short or sandy, and the other, a very fat plastic clay,"a blend in use to this day at the company's two plants.[44] Yet, variability in clay content defied even the best blending efforts. "The brick we shipped are slightly smaller than in the recent past," JBC wrote a customer in 1927, "this being due to running into clay which has a higher percentage of shrinkage."[45] J.C. Steele & Sons, which made most of JBC's brickmaking equipment, considered the company's clay "the fastest working that we have ever encountered."[46]

Determining the precise components of the clays on Jenkins' properties, and their proportions, is difficult, since conditions vary from clay bed to clay bed, and within beds as well.[47] An analysis performed on two samples by the Pittsburgh Testing Laboratory in 1935 found the following:[48]

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[44] JBC to Pulverizing Machinery Company, 10/5/27. In 1921, JBC bought fifteen acres of land adjacent top the Furnace St. site, and in 1927, added another twenty-six and a half acres, bought from Arthur Pelzer and partially paid for by selling the old Holt land. (Min., Board, 1/27/21; 1/10/22; 1/12/27.)

[45] JBC to Jim C. Johnson Hardware Co., 5/30/27.

[46] J.C. Steele & Sons to JBC, 5/28/25.

[47] After a year in operation, J.C. Steele & Sons supplied a new pulley and die brushes for Jenkins' brick machine because, they noted, "your clay does not now shrink as much as that which was formerly used." J.C. Steele & Sons to JBC, 6/27/07.

Jenkins did have Alex. Scott analyze his clay in 1906, but the results are not known. See JBC to Alex. A. Scott, 1/19/06. By 1928, the movement for scientific analysis of clay had reached the South, with the establishment of a laboratory and ceramics resources department at the University of Alabama at Tuscaloosa. T.N. McVay was charged with building a kiln and testing laboratory, as well as teaching, and asked Jenkins Brick Company to donate samples of both brick and clay for teaching purposes. T.N. McVay to JBC, 8/29/28.

[48] Pittsburgh Testing Laboratory to JBC, 7/5/35.

Table II

Composition of Clays for Jenkins Face Brick, 1935		
Component	% (Blue)	% (Red)
Silica	58.9	60.38
Iron Oxide	4.76	6.30
Alumina	24.41	22.40
Titanium Oxide	0.90	1.05
Calcium Oxide	0.18	Trace
Magnesium Oxide	0.61	.71
Total Alkalites ($AsNa_2O$)	1.13	1.25
Loss on Ignition	9.80	8.45

The consistency and metallurgical properties of the clay determined its behavior in the kiln. J.M. Jenkins, I, wrote Richardson that his clay "makes a good hard red brick at cone 05 or 04."[49] By 1917, though, after extensive kiln modifications, JBC was "burning to a temperature between cones 03 and 1."[50] Jenkins noted that his clay required a high temperature, "approximately 1900 degrees."[51] "Other clays might stand hurrying up, but ours clinkers about the fire holes if we increase the draft and fires to hasten the burning."[52] Jenkins' clay also required thorough drying before burning. "Our brick do not whitewash

[49] JBC to W.D. Richardson, 4/18/07.

[50] JBC to Fraser Brick Company, 1/23/17.

[51] JBC to Tulsa Vitrified Brick and Tile Company, 8/2/19.

[52] JBC to Frank H. Reid, 10/8/10.

if we dry them before burning them," he wrote L.L. Stephenson. "It is only when we get in a hurry and the dryer will not hurry and we proceed to set them any how, that we get whitewash....I think that when we have a great volume of steam during the watersmoking period, the sulphur, magnesia, alum, etc. in the clay and coal, is carried forward and deposited on the cold brick ahead, and when they burn, it does not burn off."[53]

Clay may be mined, dragged, or shoveled but, among brickmakers, the process of obtaining clay was ubiquitously known as "winning."[54] Jenkins "won" his clay with steam shovels from the start of his operations in Montgomery. In 1906, he purchased a Thew No.1 (3/4 or 1 yard dipper) shovel for the Montgomery pit and a smaller Thew No. 0 (1/2 yard dipper) for Wetumpka. At Montgomery, he opted for a track-mounted shovel that ran on pairs of 60 lb. rails, each 6' long and resting on three ties; he bought the track used from a brick maker who recommended three sections.[55] The shovels were designed specifically for clay excavation: full circle swing, self-propelling, with hoisting, swinging and crowding motions independently powered and controlled. Loading at either side and in the rear, they could be fired and controlled by one man, and also handled their own track. Their strong features, noted

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[53] JBC to L.L. Stephenson, 4/17/11 (emphasis in original.) See also JBC to Fraser Brick Co., 2/8/17. Jenkins was referring to one of three types of discolorations inflicted on bricks during the drying and burning processes. *Scum*: "a white, relatively insoluble coating developed on the surface of the burned ware during the process of manufacture, from soluble salts within the unburned ware...commonly known as 'Scum,' 'Whitewash,' 'Dryer Scum,' 'Kiln Scum'..." *Efflorescence*: "white, yellow, green or brown coating from within the burned ware...deposited on the surface of the ware after removal from the kiln and exposure to weather sufficiently long to accomplish absorption, solution and subsequent evaporation from the surface of the ware." *Inflorescence*: "a white coating from outside sources, deposited on the surface of the burned ware during the cooling..." Ellis Lovejoy, *Scum on Clay Wares, Its Cause and Prevention* (Philadelphia, PA: Foote Mineral Company, Inc., 1927), 4-5.

[54] Richardson traces this term to the extensive nineteenth and early twentieth century German literature on the ceramics industry, in which the word *"Gewinnung"* has the same meaning. See "Some Problems...," 52.

[55] Alex. A. Scott to JBC, 7/20/07.

an industry journal, were "simplicity and low cost of operation."[56] After the company closed its Holt plant, it moved the shovel at the Furnace St. plant.[57]

From 1906 until around 1912, clay was hauled to the wall of the pit by mule and cart, but in 1912, Jenkins looked into buying his first locomotive. "I am now figuring on a locomotive to haul my clay instead of the mule," he complained to fellow-brick maker J.E. Carson. "We are getting further away all the time, and sometimes our output is curtailed by scant clay supply."[58] Mules hauled one car each, holding two yards of clay, on twenty pound rails, to the point at which the incline ascended the claybank to the mill. As he generally did with other equipment, Jenkins sought the most economical way to mechanize his hauling operation. Obtaining a quote for a new engine, he finally purchased a rebuilt Baldwin saddle tank engine, with four driving wheels and no truck, for $1000 from Birmingham Rail & Locomotive Co.; it was to have "no ornamentation whatever, no headlight."[59] His railroad background and familiarity with engines permitted him to develop detailed specifications for the locomotive, which included "new chilled drivers or steel tires, a lever hand brake, taking out and rattling the flues, (renewing them if necessary to make a good safe boiler), thoroughly overhauling all machinery, facing valves and seats, renewing packing rings if necessary, painting, etc. You may also find it necessary to re-bore the cylinders when you get into them."[60] Nonetheless, an inspection of the boiler in 1914 revealed significant scale and "a heavy bar of

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[56] "The Thew Shovel," *Brick*, (August 1910), 54; "The Thew Single Truck Shovel," *Clay Record* (April 1904), 28-9.

[57] Messrs. Meyer, Baum & Co., Agents, The Hartford Steam Boiler Inspection and Insurance Company, to JBC, 7/18/25.

[58] JBC to J.E. Carson, 3/18/12.

[59] JBC to Davenport Locomotive Works, 2/21/12; Birmingham Rail & Locomotive Co. to JBC, 4/2/12.

[60] JBC to Birmingham Rail & Locomotive Co., 6/6/12.

iron" in the water leg that would "wear stay bolts and sheets" if allowed to remain. Front and rear plates also showed corrosion and required patches. Fire-box seams and patches needed caulking, but a leak was untraceable without pulling the jacket.[61] Further economizing, he wanted to use the rest of his hauling equipment – cars and track – with the new locomotive. For similar reasons of economy, he accepted the short-term costs associated with standardizing a 36" gage for both his plants (Wetumpka and Montgomery) instead of the 42" then in use.[62] According to J. Michael Jenkins, II., the new locomotive was "more flexible than other engines...and operated better on the uneven track" likely to be found in the clay pit. In particular, it was preferred to a Dewey Brothers 5-ton, chain drive "Industrial locomotive" purchased in 1916 for $1200, but sold several years later.[63] In 1925, as part of a general plant reconstruction and new equipment purchase, the JBC bought a used locomotive and approximately 400 feet of track from Kahn Brick Company of Selma, Alabama for $1350.[64] Unfortunately, the company was "disappointed...in the amount of work necessary to be done before it would operate." In addition to replacing badly worn wrist pins, Jenkins had to stretch the connecting rods, repair injectors, order new grease cups, and fix a number of other things that were wrong.[65]

Clay cars were of Jenkins' own design and construction. "(C)heap, strong and durable....I looked far and wide for a car that suited me," he wrote a fellow brick maker, "then designed this car and built it." Wood was prepared on a common saw table, the machine shop supplied crank shaft and sheave, wheels

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[61] Report of The Hartford Steam Boiler Inspection & Insurance Company, 7/14/14.

[62] JBC to Birmingham Rail & Locomotive Co., 4/6/12. In a letter to W.P. Brownson, Jenkins noted that "36" is almost universal for narrow gage tracks and equipment." JBC to W.P. Brownson, 1/28/14.

[63] JNC to Dolores Brick Co., 2/23/20; Min., Board, 7/12/16, 105.

[64] Kahn Brick Company to JBC, 1/17/25.

[65] JBC to Kahn Brick Co., 2/21/25.

came from Southern Wheel Co., and doors from Hartley Boiler Works, which also supplied his kiln doors; cars cost $60 each. Jenkins acknowledged that the cars were "rather heavy for the mules,...but it is a very short haul and we keep the track in good condition." The cars were "well adapted to use with steam shovels, ...but too high for shovelling (sic)." Jenkins designed the cars for the quality of his clay: lines straight to prevent sticking (which it did anyway), flaring some of the boards to act as a funnel, and beefing up the crank shaft to withstand "the heavy drop of a dipper full of clay to the bottom."[66] As part of the company's expansion in the early 1920s, Jenkins purchased four 1-1/2 yard used clay cars from Kahn Brick Company of Selma, Alabama,[67] and constructed additional cars in 1923.[68] Five cars were hauled by the locomotive at one time, and were dragged up the 500' incline of the pit to the mill by a wire rope winding on a 20" diameter drum, a setup that caused some trouble, as the wire rope suffered from excessive wear caused by unavoidable rubbing on railroad ties and dirt.[69]

Clay equipment at the Montgomery Plant (No. 2) was steam-powered. In 1905, JBC purchased two "Columbian Corliss Engines" from Lane and Bodley Co. of Cincinnati, Ohio. The smaller of the two, a 125 h.p., 14" x 36" right hand, cost $1125 and was installed at the Wetumpka plant (No. 1). The larger one, a 150 h.p., 18" x 36" left hand, was $1525 and powered the Montgomery plant.[70] In 1912, the company purchased a girder frame, Corliss engine from Hardie-Tynes Manufacturing Company of Birmingham, Alabama. Considerably larger than the Lane and Bodley engines, the 18" x 36" right hand

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[66] JBC to W.P. Brownson, 1/28/14.

[67] JBC to Kahn Brick Co., 2/26/21.

[68] JBC to Southern Wheel Co., 12/22/22.

[69] JBC to The Ironsides Co., 4/17/11; "From Bee Hives...," 263.

[70] Dimensions on the Corliss engines were standard descriptors referring to cylinder diameter and stroke length. Thus, an 18" x 36" engine had an 18" cylinder with a stroke length of 36".

Hardie-Tynes Corliss developed 190 h.p.[71] The engines ran on steam generated by two horizontal tube boilers fired by the "best quality steam coal."[72]

Once removed from the pit, clay was prepared for forming in a three step process by the feeder, disintegrator and pug mill. Jenkins dumped directly from the car into Rust Clay Feeders at both his Montgomery and Wetumpka plants. The feeders, purchased in 1906 from the Marion Machine, Foundry & Supply Company, of Marion, Indiana, were an important innovation in the treatment of clay. Introduced to the trade in 1903 by the Gemmer Engine and Manufacturing Company, also of Marion, Indiana, the Rust feeder improved clay consistency, evened the feed to the disintegrator, and saved labor. In operation, cars dumped clay into the feeder's hopper, where it was tempered by four augured "spirals" that "drew their supply evenly from all parts of the hopper, mixing the clay perfectly." The speed at which clay was then fed to the disintegrator was regulated by repositioning the front of the hopper or by changing the speed of the spirals. Increasing the regularity of the feed prevented "choking and consequent wear and tear on the disintegrator," noted a contemporary industry journal. "The principal advantage," it emphasized, was in the "saving of labor. By its use, the time of one to two men is entirely dispensed with."[73] Illustrating his tendency to note imperfections in machinery and recommend corrections, Jenkins wrote the Marion Machine, Foundry & Supply Company about prematurely wearing gears, and suggested the use of cast steel rather than cast iron. He also called the company's attention to

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[71] Specifications and Proposal, Lane and Bodley, 11/27/05; Proposal, Hardie-Tynes Manufacturing Company, 6/5/12.

[72] Boiler Inspection Report, Hartford Steam Boiler Inspection & Insurance Company, 6/19/16 (copy in JBC files); JBC to Cahaba Southern Coal Mining Co. 11/9/11.

[73] "The Rust Clay Feeder and Mixer," *Clay Record* (June, 1907), 24-25; The Rust Clay Feeder," *Clay Record* (March, 1904), 38; "The Rust Clay Feeder," *Clay Record* (April, 1906), 34-35; "A Labor that Saves," *Brick* (February 1910), 148; "Efficiency," *The Clay-Worker* (January 1915), 65.

weak sides on the hopper. "I offer these criticisms for what good they may do you, and not in a complaining spirit," Jenkins wrote. "We assume that you do not use the feeders, and that we, who do use them ought to point out its weak features, and thus help you to perfect what is one of the most valuable machines offered to the clay working trade. Make the machine as good as you can, & advance the price if necessary."[74] Jenkins used the Rust Clay Feeder for almost twenty years, replacing it with a J.C. Steele & Sons "Even Clay Feeder" in 1924.[75]

The feeder distributed clay evenly and at a uniform rate into a No. 4 J.C. Steele & Sons disintegrator, where lumps were broken up in preparation for pugging. Unlike dry clay or shale that was ground and screened, the plastic, often wet quality of Jenkins' clay required a different pulverizing operation. The disintegrator contained two rollers in a metal pan: the larger feed roller revolved slowly as the smaller disintegrating roller, with cutters or knives, turned rapidly. As lumps of clay were fed into the disintegrator, they were "thrown violently about between the drums and also strike against each other, thus pulverizing the material," noted the *Ceramics Products Cyclopedia*. Disintegrators worked with clay in a variety of consistencies, but if it was too wet, dry lumps, or "bats" – pieces of brick – were added.[76] Disintegrators also threw out stones too large for crushing. The distance between the two rollers, which were each powered independently, could be adjusted for the consistency of the clay, and cutters on the smaller roller could be easily replaced. The simplicity of the disintegrator contrasted sharply with other machines available for similar tasks, such as the "Compound Four-Roll Patent Clay

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[74] JBC to Marion Machine, Foundry & Supply Co., 5/2/07.

[75] JBC to J.C. Steele & Sons, 2/12/24.

[76] "Disintegrators," *Ceramics Products Cyclopedia* (Chicago: Industrial Publications, Inc., 1930), 590.

Crusher and Stone Separator" marketed by J.W. Penfield & Son, and likely appealed to Jenkins.[77] JBC replaced the old No. 4 disintegrator with a new version of the same model in 1924.[78]

The pug mill further mixed and tempered crushed clay received from the disintegrator. As described by the *Ceramics Products Cyclopedia*, the pug mill was an uncomplicated machine consisting of a "hollow metal trough placed horizontally with a shaft running thru the center from end to end which is equipped with blades or knives arranged like the threads of a screw....(T)he revolving blades masticate and wedge the clay into a homogeneous mass."[79] By the early twentieth century, nearly all pug mills were open-top, since brickmakers found it "very difficult to get uniform tempering with closed-top pugmills," according to George M. Fiske.[80] In addition to further mixing clays, pug mills added water to bring them to the proper consistency, and tempered them by "cutting" and turning. Two features were critical to its performance: its length and the knives. Generally, the longer the mill, the better it mixed the clays. Knives (or blades) needed to be strong, carefully shaped and arranged to both thoroughly mix the clays and water, and propel the mixture forward.[81] "What do we expect the pug mill to do," asked Robert

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[77] For examples of other equipment, see J.W. Penfield & Son, *Clay-Working Machinery* (Willoughby, Ohio: 1896), 136-39. It is not clear why Jenkins selected the disintegrator over another straightforward technology, the wet pan.

[78] JBC to J.C. Steele & Sons, 1/12/24.

[79] "Pug Mill," *Ceramics Products Cyclopedia* (Chicago: Industrial Publications, Inc., 1930), 596.

[80] George M. Fiske, "Evolution of Brick and Brickmaking in the United States," *The Clay-Worker* (November 1927), 403.

[81] Knives were of "two general classes," noted the German paper *Tonindustrie-Zeitung*, "those that have propelling action and accomplishing but little in the way of mixing the material, and those whose action is one of mixing and whose propelling action is but slight....When it is desired to have the clay well kneaded, and at the same time have a reasonably large output, it is plain that this can be accomplished by a judicious arrangement of both types of blades on the same shaft..." Reprinted in *Brick and Clay Record* (Jan., 1914), 95.

Along with the new set of pug mill knives J.C.Steele & Sons sent to Jenkins in 1911 came a caveat: "Please be careful in putting knives on the Pug Mill, to make them form a screw, thereby feeding to the delivery end of the Pug Mill. It is an easy matter, and one which many of our customers overlook...We assume...that you understand

Twells in *The Clay-Worker*? "We want it to work the clay up into a tough plastic state. This cannot be done by simply cutting the clay up and adding water to it and each knife simply pushing it along so that the other knife can reach it and do the same; this is not pugging, this is only turning the pug mill into a conveyor. In order to pug clay, it must be squeezed into itself."[82] Mills operated most efficiently when the proper balance was struck between the speed of the shaft and the angle and arrangement of the knives. H.W. Hardy, who had "practical experience of forty years in the clay trade in all its branches," claimed that plastic clay was pugged best in either a double-shafted mill, with two shafts turning in opposite directions, or a graduated mill, 18" at one end and 16" at the other, each enhanced by rollers at the end.[83] To obtain a stiff paste that could be squeezed in the hand, not lumps that crumbled into dust nor a "soft slush" that ran through the fingers, the pug mill was generally attended by a man of "considerable experience."

Jenkins Brick used a J.C. Steele & Sons No. 5 pug mill in its Montgomery plant, purchased at the same time the company bought its No. 5 brick machine. Small in comparison to other mills offered by Steele, the American Clay Machinery Company, and Riddell, the mill had 36 knives and the shaft was approximately 15'6", suggesting a tub of 6' - 8' in length.[84] Over the years, Jenkins became adept at repairing the mill (see below), and it was still in the company's service in 1923, when JBC ordered a new grinder shaft.[85] Although Steele & Sons no longer made the No. 5 mill, the company did have a shaft or

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this point." J.C. Steele & Sons to JBC, 7/17/11.

[82] Robert Twells, "The Pug Mill – Its Use and Abuse," *The Clay-Worker* (November, 1917), 436.

[83] H.W. Hardy, "More About Pug Mills," *The Clay-Worker* (January, 1918), 50.

[84] JBC to J.C. Steele & Sons, 5/5/23.

[85] JBC to J.C. Steele & Sons, 4/4/19; JBC to J.C. Steele & Sons, 5/5/23.

blank available; less than a year later, JBC ordered a new No. 5-A pug mill from Steele & Sons.[86]

Jenkins had problems with the pug mill as soon as he started using it, and his experience is a case study in the two-way dialogue between clay machine makers and users. Within months of installation, Jenkins broke three knives. "For the last two times that we have put on new knives," he wrote Steele, "three of them, numbers 5, 6 and 7 have broken."[87] Steele attributed the trouble to a worn babbitt beneath the shaft that permitted "it to drop down low enough to allow the knives to catch on the ribs of the machine."[88] By winter of that year, the clutch and flywheel had worn out and Jenkins asked Steele to change the design. The results were "new 3-arm clutches and solid band wheels....That was a fine improvement," Jenkins wrote Steele, "and we thank you for giving it to us."[89] Nonetheless, shortly thereafter, "one point of the 3-arm spider carrying the pivot-belt, snapped off....From the nature of its construction (or design)," Jenkins wrote Steele, "there is considerable inward pressure, and breaking strain, on these points," and he suggested that "maybe you should put a little more iron in this point..." Since he had to keep the plant running, Jenkins took the wheel "to the shop with the hope of getting it patched up for temporary use..." and ordered a new piece. Before he had sent off the letter, though, Jenkins appended "Since writing the above, I have returned from the shop with the repaired casting, and am so well pleased with the job that we cancel the request above, for a new piece....We are letting this letter go to you for what you may get out of the suggestions it may contain."[90] Evidently, this was an

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[86]JBC to J.C. Steele & Sons, 2/12/24.

[87] JBC to J.C. Steele & Sons, 8/16/06.

[88] J.C. Steele & Sons to JBC, 8/20/06.

[89] JBC to J.C. Steele & Sons, 5/3/07.

[90] JBC to J.C. Steele & Sons, 5/14/07.

inherent weakness of the mill, one that Jenkins repaired periodically, and suggested in 1919 that "the general features of your new clutch, applied to your heavy pug mills would be a marked improvement."[91] This wasn't the only time that Jenkins had something to offer Steele on the manufacture of pug mills. "We are having to cut off some of the shoulder of our pug mill knives," he wrote the company, "so as to give them a little more 'hurry-up – a little more angle. The clay would bank up and fall over the sides of the mill, and not get out near fast enough. We first tried grinding off a little of the shoulder, but that is not enough, so next time we will take enough off to give them more than twice the angle you made them with. I will let you know how much we find necessary to give good results..."[92] Steele took the suggestion, and agreed to make the knives in the future "so that they can be set with considerable pitch."[93]

The brick machine received clay from the pug mill, cut and blended it again, and extruded it as a densely packed clay column. Commonly called a stiff mud machine, it had three main parts – the barrel, a rotating auger, and the die. Clay was fed from the pug mill above into the back of the barrel, and then propelled forward by the auger until it was extruded from the machine through the die. Barrel walls tapered from rear to front, continually compressing the plastic clay into a denser mass, and were grooved to prevent the mass from turning with the auger. Knives on the auger continually cut the clay and forced escaping air to the rear.[94] The stiff mud process was the most flexible in the quantity and variety of products. Output could be increased or reduced with the speed of the machine, and sectional shapes – different size/style bricks or tiles – could be varied with the die used. As *The Clay-Worker* pointed out,

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[91] JBC to J.C. Steele & Sons, 4/4/19.

[92] JBC to J.C. Steele & Sons, 5/3/07.

[93] J.C. Steele & Sons to JBC, 5/7/07.

[94] Davis, *Brick*, 202.

> We may make rectangular section columns and cut them to any length. We may introduce cores and then get perforated or hollow blocks, we may enlarge the dies and by use of cores produce hollow blocks in a wide variety of sectional shapes of different sizes and different number of cells, etc. Thus we get bricks, hollow blocks, fireproofing, drain tile, electric conduits, standard terra cotta shapes, some types of roofing and floor tiles, etc. Drain tile up to sizes of 12" and at times even as large as perhaps 15"....[95]

The Steele No. 5 machine that Jenkins installed in 1906 at Montgomery was, with minor variations, little different than the first auger-extrusion machine patented by Cyrus Chambers, Jr., in 1863 and exhibited, in slightly improved form, at the 1876 Centennial. The Chambers machine, Paul C. Grunwell of the Bureau of Standards pointed out in 1928, "was the forerunner of the present auger machines in which the same original principles of barrel, die, and rotating auger are present as were incorporated in its predecessor."[96] The enduring character of the technology comes as little surprise; in 1889, machine maker Alfred Crossley castigated brick machinery manufacturers by noting that "in the whole manufacturing world there was perhaps no industry so slow to adopt modern progressive ideas as brickmaking. Down to, say, forty years back, the same methods pretty much had been employed for centuries."[97] The Steele No. 5, introduced in 1905, featured all but the out-board bearings on a single casting, increasing the machine's rigidity and strength while making it more compact. Gears were now made of steel rather than cast iron, with the exception of the large master gear, and had "bronze end-thrust bearings running submerged in oil

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[95] "Factory Design and Equipment: Various processes: Stiff Mud Process," *The Clay-Worker*" (January, 1928), 29.

[96] Paul C. Grunwell, "Studies of Machines for Extruding Clay Columns: Augers, Spacers, and Dies for Brick Machines," Bureau of Standards, *Journal of Research* (Dec., 1928), 1026. On the Chambers machine, also see: Charles Thomas Davis, *A Practical Treatise on the Manufacture of Brick, Tiles and Terra-Cotta* (Philadelphia: Henry Carey Baird & Co., 1895), 200-204; and George M. Fiske, "Evolution: The Development of the Chambers Machine," *The Clay-Worker* (December, 1927), 456-458, and (14 January, 1928), 36-38, 76.

[97] Alfred Crossley, *Bricks and Brickmaking* (Ottawa, IL: The Brick, Tile & Pottery Gazette, 1889), 15.

in a dust-proof case."[98] Rated at 50,000 - 100,000 bricks/day, it had "adjustable hardened steel knives, steel shaft with renewable iron shell, main bearing 9 inches in diameter, the end thrust held by U bolt equalizing the pressure." Steele & Sons advertised the machine as especially suited to "clay that is too much for the machine you are trying to work."[99]

As an early user of the No. 5, the JBC experienced many of the problems of a machine that was still undergoing field testing. "Our No. 5 brick machine has given us a lot of trouble from time to time," Jenkins wrote Steele & Sons eighteen months after installing the machine, "and we are forced to believe that it must have been put together in a strain, or out of line some way." Broken shafts, flanges, U-bolts, and bolts, a tight end-thrust bearing (that Jenkins ground down), made the company wonder "how strain sufficient to cause so many breaks could come on it if all were properly designed and put together." Jenkins noted that the company did not "work dirt too stiff," properly maintained the machine and oiled the bearings, and had mounted the machine on a good cement foundation. Comparing his experiences with the No. 4 at Wetumpka, Jenkins had "about come to the conclusion that the No. 4 machine is better than the No. 5. It certainly gives us less trouble, and will make more brick in a day, to say nothing of the first cost, weight and wearing parts." Jenkins then asked what he could get in trade for a new No. 5, or a No. 4 outfitted with steel pinion.[100] In 1909, JBC ordered a "new style" No. 5, "with liner in the front," and again recommended specific improvements: "With this machine the end of the shaft that drives the cutter is supported by a small pedestal, an arrangement that allows a great deal of noise and vibration, which we

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[98] "The No. 5 'Steele' Brick Machine," *Brick* (January, 1905), 63.

[99] Advertisement, *The Clay-Worker* (February, 1912), 333.

[100] JBC to J.C. Steele & Sons, 12/17/08.

believe causes these gears to break. If the shaft be made to run in the box, properly supported across both I-beams by a heavy enough brace or casting, we think would be quite an improvement."[101] But the clutch sleeve on the new machine caused a new set of problems, brought on by the normal wear and tear associated with the heavy clay industries. "It is out of the question to handle this clutch easy," Jenkins wrote Steele & Sons. When this machine is full of stiff clay, as it ought to be run, we have to slam it on pretty hard to start the machine. You can't start it easy." But breakage and wearing parts continued, with J.C. Steele & Sons making allowances for new parts and supplying extra castings. Jenkins was not mollified: "Of course, I expect a machine to break when it is neglected and allowed to go to pieces, but when it is kept up in good shape, it ought to stand up to its work like a man, and without being petted."[102]

In 1919, the company ordered a new J.C. Steele & Sons No. 6 machine, one of the largest the company made. Capable of producing 150,000 bricks/day, it featured a substantially simplified drive train, with "only two gears and four bearings – a reduction of three bearings, two gears and one shaft," large gears that reduced "tooth load," engine and auger running at "fixed speeds" to reduce power requirements, additional auger shaft supports (as Jenkins had recommended for the No. 5), capability of running in either direction, and "equipped with a system of continuous augers and bushings, telescoping mouthpiece, etc. for any kind of hollow ware (tile)."[103] The purchase was paid for by a creatively crafted finance package consisting of trading in the old No. 5, selling the Dewey locomotive (which Steele & Sons had already sold and which Jenkins was to ship directly to the customer), "and $50 in cast scrap,

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[101] JBC to J.C. Steele & Sons, 1/23/09.

[102] JBC to J.C. Steele & Sons, 5/9/10.

[103] Advertisement, *The Clay-Worker* (February, 1914), p. 327.

with $850 cash."[104] By the time the machines were ready to ship in early May, J.M. Jenkins, Jr. had convinced Steele & Sons to accept the old Chambers cutter in use at the No. 3 (Holt) plant, which "should be worth considerably more than yours, for, as you know, it is a great deal heavier," while he replaced it with the old No. 5 Steele cutter.[105] The new No. 6 machine was modified "to run in the reverse direction" to accommodate the orientation of the Jenkins plant, and the cutter, it is worth noting, was an "endcutter," not the side cutter that was growing in popularity among brick makers.[106] The new machine was in transit when the old machine broke down again, and JBC "decided not to repair it."[107]

As was the company's practice, JBC followed the progress of the new machine as it was under construction, pointed out shortcomings and suggested significant modifications, based on experience with other machines, particularly the old Chambers machine JBC inherited at the Holt Brick Company. "...(W)e would be glad to have advantages of the present method of putting in the knives, over the old way, explained for our information," J.M. Jenkins, Jr. wrote Steele & Sons.

> Mr. Meek, our superintendent favors strongly the old arrangement. He is able to take off the front, change the grinder and be running in an hour or an hour and a half. With the Chambers machine which we operate (at the old Holt Company plant), it is about a half a days (sic) job. It is necessary to take off the top half of the barrel of the machine, and in addition, the keys fastening the knives sometimes get fastened, making them troublesome to get out....The writer has been of the opinion that the method of putting these grinders in the old machines was hard to

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[104] J.C. Steele & Sons to JBC, 5/13/19. The "scrap" included "an auger and a full set of grinders bought a few months ago (for the No. 5 machine). One of the grinders has been used just a little, the others not at all, and this being standard stock we wonder if we cannot get just about the market for them," JBC wrote Steele. The deal offered JBC a chance to clean up worn parts, including bushings, large gears, and a pug mill band wheel, shaft and pinion, and clutch. JBC trusted Steele to "weigh it up and allow us the proper credit." JBC to J.C. Steele & Co., 5/27/19.

[105] JNC to J.C. Steele & Sons, 5/5/10.

[106] J.C. Steele & Sons to JBC, 3/13/19; JBC to J.C. Steele & Sons, 3/15/19; JBC to J.C. Steele & Sons, 4/10/19.

[107] JBC to J.C. Steele & Sons, 5/5/19.

beat."[108]

Steele & Sons confirmed that the knives were "set in the shaft in same manner as Chambers exactly, except that the key holding same is drifted out from reverse side, whereas in Chambers the shand is driven out." Steele noted that the machine was "so arranged as to make it possible to get all knives out, except about two or three, without taking off the top barrel," and touted the qualities of the new machine: "It seems that machine pulls lighter with the smooth shaft, and the sharp steel knives, and is much less liable to breakage from rocks, and other obstructions, the shank bending instead of breaking." Nonetheless, even though Steele already had the new shaft "shot full of holes," the company offered to make a new shaft for JBC as soon as a new shipment of steel arrived although, in the post-World War I era of high prices and materials shortages, "no man knoweth when it shall come."[109].

The knives turned out to be a weak feature of the machine, as JBC had anticipated, although not for the same reason, and Jenkins once again offered the machine maker his brickmaker's expert advice on construction. Less than a month after installing the No. 6, JBC "had four knives broken in our new machine...as well as a good sized chunk off the augur." Immediately ordering replacements from Steele & Sons, JBC abruptly cancelled the order, welded the auger, and then modified knives from "an old Chambers machine we have," in much the same way the company had modified pug mill knives years earlier (see above). "We don't know how you will take criticism of this equipment, but assure you in the beginning that what we have to say now is in the best spirit," JBC wrote Steele & Sons. "To all appearances, these knives are ordinary casting, and we do not think this grade of material should be sent out with this machine. The knives we took from the old Chambers machine are steel, and we know they

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[108] JBC to J.C. Steele & Sons, 4/10/19.

[109] J.C. Steele & Sons to JBC, 4/12/19.

will bend but not break....write us if you are equipped to furnish good steel knives, and at what price. The present breakdown has been too expensive for us to risk again."[110] Steele & Sons assured JBC that the "knives are drop forged steel, the best that can be had...at least we purchased them for drop forged steel....We would have thought that the knives would have bent back sufficient to clear the obstruction rather than break, and they would have done so if the material had been right." The machine maker asked JBC to return a broken shank so that it could take it to the company that forged it "and ascertain as to the trouble."[111]

In the brick industry of the early twentieth century, dies were considered "the important part of an auger machine" in the stiff mud process.[112] Shaping the clay column as it emerged from the barrel, dies were tapered to further increase pressure on the clay and "knit together the intertwined spirals of clay from the auger." Too little taper failed to sufficiently compact the clay, while too much taper both increased the friction of the clay on the die and resulted in a poorly knitted column structure, since the elasticity present in a plastic clay caused it to expand on extrusion, breaking down some of the bonding

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[110] JBC to J.C. Steele & Sons, 6/4/19.

[111] J.C. Steele & Sons to JBC, 6/6/19.

There is good reason to treat the correspondence on machine weaknesses and repairs in broad perspective. First, problems tend to be the subject of correspondence, while machines that run smoothly rarely appear on letterhead. Second, JBC had an open dialogue with Steele & Sons, in which the brickmaker was evidently comfortable expressing dissatisfaction with aspects of the machinery and suggesting remedies, and to which J.C. Steele & Sons regularly responded positively. Finally, not only did JBC use Steele & Sons machines at Wetumpka (No. 1) and continue to replace Steele & Sons equipment with newer and larger models at the Montgomery plant (No. 2), but it also replaced Chambers machinery at the old Holt plant (No. 3) with a new Steele & Sons No. 4 and cutter, even though "(o)ur present equipment is in very good shape, and we are running with it every day....(W)e would not mind," Jenkins wrote Steele & Sons, "getting in some more of your machinery in its place." JBC to J.C. Steele & Sons, 3/4/20.

In addition to knives, JBC also had problems with the endthrust JBC to J.C. Steele & Sons, 7/5/23; J.C. Steele & Sons to JBC, 7/7/23.

[112] "Dies for Auger Machines," *The Clay-Worker* (May, 1903), 557.

introduced in the die.[113] Clay experts recognized early on that the friction of the clay as it passed through the tapered die frequently broke the surfaces of the column, caused a laminated or cracked structure, or tore the corners, creating what were known as "dog teeth." Solutions to these problems created increasingly complex dies, beginning with a die lined with overlapping strips of metal that lubricated the clay column with water. But the pressure of the clay column forced clay between the strips, prompting the development of a water-tight jacket surrounding the die that carried a continuous supply of clean water through the strips.[114] There followed, noted R.H. McElroy, president of the International Clay Machinery Co., "the judicial placement of fillers (bridges, plates or rings) between the auger and die,...various tapers and types of liners, slickers, various lubricants, and so forth..."[115] Die design continued to be an issue for brick makers well into the twentieth century.

Jenkins used steam-lubricated dies to produce tile through 1923, when the company switched to oil-lubricated dies. These were low pressure dies, and Steele noted that "our experience tends to show that for brick they should not have a great deal of taper..."[116] Although Steele recommended that the die extrude the column flat, Jenkins wrote Steele that JBC had "quit long ago having our clay come from the

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[113] "Dies for Auger Machines," *Brick and Clay Record* (October, 1923), 487.

[114] "Dies for Auger Machines," *The Clay-Worker* (May, 1903), 557; "Dies for Auger Machines," *Brick and Clay Record* (October, 1923), 486.

[115] R.H. McElroy, "Guides in the Purchase of Auger Machines," *Brick and Clay Record* (October, 1924), 552. Other lubricants included soapy water, steam, and emulsified oils. "Lubricating Brick Machine Dies," *Brick and Clay Record* (June, 1914), 1403. Bridges, plates or rings, broke up the smooth surfaces caused by the action of the auger in propelling the clay along the barrel, but greatly increased power consumption. "Lamination in Stiff Mud Brick," *Brick and Clay Record* (July, 1926), 133; J.E. Kirchner, "Lamination – A Scientific Study," *Brick and Clay Record* (July, 1927), 106-110.

[116] J.C. Steele & Sons to JBC, 7/20/07.

die flat. We have found no disadvantage in having it come out on edge..."[117] Bushings were grooved - "10 grooves - our pattern," JBC wrote J.C. Steele & Sons.[118] JBC complained to Steele that "your bushings wear a good deal faster than formerly." Prior to 1913, the company turned out "five hundred to six hundred thousand with each one, and now we do not go much above half that quantity." Worn bushings made bricks too large.[119] JBC didn't "know that our clay has changed materially that would cause this," and questioned whether Steele & Sons had made any change in production that made softer bushings.[120] Periodically, when JBC tapped a new area of the clay bed, it would have to order new dies or bushings. "We have gotten into some clay that shrinks very little, and it makes brick too heavy," JBC wrote Steele. "Please make us 6 bushings this size: 2-1/4 x 3-15/16, with the 10 corrugations on sides as usual."[121] Later, JBC complained to Steele that one in four die bushings were breaking, and even a die

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[117] JBC to J.C. Steele & Sons, 8/13/06.

[118] JBC to J.C. Steele & Sons, 1/20/12.

[119] The National Brick Manufacturers' Association (NBMA) established the "standard size of a good, hard-burned common building brick" in 1893 (reaffirmed in 1899) at 8-1/4 x 4 x 2-1/4 inches. However, as H. Brewer, an equipment manufacturer from Tecumseh, Michigan, noted in its catalog, "...peculiar to state, some of the most extensive brick manufacturers in the country, who are members of the (NBMA), do not make their brick of the dimensions specified, and this, together with the fact that other local associations of brick manufacturers and some state legislatures have specified different dimensions, makes it impossible to state that there is such a thing as a standard size which has been universally observed. It seems, then, as far as the individual manufacturer is concerned at least, that the proper size of brick is the smallest one which will be accepted in the market where they are sold." The Brewer article was reprinted in *Brick* (June, 1905), 310-312. JBC was a member of the NBMA. A brick from the JBC Wetumpka plant measures 8-1/4 x 4-1/4 x 2-3/4, differing from the standard proportions, where the length is twice the width plus one mortar joint. In 1925, JBC requested from Steele a larger die "than we use for common brick" so that the company could "make up some wire-cut brick similar to ones we have made in the past..." JBC to J.C. Steele & Sons, 4/23/25.

[120] JBC to J.C. Steele & Sons, 4/7/15.

[121] JBC to J.C. Steele & Sons, 7/22/14. The company made a similar request seven years earlier, when Steele agreed to furnish a "measuring pulley with gears and 4 die bushes..." J.C. Steele & Sons to JBC, 6/27/07.

itself that the company had installed on its new No. 6 machine broke with only a few hours use.[122] Steele replied that dies "are made as hard as possible in order to wear well and are about like glass," but they had to be attached evenly to the machine and "will break easily if bolted on in a strain."[123] When JBC switched from steam to oil dies in 1923, the changeover cost $117, and oil dies cost over half again as much as steam dies to replace. But Steele recommended the change: "...your clay is hard to work and it seems that the oil die would be very effective, and we are furnishing them to most of the large brick plants throughout the country."[124] When the dies arrived, however, the bushing was "smaller by 1/32nd than the ones we have been using...;" in addition, the bead (for keying the mortar) was too large. Since JBC had "been using the 2-3/8 x 4 for many years and, as this finishes up a brick just about standard with our clay," the company was "afraid to make anything smaller."[125] Steele's response reinforces the notion that variability in clay content affected die dimensions and was difficult to predict: "It seems that the shrinkage varies a little in almost every die and it is practically impossible to get them the exact size to the hair's breath..."[126]

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[122] JBC to J.C. Steele & Sons, 3/29/23.

[123] J.C. Steele & Sons to JBC, 4/4/23,

[124] J.C. Steele & Sons to JBC, 5/21/23. Convinced of their value, JBC ordered six additional oil dies at that time. JBC to J.C. Steele & Sons, 7/13/23.

For tile dies, though, JBC sought the advice of The Louisville Machine Manufacturing Co. "as to the success of oil or steam lubrication, and which in your opinion would be better for us to use with a good plastic surface clay. In brick manufacturing we used steam for many years, but now are using oil." JBC to The Louisville Machine Manufacturing Com., 5/27/25. The Louisville company replied that "it happens very much on southern clays, that they prefer oil lubrication to steam or water..." For dies, the Louisville company also recommended "independent corner lubrication so that one or more of the corners can be used or not used and that you can control the flow of the liquid on either corner as you may require." The Louisville Machine Manufacturing Co. to JBC, 6/2/25.

[125] JBC to J.C. Steele & Sons, 8/29/23.

[126] J.C. Steele & Sons to JBC, 9/5/23.

The stiff mud machine extruded clay in a horizontal column, accurate in two dimensions, which then needed to be cut into bricks.[127] "In the manufacture of auger brick machines," wrote Chambers Bros. in its brick machinery catalog of 1905, "probably no feature has taxed the inventor so severely as that of automatically cutting the brick." Unlike the brick machine itself, which remained relatively unchanged in principle, automatic cutters changed substantially from the first ones introduced by Chambers Bros. in the 1860s. The first cutters used knives, discs or spirals, all of which proved unsatisfactory and were superceded by the wire cutter, which was developed as a low-cost alternative to the heavily-mechanical spiral for plants producing fewer than 50,000 bricks per year. Wires were mounted on an endless belt, attached to flexible holders, with "the distance between wires representing the length of the brick, and the angle at which the wire-holding belt was presented providing for the passage of the wire through the clay bar during its forward motion." The first model suffered from several serious defects: an obstruction to one of the wires affected the other two that were in the bar simultaneously; there was no way to clean the wires between cuts; and brick lengths could vary as the wire-holding belt stretched. In the next iteration, wires were mounted on holders on a revolving wheel that made one cut at a time, the clay column still triggered the cutter but now used a cam and tappet wheel to control speed, a cleaning wiper removed clay and debris from the wire, and several modifications eased the brick onto the off-bearing belt. Later, Chambers replaced the sliding contact between the tappet wheel and cam. In 1901, the American Clay-Working Machinery Company introduced the first rotary automatic cutter. The American machine departed from the Chambers Bros. model in two important respects: The wheel and cam system were replaced by a reel holding two sets of

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[127] Information in this paragraph is gleaned from "Forty Years of Brick Cutters," *Brick* (April, 1905), 241-244, a reprint from the 1905 Chambers Bros. catalog, which did not include dates for the introduction of various models.

easily replaceable wires, and the travel distance of the reel carriage was reduced by half. This cutter became the model for twentieth century cutters.[128]

Like most other equipment at JBC's Montgomery plant, the cutter was made by J.C. Steele & Sons, and was designed to work closely with the company's stiff-mud machines, which extruded the clay column onto the cutter's belt that carried it to the cutting reel & wires. But Steele's conventional machine also required modifications to accommodate the belt on the Scott system Jenkins was installing to carry bricks directly from the cutter to the kiln for drying and burning. The 10" belt Jenkins wanted (rather than the 5" belt normally supplied with the Steele end-cut brick cutter) would give the company flexibility to change its brick style in the future. "We are not sure," he wrote Steele, "that we will not want to make side-cut brick, and for that reason would not care to discard the 10" belt. If we do change to side-cut, we will not have much to change except the cutter."[129] JBC felt it would take only slight modifications on Steele's part to fit the Scott belt. At first, Steele balked at the idea, calling it an "absolute impossibility...to rig up a cutter to use a 10" belt & to get it into perfect condition, without changing the cutter almost entirely."[130] Jenkins then proposed transferring brick from the off-bearing belt to the Scott belt, but Steele cautioned that "the brick would be very much disfigured." Finally, JBC had Steele "make us this delivery table, with about a 5" roller at the upper (machine) end and a sheet metal apron to take the brick over to the Scott belt," a solution developed by Jenkins.[131] Not long after, when JBC was considering taking on work for Alphonsis Custodis Chimney Company, it wanted Steele to build a cutter that would cut tile as

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[128] "The American Rotating Automatic Cutter," *The Clay-Worker* (October, 1901), 333. The C.W. Raymond Company introduced a similar cutter that year. "The Raymond New Automatic Cutter," *Brick* (October, 1901), 170.

[129] JBC to J.C. Steele & Sons, 8/13/06.

[130] J.C. Steele & Sons to JBC, 7/16/06.

[131] JBC to J.C. Steele & Co., 8/13/06.

well as side-cut brick, but Steele pointed out several inherent problems with the arrangement, and the idea was dropped, even though Jenkins sent Steele detailed instructions on how to make the machine.[132] By 1916, JBC had a Steele cutter for side-cut brick, as well as the older one designed for end cut bricks.

Compared to the Wetumpka plant, for which Jenkins drew the kiln design on a vest pocket memorandum, burning equipment for the Montgomery plant was thoroughly researched and some of the newest technology selected. His oft-stated goal was "to have everything as nearly as possible favorable to the cheapest production of brick that are better than the best of all the rest,"[133] with "a special view of saving labor and fuel."[134] He visited a number of brick companies to examine drying and burning systems, including the Knoxville, Tennessee plant of Alex A. Scott, developer of the "Scott System" of drying brick that Jenkins eventually adopted.[135] Scott highly recommended the furnace design of Willard Richardson, a ceramics engineer from Columbus, Ohio, and praised Richardson as "evidently the best man to follow in this line there is in America."[136] Based on Scott's recommendation, Jenkins intended "to follow his (Richardson's) plans as near as I can, for I am sure he knows the business and his advice and plans are well worth following."[137] The American Blower Co. promoted the innovations Jenkins was

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[132] J.C. Steele & Sons to JBC, 9/28/08; JBC to J.C. Steele & Sons, 9/30/08..

[133] JBC to Alex. A. Scott, 1/15/06; Min., Board, JBC, 2/10/06, p. 13.

[134] JBC to Alex. A. Scott, 1/15/06

[135] JBC to Alex. A. Scott, 2/12/06; 1/22/06.

[136] Alex. A. Scott to JBC, 1/18/06.

Scott was more than just a customer of Richardson's. He and Richardson were partners in the Scott Kiln-Drying Company, lessees of the Alex. A. Scott patents, along with furnace developers C.B. Harrop and Ellis Lovejoy. Richardson, Harrop and Lovejoy were also principals in the Richardson-Lovejoy Engineering Company, which supplied plans and setup labor for Jenkins' kiln. W.D. Richardson to JBC, 5/7/06; W.D. Richardson to JBC, 6/1/06.

[137] JBC to Alex. A. Scott, 1/15/06.

installing: "You know you are doing something different and unusual from the average brick-maker in the south," the company wrote Jenkins. "(Y)ou are placing yours in a position to be about 20 years ahead of your competitor, and the brick making world of the South has its eyes concentrated on you."[138]

The drying and burning system were the most innovative aspect of the plant. The Scott System for drying brick was introduced in 1905 by Alexander A. Scott, a Knoxville, Tennessee brickmaker who had developed a well-regarded car-and-pallet drying system several years earlier.[139] In addition to mechanical patents, "the process was recognized by the patent office as being an entirely new art..." To demonstrate his new system, which turned the kiln into a dryer as well, Scott built a new, $85,000 plant at Knoxville, which Jenkins visited as he was preparing to build his Montgomery plant. Bricks were transported by conveyor from the off-bearing belt to a belt running directly into the kiln, where they were set, dried, and burned. In the kiln, bricks were set eight to ten courses high over the entire surface of the kiln floor, except a small space at the center over the hot air tunnel. Each course was covered with a layer of paper to direct air currents through the course. The paper remained in place, burning off when the kiln was fired. A layer of sheet metal was laid across the top of the day's setting, except at the sides, where moisture-laden air was permitted to escape. When the top layer was dry enough, the next day's run of eight to ten courses was set, with setters removing the metal sheets as they set the bricks. A flash wall of unburned brick was built each day to the height of the dry brick, to direct air currents through the stack. The system worked best with two kilns, or with a kiln with multiple chambers, that permitted

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[138]ABC to JBC, 9/27/06.

[139]"Scott's Patent Brick Car and Open Air Drying System," *Brick* (Oct., 1901), 14; "The Scott Patent Car System," *Brick* (Sept., 1902), 114-5; The Scott Patent Brick Car Co's. Natural Carless Drier," *Brick* (Oct., 1903), 14-5; "The Scott Method of Handling Brick," *The Clay-Worker* (Jan., 1902), 70.

alternate setting and drying, but even then, Jenkins "found it necessary to install a third conveyor, so as to give 12 or more hours for cooling before the men went back into a kiln, that had been fanned....(T)he last, or crown setting is especially hard on the setters."[140] The number of layers that could be set depended on the size of the kiln, but contemporary illustrations depict up to five days' runs of bricks. "As the dry air must pass through all the bottom courses of brick until the kiln is finished, this insures a perfectly dry kiln of brick, and the drying is progressive," the company noted.[141]

The simplicity, cost savings and efficiency of the Scott System appealed to ceramics engineers. No additional drying structures, with attendant flues, tunnels and multitude of drying cars, were needed. Waste and burning heats from other kilns, or exhaust and waste steam from the plant, were used to dry the brick, reducing the fuel cost of drying brick to three-to-six cents per thousand. The tendency for brick to dry unevenly, warp or crack on drying cars in conventional dryers was avoided. But "the greatest advantage is in the saving of labor," contemporaries claimed. An average size plant producing 50,000 bricks per day would generally require approximately fifteen men to move brick from the off-bearing line to the dryer, attend the dryer, and then move brick to the kiln. Scott's system needed four - one transferring brick from main to kiln belts, and three setters. In addition, after burning, the same belt system transferred brick from the kiln to railroad cars. The system exhibited impressive results at Scott's plant: "The first burn made by the process," reported the industry trade journal *Brick*, "yielded 95 percent good hard-burned brick and the mechanical operation of the system was entirely satisfactory..."

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[140]JBC to Kansas Buff Brick & Mfg. Co., 8/20/07.

[141]"A New System of Handling, Drying and Loading Brick at Knoxville," *Clay Record* (Nov. 15, 1905), 25-29; "A New System of Handling, Drying and Loading Brick on the Alex. A. Scott Brick Co.'s Plant at Knoxville, Tenn.," *Brick* (Nov., 1905), 184-88; W.D. Richardson, "Drying Brick," *The Clay-Worker* (Dec., 1905), 571-3.

Richardson, heartily endorsed the Scott System: "What must, more than anything else...bring his system into use, is the daily saving and labor of handling brick, even over the best that can be done with any other system of drying that I know of."[142] Still true years later, he told fellow brickmakers, "With this system no investment in a dryer or dryer cars are needed. In operation, we save the labor of a setting crew, as the same number of men who would on an ordinary plant, hack the green brick on the dryer cars, set them in the kiln."[143]

Richardson thought so highly of the Scott System that his firm, Richardson-Lovejoy, adapted several compatible German kilns for use with it.[144] Jenkins selected one of these, but not without serious reservation. Although "familiar with building and operating ordinary down-draft kilns, ...(he did not find them) economical in the use of fuel," and chose Richardson's semi-continuous kiln design, even though "I don't know just what I am going into as to cost." He confided to Scott that he had "never seen a continuous kiln," and found it hard to understand "how brick can be well burned with so little coal, and no cleaning of fires."[145] Jenkins progressed from skepticism to open questioning of the design. After visiting Richardson in Columbus and reviewing the plans in detail, Jenkins wrote Scott "Confidential and Personal," that Richardson's design "calls for too much tom-foolery...too many ducts, fire holes, dampers, &c., &....Personally, I regard Mr. Richardson very highly, but I think I will have to modify his plans

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[142]"A New System of Handling, Drying and Loading Brick at Knoxville," *Clay Record* (Nov. 15, 1905), 25-29; "A New System of Handling, Drying and Loading Brick on the Alex. A. Scott Brick Co.'s Plant at Knoxville, Tenn.," *Brick* (Nov., 1905), 184-88; quote, W.D. Richardson, "Drying Brick," *The Clay-Worker* (Dec., 1905), 572.

[143]JBC to Ross C. Purdy, 1/10/22.

[144]W.D. Richardson to JBC, 1/28/07.

[145]JBC to Alex A. Scott, 1/19/06.

somewhat to get them down to a practical basis."[146]

As he had expected, the complexity and cost of the Richardson-Lovejoy kiln led Jenkins to modify its construction and operation. "My experience with down-draft kilns is of advantage to me in figuring on this kiln too," Jenkins wrote a stockholder.[147] He was initially most dissatisfied with the firing plan. "Richardson says for me to fire on both sides of a 12 ft. chamber and I don't see the use," he wrote Alex. Scott. "I want to fire on one side and let the fire go down and out, under the wall on the opposite side."[148] He also questioned the size of the ductwork. Since Alex. Scott had built a Richardson-Lovejoy kiln, Jenkins sought Scott's advice. "I, like you, do not see the use in firing on both sides," Scott wrote Jenkins, nor did he agree with Richardson's specifications for ductwork. Richardson himself felt that Jenkins' redesigned furnace, which fired from one side and used modified ductwork, would work, "and the only objection he offered to the plan," Jenkins told Scott, "was that when kilns were fired on one side, they were inclined to settle or lean that way." Jenkins felt he could guard against that danger by "doubling the thickness of the partition wall."[149] Richardson argued that "(t)he 2-sided firing gives a more uniform and rapid burn. More uniform because the firing from both sides and the arrangement of the flues gives a better distribution of the heat. More rapid because the hot air from the cooling and from the burning chambers circulates first under the bottom of the kiln, warming it up so that the heat will go quickly to the

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[146]JBC to Alex. A. Scott, 2/12/06 (underlining in original).

[147]JBC to B.C. Fennell, 9/28/06.

[148]JBC to Alex. A. Scott, 2/12/06

[149]JBC to Alex. A. Scott, 4/14/06.

bottom."[150] Richardson modified the kiln's foundation plans to enlarge the bottom drying flue, accounting for the special circumstances of using the kiln with the Scott System.[151] He also modified Scott's system, dispensing with the sheet iron plates and enlarging the floor openings to circulate the heat to the outer walls.[152]

The Richardson-Lovejoy kiln did not burn brick as advertised, and Jenkins considered "the kiln as first designed...a failure."[153] Try as he might, he could not get it hot enough to "burn off the chambers as they should be to keep ahead of the brick making machinery."[154] Instead, his earlier doubts about excessive flues appear to have been substantiated: "The heat from a burning chamber is absorbed by that extensive system of under-ground flues, and is lost in the bowels of the earth, instead of getting to the brick," he wrote a fellow brickmaker.[155] By the time the fire reached chambers 7 and 8, the heat had dissipated. Even in the chambers that burned hot, the bottom brick – from five to ten courses – burned soft.[156] The kiln burned too much coal at this minimal level of performance.[157]

The kiln's failure to work as promised induced Jenkins to terminate his relationship with Richardson's firm

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[150]W.D. Richardson to JBC, 5/7/06.

[151]W.D. Richardson to JBC, 6/1/06.

[152]W.D. Richardson to JBC, 10/12/06.

[153]JBC to J.E. Carson, 5/20/07.

[154]JBC to Richardson-Lovejoy Engineering Co., 2/11/07.

[155]JBC to James Inglis, 2/21/07 (emphasis in original).

[156]JBC to W.D. Richardson, 4/18/07.

[157]JBC to J.E. Carson, 5/20/07.

just as he was burning his first brick. After repeated correspondence with the company, he learned that his kiln "was the first one and has some faults" that Richardson-Lovejoy addressed in the various plans they redrafted.[158] Jenkins was irate:

> In building this kiln, we have followed your plans, not expecting that it was an experiment. Our recent correspondence with you, and our experience with the kiln have forced us to the conclusion that we are experimenting. As you know, experimental work is always expensive, and to be frank, we do not feel like assuming the additional cost of your expenses and per diem in the further conducting of these experiments in which you should be as much interested as we, if you care anything for your professional reputation.[159]

Richardson & Lovejoy generally supervised kiln installation closely, but Jenkins' tendencies toward self-reliance and economy thwarted that practice. The engineering company evidently expected some difficulties, since it had complained to Jenkins on several occasions that the usual policy was to send a man out to supervise construction and to observe the first few burns. In fact, Richardson-Lovejoy had "thought when we made the drawings that we would, at least, have opportunity to see the kiln during its construction and to talk with you about the burning of it."[160] The company evidently intended to modify the kiln as it was under construction, or after the first burns. For example, Richardson-Lovejoy acknowledged, "It is undoubtedly true that the fire boxes are too narrow for most coals. We make these now wider, in fact had we looked after the construction of your kiln, they would have been made wider." In something of an understatement, the company admitted "We think the construction was not made very clear on your plans.[161] But the company firmly denied that the kiln was experimental, "only, in so far, of course, as it applies to the Scott System," and laid the blame for its failure squarely on Jenkins' shoulders:

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[158]W.D. Richardson to JBC, 1/28/07.

[159]JBC to Richardson-Lovejoy Engineering Co., 2/18/07(emphasis in original) .

[160]W.D. Richardson to JBC, 1/28/07.

[161]W.D. Richardson to JBC, 2/13/07.

"If you do not get good results from the kiln it is either because you have not built it according to our drawings, or because you do not know how to operate it."[162] But Jenkins was unconvinced: "I have had so many disappointments in trying to make this kiln work, that I am thoroughly disgusted with it, and wish I could see a kiln 'Engineer' spend a few of his own thousands in experimenting."[163] If he had any success at all, Jenkins believed, it was "due only to my own thought and experimenting, and not to any help from any 'Brickworks Engineer'. (dammem)."[164]

By mid-summer of the Montgomery plant's first year in operation, Jenkins thought less about small patches for his kiln problems and more about radical modifications. "I have tried so many things & ways of setting & of firing, and kinds of coal," he confided to another brickmaker who also experienced problems with his Richardson kiln, "that it would take a book to tell you about it."[165] He estimated he had spent about $30,000 constructing and trying to make the kiln work and, by July, 1907, was not much closer to his goal of 90% hard burned brick.[166] The catalyst for radically modifying his kiln was the appearance in Montgomery of P.L Youngren, a kiln designer from Milwaukee, who had been retained by the Holt

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[162]W.D. Richardson to JBC, 3/4/07.

Richardson-Lovejoy claimed, and Jenkins agreed, that kiln plans were furnished free of charge, to purchasers of the Scott System.

Jenkins was not the only brickmaker having trouble with the Richardson kiln. T.W. Spinks of Covington, Kentucky also had bad burns after reconstructing ten chambers of his kiln under Richardson's instructions. T.W. Spinks to JBC, 7/23/07.

[163]JBC to J.E. Carson, 7/27/07 (emphasis in original).

[164]JBC to J.E. Carson, 7/27/07. Recounting his trials over the two years of redesigning Richardson's kiln, Jenkins lamented to another brickmaker: "I would rather forget it, along with the disappointments, agony and heartaches I endured, by faithfully working out and following the plans of an Expert, Scientific, Brickworks ENGINEER." JBC to Frank Reid, 10/8/10. (Emphasis in original.)

[165]JBC to T.W. Spinks, c. 7/23/07.

[166]JBC to Alex. Scott, c. 7/27/07.

Brick Company to build one of his producer gas-fired, continuous kilns. He and Jenkins met several times, and Jenkins "studied his catalog, and ...(was) impressed with him and his work."[167] After these discussions, Jenkins concluded that "crown-kilns are used with the Scott system under considerable disadvantages, and if an open kiln can be devised that will do the work, on continuous kiln principles, it will be a good thing."[168] He had also studied the kiln designs of Chmelewski, which used principles of continuous operation on an open, or unarched, kiln, and corresponded with H. Haigh, another kiln designer from Catskill, NY. [169]

The problems affecting Jenkins' kiln after six months of burning may have stemmed, in part, from his modifications of Richardson's design and, in part, from firing strategies he used to compensate for the failure of the kiln to burn brick hard. To cut construction costs, Jenkins used Richardson's kiln plans, offered free with the Scott system, but chose to build the kiln himself rather than pay a man from

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[167]JBC to J.E. Carson, 7/27/07.

Ellis Lovejoy later wrote: "Mr. Youngren's unbounded faith in his kiln, his recognition and admission of his faults, his ability to overcome such faults, and his untiring energy in presenting the kiln to American clayworkers have won for the kiln the prominent position it holds today." Ellis Lovejoy, *Burning Clay Wares* (Indianapolis: T.A. Randall, 1920-1922), 282. By 1917, Youngren's kilns, marketed first by Youngren, then by the C.W. Raymond Co., and then by the International Clay Machinery Co., had been installed in at least ten Canadian plants, and in American plants throughout the South and midwest. R.H. McElroy, International Clay Machinery Co. to JBC, 1/31/17.

[168]JBC to J.E. Carson, 7/27/07. In particular, the Scott system needed ample space below the crown for the conveyor belts. Brick settled as it dried and burned, increasing this space at the top, where the heat tended to concentrate. Moreover, the crown trapped "the warm, humid air," which was bad for setters, while the heat form the burned brick was bad on the loaders. "Crowns are expensive to build and maintain, for they must be repaired and rebuilt occasionally." JBC to J.E. Carson, 7/27/07

[169]JBC to J.E. Carson, 7/27/07; JBC to H. Haigh, 7/29/07; JBC to J.E. Carson, 8/15/07.

The Chmleweski kiln was developed in Finland in the early twentieth century. "(S)imply a ring furnace, without a crown," it was continuous, regenerative and open-top. Lovejoy, *Burning*, 178.

Richardson-Lovejoy to supervise its construction and observe the first few burns.[170] Even as it was under construction, Richardson complained that the firm felt "quite anxious about the kiln, since it is not under our supervision and we have had no questions from you in regard to anything."[171] Richardson insisted that "we want to be sure that everything is done right and hence have specified in every case so far that our man should erect the apparatus," referring to the Scott System conveyors.[172] But, as noted above, Jenkins found too much "tom-foolery" in Richardson's designs and modified them considerably, reducing the size of the chambers from 15' to 13-1/3', changing firing from two- to one-side, adding a chamber, and cutting extra feed holes in the crown.[173] Richardson repeatedly warned that firing kilns from one side would compromise them structurally, but even he admitted that "a crown ought to last several years, if properly constructed of fire brick."[174] Although Jenkins used firebrick in his arches, he acknowledged that, "with more fire brick, it would give us less trouble."[175] But much of the damage to the kiln grew out of Jenkins' attempts to burn his brick hard. "When we had the trouble with the kiln a while back," he wrote fellow brickmaker J.E. Carson, "we fired it pretty hard, trying to get it hot, and we did, at the top,

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[170]Richardson noted that "We have several of these kilns under way in charge of our own men and yet we have to help them on several points. However, the kiln is not so complicated as it looks to be at first and we trust that you will have no trouble in the building of it." W.D. Richardson to JBC, 6/27/06.

[171]W.D. Richardson to JBC, 6/27/06.

[172]W.D. Richardson to JBC, 5/7/06.

[173]JBC to Richardson-Lovejoy Engineering Co., 3/14/07.

[174]W.D. Richardson to JBC, 8/10/07.

[175]JBC to Eastern Townships Brick and Manufacturing Company, 2/8/08.

Jenkins' extensive correspondence with Alex Scott gave Scott a clear picture of Jenkins' kiln problems. Scott wrote Jenkins that "the greatest trouble that I see is that your kilns will not stand the heat.. If they were built of material that would stand the heat, then we could easily change them to gas fired kilns." Alex. A. Scott to JBC, 3/5/08.

warping the crown somewhat...and each succeeding burn warps them a little more."[176] In addition to these problems, Jenkins had concluded that "some form of open-top kiln would be better adapted to the Scott system, than a crown kiln."[177]

In January, 1907, Jenkins prepared to "take off some of the crowns and try the Chmleweski plan,"[178] believing he could "get something like 90M brick in a kiln, instead of 55M as we do now."[179] Studying the Chmleweski kiln convinced Jenkins that his would work without the crown. Removing the crown from five chambers brought unsatisfactory results, and Jenkins "began to study out the improvements and experiment, until, I believe, I have the best kiln in the world for burning common brick."[180] He sought advice from Scott, who was developing his own kilns, and visited his yard at Knoxville again, but Scott eschewed the open-top in favor of a crown. "I have my ideas on the subject which they did not take

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[176]JBC to J.E. Carson, 8/15/07 (emphasis in original) Jenkins advised fellow brickmakers that "the crowns would always follow the fire." Ed Carson to JBC, 4/13/11.

"My experience with crowns," Jenkins wrote Carson, has been so productive of heartache, headache, backache, wakefulness, atrophy of bank account, gray hairs, 'rinkles, vengeful thoughts and murderous moods..." JBC to J.E. Carson, 3/11/08. And later, to Carson, he was even more emphatic: "If Carnegie or John D. should offer to build crowns to my kiln and guarantee them to stand for fifty years, free gratis for nuthin (sic), I'd sic the dog on him - or call the police. I don't want no crowns." JBC to J.E. Carson, 10/6/11 (emphasis in original).

[177]JBC to Kansas Buff Brick & Mfg. Co., 8/20/07; JBC to D.G. Loomis, 1/28/08.

Listing its many advantages, Lovejoy later noted the widespread regional popularity of the open-top continuous kiln: "There is a persistent demand for an open-top continuous kiln, particularly in the South. Such a kiln is comparatively low in cost; it is as sanitary as the up-draft kiln, which is an important feature in hot climates; the capacity, dingle fired, is limited to from 30,000 to 50,000 bricks per day...; being regenerative, the kiln is more economical in fuel than a periodic kiln; it is adapted to crane setting and drawing; it gives a larger percentage of hard bricks and largely eliminates arch bricks." Lovejoy, *Burning*, 176.

[178]JBC to Alex. A. Scot, 1/17/08. Jenkins found Chmleweski's kiln "very interesting, but totally different from my kiln except for the open top, and the use of the continuous principle, both of which are too old for anybody to claim." JBC to C.M. Steele, (J.C. Steele & Sons), 3/11/10.

[179]JBC to Alex A. Scott, 1/28/08.

[180]JBC to J.C. Steele & Sons, 3/11/10.

favorably to at first," Jenkins wrote Carson, "but finally Scott...agreed that they believe I am on the right track, and that my ideas are sound, and that I can get good burns with open top kiln."[181] Jenkins completely modified the kiln during the winter of 1909. "It is open-top – nothing but walls, therefore not expensive to build. No firebrick in it. No crowns with their ever present danger and cost of repairs."[182] He could "burn brick with 300 lbs slack coal per M," compared with 500 lbs per thousand with the Richardson kiln.[183]

Jenkins did not claim anything novel about the design, "a combination of old features of different kilns," but was "sure there is nothing else like it, as we have it," he wrote H.O. Steele. J.C. Steele & Sons, the largest brick equipment manufacturer in the South and Jenkins' primary machinery supplier, encouraged him to patent his kiln, and assisted with the patent research.[184] Jenkins proposed that J.C. Steele & Sons "do all the work, promote and sell the right and plans if we get patents, or the plans, if we get no patents, for a half interest in it. We have spent thousands in getting success out of it..."[185] Jenkins studied the patent specifications of other, similar kilns, and saw "nothing in them to interfere with us." Yet, he admitted, "I hardly know what point or feature of my kiln is new enough to patent, but a combination of features, together with the manner of setting the brick, is what gives us a successful kiln, and should

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[181]JBC to J.E. Carson, 3/11/08.

[182]JBC to J.C. Steele & Sons, 12/20/09. See also, Min., Board, 1/13/09, 45.

[183]JBC to J.C. Steele, 12/20/09

[184]JBC to J.C. Steele & Sons, 12/20/09. C.M Steele noted that the American Blower Company was marketing an open-top continuous kiln, and that Richardson himself had discussed one in a talk before the "convention on the Small Brick Maker." J.S. Steele & Sons to JBC, 3/4/10.

[185]JBC to J.C. Steele & Sons, 3/11/10.

entitle us to patents, seems to me."[186] Although J.C. Steele & Sons expressed some interest in the possibility, Jenkins never patented the kiln.[187]

The redesigned kiln fulfilled most of Jenkins' goals for his plant. Construction costs were about as low as possible. He claimed that "The kiln now is cheap-cheaper to build than a common clamp kiln of the same capacity, as there are no furnaces or gratebars. No fire brick in it. No arches or crowns, therefore very few repairs. It will cost less than 1/4 of what a continuous of the usual crown type will cost, and the up-keep will be much less." Partition walls had a tendency "to follow the fire" and lean after a while, but Jenkins could rebuild a wall for less than $100, and was learning to build them better. The kiln burned off a chamber of 100,000 brick, stacked 42 high, in 60-72 hours at about 90% hard, slightly slower than the plant's rated capacity of 50,000 per day, but nearly as much as was possible given the composition of the clay he worked with, which "clinkers about the fire holes if we increase the draft and fires to hasten the burning." The plant was very economical to operate, a prime concern. The kiln used clean, quick-burning slack coal that could be purchased below the cost of lump coal, and the method of firing was such that "very little is dependent on the burner...(Y)ou may take a field hand, give him a little house shovel and a clock and tell him to spill a shovel full of slack coal into the fire-holes every 15 minutes, without an 'expert' (?) burner who may or may not bankrupt you." The kiln eased considerably the work of setters and loaders: "The chambers being open top, is (sic) filled and emptied with much less discomfort than a crown kiln..." In short, compared to the covered continuous kiln, Jenkins claimed his "holds 1/3 more brick, and is burned off in the same time, with the same labor, and with as little coal (on account of the

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[186]JBC to J.C. Steele & Sons, 2/23/10.

[187]JBC to Bright Williamson, 6/7/15.

better distribution of heat) in my kiln."[188] As in many industrial innovations, it was not the novelty of the equipment that led to the success of the open top, semi-continuous kiln. Jenkins considered "the matter of setting of as much importance as the construction of the kiln, as it would not succeed without it. In fact, the kiln was designed and built with this style of setting in view...."[189] Brick was set "forty course high in each chamber," he wrote Ross Purdy, a fellow brickmaker, "divided into four settings of ten high each."[190]

Redesigning the kiln may have saved the company. "It was conceived in dispair (sic) and born in tribulation, right here," Jenkins wrote a customer. "We built after the plans of a Scientific, Expert Ceramic Engineer, and after barely escaping bankruptcy, on account of the failure of the kiln, we got busy thinking and experimenting for ourselves and came out somewhat scorched and singed, but not entirely skinned."[191] The new kiln changed the way Jenkins perceived his business. Where before he had worried constantly about the kiln, and had written extensively to engineers and brickmakers alike, by late 1912 he was able to report that "of all the worries and anxieties incident to this heavenly business, this kiln is the least."[192]

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[188]JBC to Frank H. Reid, 10/8/10 (quotes); JBC to J.E. Carson, 4/11/11. JBC to Bright Williamson, 10/6/16; JBC to Bright Williamson, 3/19/17.

[189]JBC to J.C. Steele & Sons, 2/23/10; JMJ to Frank Reid, 10/8/10 (on patents). At least one brickmaker, Bright Williamson of the Darlington Brick Company, installed a modified Jenkins open-top, continuous kiln. Bright Williamson to JBC, 3/17/17. See also Bright Williamson to Fraser Brick Co., 3/17/17, copy in JBC correspondence; JBC to J.E. Carson, 10/6/11.

[190]JBC to Ross C. Purdy, 1/10/22.

[191]JBC to Salmon Brick & Lumber Co., 4/14/11 (emphasis in original).

[192]JBC to T.L. Herbert, 12/5/12.

Tile

In addition to common brick, Jenkins Brick Company manufactured tile during the first two decades of the company's history. Although Plant No. 2, the new Montgomery facility constructed in 1906, with which this history is primarily concerned, did not undertake tile production until the mid-1920s, the company's earlier experiences -- both failures and successes -- at Wetumpka (Plant No. 1) and at Holt (Plant No. 3) provided rich background for later successful production at No. 2. JBC could not run tile at No. 2 without sacrificing its common brick business, since the semi-continuous kiln could not burn both. Wetumpka and Holt, on the other hand, had round down draft kilns that could burn discreet runs of tile between brick orders. When JBC installed Minter System kilns at No. 2 in 1923, it began making both tile and face brick at that facility. Branching out into tile production made sense for several reasons. The use of tile in building construction increased dramatically in the early twentieth century, as did the adoption of drainage tile in the South. Moreover, stiff-mud extrusion machines were easily adapted to drain tile and hollow building tile production by changing the die and cutter, and dryers and kilns could be modified with little effort or expense. The chief concern was the quality of the clay, which needed a fairly long staple and good plastic quality.[193]

In 1907, the Alphons Custodis Chimney Construction Company (ACCCC), which used from 5000 - 10,000 tons of block/year as one of the country's largest industrial chimney companies, asked Jenkins to consider making chimney tile. "We have attempted nothing but common brick, and have succeeded admirably in that line," Jenkins wrote the company. "Handling a new line would be somewhat awkward

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[193]A.L. Thomas, "Is It Practical, as Well as Profitable, to Make Brick and Tile on the Same Plant?" *Brick* (Jan., 1909), 27-8.

and slow at first, and it is likely that there would be considerable loss in the making of these blocks, from the machine to the shipping."[194] In August of 1908, JBC contracted to turn out 500 tons of perforated radial chimney blocks, at $4/ton f.o.b. Wetumpka[195] In the first order, ACCCC specified five die sizes and stipulated the thickness to be 4-5/8" "to have the blocks of such thickness that they will readily lay up with two common bricks."[196] The ACCCC also instructed JBC on the relationship between block quality and the art of chimney construction:

> By way of explanation, we will say that for chimneys of ordinary diameters the upper 16' are built of B blocks, the next 16' are built of C blocks, the next 16' D blocks and the lower sections of combinations of sizes. Blocks which show on the exterior we call 'face' and those which do not appear on the face are called 'inside'....If it so happens that your blocks average of a fair color it may not be necessary to make any selections for facing, but if there should be a wide variation it may be necessary to make selections to some extent."[197]

JBC was as anxious to undertake the work as ACCCC was to have it done. JBC was in some financial difficulties related to its expansion, a coal strike, and the 1907-8 depression, and had hoped "the chimney block proposition would help to keep our plant here in operation."[198] ACCCC, on the other hand, had orders and was "bidding on one large proposition in Alabama" and needed JBC on line in order to price blocks. Moreover, it was in the first quarter of the year "that chimneys for spring delivery" were sold, so

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[194]JBC to Alphons Custodis Chimney Construction Company, 11/27/07. "Our loss in brick is very small," he noted, "probably not more than 1%. We do not wish to undertake a piece of work blindly, and lose money on it...We are willing to undertake it on a 'live and let live' basis."

[195]ACCCC to JBC, June 2, 1908; contract between ACCCC and JBC, August 3, 1908.

[196]ACCCC to JBC, n.d.

[197]ACCCC to JBC, Aug. 4, 1908.

[198]JBC to ACCCC, undated letter hand written and attached to telegram requesting progress report on experiments from ACCCC dated April 5, 1909.

knowing JBC's ability to produce its blocks was paramount.[199] Having examined JBC hollow red brick, the ACCCC believed JBC "should have little difficulty, if any, in starting off to make the chimney blocks." The ACCCC thought it might be unnecessary to send someone to help, although the JBC had reminded ACCCC that it was its "custom to send a man to help a beginner start off." JBC indicated it would notify ACCCC when it was ready for that help,[200] but would "would certainly try to do the work without (ACCCC) having to send a man to help."[201]

Chimney tile was considerably more complicated to produce than ordinary building brick. ACCCC specified nine different styles/finishes in varying quantities in its first order.[202] To do this work, JBC had to order a special cutter. "We make only end-cut brick, therefore, will have to set aside our cutter and use a different one altogether for making chimney blocs," he notified ACCCC. "If we made a side-cut brick the plan you suggest of removing every other wire would probably do the work."[203] Two months

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[199]ACCCC to JBC, Jan. 20, 1909.

[200]JBC to ACCCC, c. Jan. 7, 1909. JBC response is undated, hand-written on obverse of letter from ACCCC dated Jan. 7, 1909; ACCCC to JBC, Jan. 13, 1909.

[201]ACCCC to JBC, Jan. 18, 1909.

[202]ACCC to JBC, Aug. 4, 1908. Shipments were specified as follows:

8900	A-20 face
1200	A 20 inside
9400	B-22 face
22200	C-23 face
10400	C-23 inside
14800	D-20 face
3000	D-20 inside
6200	N-20 face
7300	N-20 inside

[203]JBC to ACCCC, Sept. 11, 1908.

later, JBC notified ACCCC that equipment manufacturers advised the company that the plan of removing every other wire would not work, and the company appealed to the chimney builder for help. "Being without experience in this matter of chimney blocks, we do not know just what we should have in the way of a cutter.... If you could...let us have a cutter, even temporarily... we will then see by experience what we will need." Although JBC didn't mind purchasing a cutter "if the volume of business (with ACCCC) will justify it," it would have "to be adjustable so as to make common building brick as well as chimney blocks."[204] According to the ACCC,

> The cutter used in the majority of our yards is made by the E.M. Freese & Co. It is of the revolving, automatic type and the arms in the frame are made in such a way that it will take our largest sized D block. It is adjustable for several inches in a direction at right angles to the measuring belt, so that the back board can be adjusted to any length of chimney block or brick. In making chimney block, it is only necessary to take out every other wire, and if it is desired to make common brick, it is but little trouble to replace the wires, adjust the table and cut that size.[205]

As a temporary measure, the ACCC arranged with its brickyard in Pittsburg, Kansas to ship JBC a hand cutter in use there for the manufacture of radial blocks.[206]

A similar situation occurred with dies, which differed greatly from conventional brick dies. JBC had no experience using them, and the ACCCC lent the brick company the correct block dies, an arrangement similar to jobbing foundries, in which companies retain their own patterns and send them to the foundries when they want special castings made.[207] ACCCC also offered "to arrange to put the die on the machine without the cutter for a trial in order to demonstrate quickly whether or not (JBC's) material will work into

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[204]JBC to ACCCC, Nov. 18, 1908.

[205]ACCCC to JBC, Nov. 20, 1908.

[206]ACCCC to JBC, Nov. 28, 1908.

[207]ACCCC to JBC, Nov. 12, 1908.

our shapes. Of course, we expect a little difficulty at first, as usual."[208] Despite ACCCC's provision of dies, the JBC had to await their arrival to fit them to its machines, and then had "to have a casting made for the mouth to which to bolt the dies."[209]

Trials were not undertaken until early March, owing in part to floods that damaged JBC's plant, and were not successful. By that time, ACCCC had taken an additional order in Jacksonville, Florida, making three in the southern region, and was anxious for block from Jenkins.[210] JBC notified the ACCCC that it

> was unable to make...chimney blocks. As far as we can tell, our clay is too 'short' for so large a column of clay. It makes common brick with very little breakage, but it cracks and breaks badly in making chimney block. We think we lined up and adjusted the cutter to the machine, and had all the conditions right to obtain satisfactory results, but the trouble is in the constant breakage of the column of clay, indicating a (?) or insufficient plasticity.[211]

The ACCCC was still confident JBC could produce the blocks, and believed the problem was in the dies, which it encouraged JBC to take up with its die makers.[212] Nonetheless, JBC felt that "after the trials we gave it that our clay will not make the block,"[213] and shipped the cutter and dies and extra casing, at ACCCC's request, to Weir Brick Co., Weir, Kansas, later that fall.[214] JBC was disappointed in the

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[208]ACCCC to JBC, Dec. 8, 1909.

[209]ACCCC to JBC, Jan. 13, 1909, JBC to ACCC, Jan. 7, 1909 .

[210]ACCCC to JBC, March 22, 1909.

[211]JBC to ACCCC, undated letter hand written and attached to telegram requesting progress report on experiments from ACCCC dated April 5, 1909. (Portion of passage unintelligible.)

[212]ACCCC to JBC, Dec. 13, 1909.

[213]JBC to ACCCC, Dec. 10, 1909.

[214]ACCCC to JBC, Dec. 7, 1909.

results of its experiments, having "spent some money and time in the preparation."[215]

Several years later, as demand for brick from the Wetumpka plant waned, Jenkins again flirted with the idea of making tile. Having successfully manufactured hollow brick, he believed his Wetumpka clay would make good drain tile, and there "wasn't much market there for brick.."[216] In 1909, Jenkins approached the American Clay Machinery Co., rather than J.C. Steele & Sons, to make a 3" and 4" drain tile dies for his #4 Steele auger/extruder, as well as a cutter.[217] Deciding "that the demand was not sufficient at that time to justify this venture," he again returned to his staple, common building brick.

JBC delayed making drain tile until1912, when it was attracting considerable attention from federal and state agricultural officials. Ordering dies for 4", 6", and 8" tile from J.C. Steele & Sons for his No. 3 brick machine at Wetumpka, the company also purchased a Bensing automatic tile cutting table through Steele but manufactured by equipment supplier J.D. Fate. For an additional $10 ($110 total), JBC ordered the cutting table with "flat boards" for cutting tile building blocks.[218] Suggesting the relative newness of tile block manufacture, Steele noted that it "had a good deal of experience lately along this line," and

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[215]JBC to ACCCC, undated letter hand written and attached to telegram requesting progress report on experiments from ACCCC dated April 5, 1909.

[216]American Clay Machinery Co. to JBC., 9/30/09; JBC to J.C. Steele & Sons, 9/23/12. The reference to hollow brick is one of several I found in the records, but it is unlikely that it was anything more than a sideline.

[217]The American Clay Machinery Co. claimed that irregularities in the Steele machines and mouthpieces required JBC to supply a pattern or tracing to permit an accurate die to be cast and machined. (American Clay Machinery Co. to JBC., 9/30/09.)

[218]JBC to J.C. Steele & Sons, 9/23/12. Jenkins asked Steele to rush the order, as "the government engineer is in Montgomery now, to do some tile work, and...we want to get our tile into these demonstration jobs." See also Min., Board, 1/8/13, 84; 1/14/14, 87; 1/14/15, 97.

JBC bought two Bensing cutters, a 1 A T, in 1912, and a larger 3 A T in 1913. JBC to Fate-Root-Heath Co., 6/7/22.

recommended "a telescoping front end and mouthpiece which will take in these large blocks, and at the same time be suitable for tile; and has the advantage of varying the distance from the auger to the die."[219] JBC ordered these, reasoning that they would "be no disadvantage in the making of the smaller sizes of tile, and will be a necessity in making tile or hollow ware larger than 8"." In addition to the equipment, Steele & Sons also supplied JBC with the names of several tile makers, which Jenkins planned to visit.[220] Jenkins also requested acquaintances in the brick industry to "put us in touch with a reliable young man of 35 or less, that don't know too durn much, but who has been through it and can show us how to get (drain tile) out of the machine, set 'em and burn 'em."[221] But echoing the experience with ACCCC chimney blocks several years earlier, Jenkins declared the manufacture of tile at Wetumpka a failure "on account of the clay being too short – we couldn't make them acceptedly or profitably. Furthermore, the L&N (railroad) wouldn't give us as good a rate as we had expected."[222] Apparently, this experience and the lack of demand for brick at that location convinced Jenkins to close the Wetumpka plant, and he brought "his traps to No. 3 (the Holt plant at Montgomery) in time for next season's trade."[223]

Unlike common building brick, which needed little promotion, JBC encouraged and facilitated the marketing and adoption of drainage tile. The company cooperated closely with state and federal agricultural officials in marketing the tiles to farmers, providing tiles for demonstrations and reviewing

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[219]J.C. Steele & Sons to JBC, 9/25/12.

[220]JBC to J.C Steele & Sons, 9/26/12.

[221]JBC to Eben Rogers, 11/7/12.

[222]JBC to J.E. Carson, 11/13/12.

[223]JBC to J.E. Carson, 11/13/12.

reports from USDA drainage engineers.[224] Informing prospective customers that "the Department of Agriculture will do the engineering work and furnish a map for a drainage system where one is wanted, in order to get this work started,"[225] the company also presented farmers' specific problems on appropriate tile size to Department of Agriculture engineers.[226] JBC used its knowledge of cotton production to argue that the recent devastation caused by the boll weevil necessitated earlier planting, which drain tile facilitated by drying fields at least two weeks earlier. Similar arguments were presented for grain. Moreover, the company pointed out to potential customers, ditches permitted fertilizers to run off the land, whereas "with tile drainage, fertilizers are carried through the soil and deposited, where they are needed.[227] Finally, after World War I, JBC invested in tile trenching machines and worked with farmers to install the tile "with the idea of pushing that end of our business," Jenkins told the Buckeye Traction Company, also noting that it expected "to buy four or five machines within the next three years..."[228]

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[224]See Lewis A. Jones, "Program Report on Proposed Tile System for W.E. Ellsberry Farm, near Montgomery, Ala., c. 1913 (copy in Jenkins papers). Also see L.A. Jones to W.E. Jones, 5/18/16, which gives specifications and instructions for tiling.

[225]JBC to L.G. Prentice, 8/28/16.

[226]JBC to Morton G. Crabb, 10/17/16. Jenkins was fortunate to have L.G. Prentice as the County Agent for Cooperative Extension Work in Agriculture and Home Economics for the State of Alabama. Prentice noted to Jenkins that "there is not a County Agent in the State that is 'more of a crank' on drainage than I. I have been preaching that every time I get a chance and make it a point to get a chance. There is nothing that this county needs more than drainage." L.G. Prentice to JBC, 8/24/16.

[227]JBC to J.A. Blunt, 1/26/16.

[228]JBC to The Buckeye Traction Company, 8/1/19. JBC initially ordered a "number one machine...with wide traction wheels...arranged to cut 11-1/2" and 14-1/2" wide by 4-1/2' deep driven with 20 H.P. 4-cylinder heavy duty motor; apron traction wheels 24" wide; extensions for front wheels; combination contractors buckets, one set of center cutters and one set of rooters, only; cased shoe and all usual extras." (The Buckeye Traction Ditcher Co. to JBC, 8/14/19); Min., Board, 1/14/20.

Before ordering the second machine, JBC wrote Buckeye about problems with gears and other parts, "in a spirit of constructive criticism." (JBC to The Buckeye Traction Company, 4/10/20.)

Sales of drain tile peaked in 1921 at 600,000 linear feet, but then waned considerably.[229]

By spring, 1914, Jenkins had "succeeded so well with making good drain tile" at No. 3 that he prepared to branch out into fireproofing, or partition, tile and chimney flues although, in the pre-War years, he told the Board, "the manufacture of wall tile for house construction...is as yet in its infancy in this district."[230] At the Holt facility, Jenkins used a Brewer No. 88 tile machine, possibly acquired with the plant.[231] To make partition tile, Brewer advised JBC it needed "a different front auger with proper liners to match, and a face plate suitable to take the large die, as well as the dies themselves...," and offered to advise JBC by mail on its manufacture. JBC provided Brewer with the overall sizes of flue liners it wanted to manufacture and with clay shrinkage rates, and then relied on Brewer to "make these the right size to meet the requirements of the trade."[232] Once set up to run tile, JBC was able to produce numerous variations, including chimney flue linings and special-order jamb blocks, with relatively simple die

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[229]Min., Board, 1/10/21; 7/27/21.

[230]Min., Board, 1/12/16, 101. JBC sold its first tile for a residence in the spring of 1916. (Min., Board, 7/12/16, 105.)

[231]JBC had to modify the Brewer machine for tile manufacture. Brewer machines were known for lacking sufficient space between auger and die "to overcome the auger action which is detrimental in the making of hollowware when the distance is not sufficient," according to the Louisville Machine Manufacturing Company. (Louisville Machine Manufacturing Co. to JBC, 9/20/20) Jenkins experienced just this type of trouble, "but corrected it, first, by putting in an extra ring of about four inches, later, we had a new casting for the front og the machine made, which permitted us to take out the ring and reduce the distance a couple of inches." (JBC to Louisville Machine manufacturing Co., 9/25/20)

[232]JBC to H. Brewer & Co., 5/17/15. A debate ensued, in which Jenkins later notified Brewer that the trade demanded 8-1/2" x 8-1/2" tiles, rather than 8" x 8", and JBC reminded Brewer that it had asked for "the right size to meet the requirements of the trade." Jenkins proposed exchanging the dies for larger ones. "What can we do...We must give the trade what they want..." (JBC to H. Brewer & Co., 11/6/15.)

changes.[233] The company also built a bee-hive kiln at No. 3 for burning tile.[234]

The manufacture of tile may have helped the company survive the difficult years of the first World War. Although construction – particularly military – continued throughout the war, shortages of coal and rail cars at times severely restricted brickmaking. Late in 1917, almost completely cut off from coal supplies, JBC notified one its largest customers that it "was just about out of the brick and tile business,"and that "everybody in our line is in the same fix."[235] The company's tile plant – No. 3, the Holt facility – was shut down, and it was "just getting enough (coal) to run our brick plant."[236] Survival hinged on war-related construction orders from Tennessee Coal, Iron and Railroad company for its Fairfield steel works and Mobile ship building plant.[237] But soon after obtaining this order, JBC contracted with Denison Interlocking Tile company to supply 600,000 "Standard Size Smooth Faced" Denison Interlocking Tile for construction of the U.S. Nitrate plant at Muscle Shoals, Alabama, relying on Denison and general contractor Westinghouse Church Kerr & Company to arrange for fuel and rail cars from the Fuel Administrator.[238] The U.S. Fuel Administration then required all brickmakers in the southern section to

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[233]JBC to H. Brewer & Co., 7/9/15.

[234]Min., Board, 1/12/16, 100.

[235]JBC had its "big continuous brick kiln partly filled and burning and...(was) put to it to know where we will get enough coal to complete this burn and avoid a big loss." JBC to Gamble and Stockton Co., 12/12/17.

[236]JBC to James Howlington, 12/20/17. See also Min., Board, 1/9/18.

[237]JBC to S.P. Kennedy, 12/28/17; Min., Board, 7/10/18, 127. JBC shipped 2.25 million brick to Birmingham for the Fairfield Works, and 3.5 million brick to Mobile for the ship building works. Min., Board, 1/8/19.

[238]Denison Interlocking Tile Corporation to JBC, 1/22/18; Denison Interlocking Tile Corporation to L.A. Sneed, c/o U.S. Fuel Administration, 1/22/18 (copy in JBC files); Denison Interlocking Tile Corporation to Westinghouse Church Kerr and Company, 1/22/18.

Brick production was still JBC's priority, primarily because of the constraints of the kiln. "At our brick plant we have only a continuous kiln," JBC wrote Denison, "so that by the construction of the plant itself we either have

cut "production 50% of the average production for the years 1915, 1916, 1917..." For JBC, these years were "the poorest we ever had."[239] Supplying the steel mills and shipbuilding works, JBC had already exceeded its coal quota by July, 1918, but on the basis of the Muscle Shoals Denison Interlocking Tile order the company was placed on the "Preference List," which Jenkins believed would "simplify our coal situation very materially."[240] Indeed, under the Preference List, the State Administrator advised JBC that the "curtailment is set aside."[241] The War Industries Board then established the Brick Division "to procure the cooperation of those engaged in the industry in the conservation of coal, labor and transportation as well as the allocation of Brick orders in the various Zones for Government requirements in the winning of the war."[242] Coal curtailments were lifted for brickmakers in November, 1918.

JBC saw advantages and disadvantages in taking up the production of Denison Interlocking Tile. It considered the tile superior to conventional vertical building tile, and believed it would eventually develop

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to operate continuously or not at all. We are frank to say that if we can operate but one of our plants, it is much more to our interest to run the brick plant rather than to make tile." (JBC to Denison Interlocking Tile Corporation, 1/31/18). To make that much tile, JBC required "one car of ordinary steam coal per week for our boilers and five cars per month for the kilns. This latter coal should be a high grade coal, suitable for burning in a gas producer." (JBC to S.P. Kennedy, 2/5/18.) Two cars of steam coal were obtained in March. (JBC to State Fuel Administration, 3/15/18).

[239]JBC to A.H. Bickerstaff, 4/23/18.

[240]JBC to Brick Selling Company, 7/14/18. On the other hand, fellow brickmaker J.T. Howlington, after visiting the Fuel Administration in Washington, wrote JBC "that having a war order does not help you any in getting coal or cars, because nearly every-body in the country that has any business at all can call it war business." J.T. Howlington to JBC, 1/22/18.

[241]JBC to James Howlington, 10/31/18.

[242]Howard Stafford, Report on Brick Committee, War Industries Board, 7/2/18. Brick makers saw the Brick Committee as "a wonderful opportunity for the manufacturers of Brick to create a strong organization for the promotion of their industry and should be grasped by every interested concern." Named the War Service Committee on Brick, Sixth Group, it standardized the size of hard brick at 2-1/4 x 3-7/8 x 8 inches. (W.E. Dunwody to JBC, 7/26/18).

"a good trade." Yet, construction practices in the region did not yet incorporate building tile to any great extent. The South "is new on hollow tile construction," the company wrote Stockton & Gamble, with whom it signed a twelve-month contract for the tile, which meant demand was limited and that the price Jenkins charged for Denison Tile would have to be higher because runs would be smaller.[243] Probably more important, JBC could not "afford to give it (drain tile) up, as it is a more attractive proposition to us than the Interlocking tile business at the prevailing prices."[244] Nonetheless, the tile company field agent wrote Denison headquarters that "Jenkins is going after this proposition with hammer and tongs and naturally wants to make his plant the leader in this territory..."[245]

The company's experience with Denison tile proved troublesome and did not survive the War years. Unlike simple, production-line drain tile, which is to building tile as common brick is to face brick, building tiles were larger and more intricate, and had to meet requirements of strength, color, and uniformity, as well as availability in numerous shapes and sizes. Their complexity – with interior partition walls, large, smooth faces, and mortar corrugations – demanded sophisticated dies. JBC had problems with the first building tiles it made, even before the Denison contract. Suggesting the new level of complexity, tile die and machine maker H. Brewer& Co. informed Jenkins that the "tearing-out of the middle section of the partition wall"on 8" tiles could be due to either the die running fast or slow, depending on which way the

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[243]JBC to Gamble and Stockton Co., 7/19/17.

[244]JBC to Denison Interlocking Tile Corporation, 9/1/17; letter from field agent for Denison Interlocking Tile Corporation to Interstate Clay Products Company, 9/3/17.

[245]letter from field agent for Denison Interlocking Tile Corporation to Interstate Clay Products Company, 9/3/17. See also Min., Board, 7/10/17; 1/9/18.

cracks flowed.[246] Bridges holding cores in some longer dies (8" x 13") bent, and required reinforcement, which Jenkins provided. Some problems, such as cracking across the face of the tile, persisted for years, and JBC admitted they could not "be absolutely done away with" despite working "constantly with the machine and dies to do so. If the cracks are bad, we throw them out..."[247] Difficulties persisted with Denison tiles. One contractor, complaining about tile quality, wrote that "The clay itself is hard but the manufacture is awfully poor. Four out of every five tile have from three to five cracks on the big face of the tile..." Jenkins explained that the company "had considerable trouble in eliminating the cracks...We do not believe this can be absolutely done away with, though we work constantly with the machine and dies to do so." Results were better from the smaller beehive kilns at the No. 3 plant than from the larger Youngren kiln, in which the company loaded surplus tiles, and Jenkins believed that quality was improving.[248] There were also problems with cutting the column. Cutter wires broke on the larger, 8" x 12" sizes, and Jenkins determined that the die should have been mounted to extrude the tile on edge rather than flat (broad side down), with which Brewer agreed, "if the 8x12 ware is to be cut with a wire which passes squarely down."[249] By January, 1918, JBC had not operated the tile plant since late November of the previous year, "and the chances look poor for any time in the near future," the company wrote

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[246]Brewer wrote Jenkins that "A good way to determine the rapid and slow portion of a die of this kind is to cut the column off right up close to the die, then start the machine a little, allowing not more than 3/8" or ½" of the column to issue. By making an inspection of the column then you can determine which portion of it has been running faster..." Adjustments in the cores forming the holes alleviated the problems. H. Brewer & Co. to JBC, 7/17/15.

[247]JBC to Gamble and Stockton Co., 7/14/17.

[248]JBC to Gamble and Stockton Co., 7/14/17. To produce enough tile, however, the company had to use the big kiln, and continued to set it "and hope for better burn another time." This was the Youngren kiln. Coal shortages during the War years prevented its extensive use. (JBC to Gamble and Stockton Company, 11/16/17.) After the War, Jenkins converted the Youngren kiln to direct coal firing. (Min., Board, 1/14/20.)

[249]JBC to H. Brewer & Co., 6/28/15; H. Brewer & Co. to JBC, 7/1/15.

Howlington of the Coral Ridge Clay Products Co., which was close to the truth, since the company still hadn't made tile by August of that year.[250] Resuming Denison tile manufacture, JBC found itself in "a pocket of clay too short for tile."[251] By that time, though, the company had decided against continuing "in the Interlocking game," primarily because "relations with the Interlocking Tile Corporation have not been...satisfactory."[252]

The company did not abandon tilemaking after the Denison experience, but decided to further treat its clay with the goal of making consistently good quality building tile. Although "anxious to get actively into the hollow tile business," the difficulties the company experienced making Denison tile convinced it that "we will have to make many changes before we can operate, except at a loss," Jenkins wrote a fellow brickmaker. Producing drain tile one or two days a week, the company was well aware that its "clay would stand drying in either brick or drain tile form," but that it would "have to put in equipment to improve the quality of hollow tile...Our loss in drying is too great to justify us in continuing this end of our business..."[253] Indeed, JBC believed it could "not make tile successfully until we put in additional grinding machinery to prepare a grog to loosen up our clay."[254] The company considered installing either a dry pan or a "William's crusher" to crush waste for grog. Although less expensive, lighter, and advertised by

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[250]JBC to Jas. T. Howlington, 1/19/18; JBC to C.W. Dixon, 8/1/18.

[251]JBC to Gamble and Stockton Co., 8/18/19.

[252]JBC to Gamble and Stockton Co., 4/5/19.

[253]JBC to Jas.T. Howlington, 7/29/20. After the War, H.M. Meek was "devoting his entire time to the tile end of our business," J.M. Jenkins II told the Board of Directors. (Min., Board, 7/9/19.)

[254]JBC to J.P. Callaghan, 7/31/20; see also JBC to Jas. T. Howlington, 8/6/20. Grog, according to Karl Gurcke, "is clay that has already been burned to a high enough temperature to destroy its plasticity and then ground to a powder or a bit courser." *Bricks*, 13.

the company to "pulverize bats and other material," Jenkins bought a dry pan rather than a crusher, a choice shared by Howlington, who wrote Jenkins that "he never heard anything good of the Williams machine."[255]

New marketing efforts in the home building and construction materials industries convinced JBC to increase its tile making. The active role of the Hollow Building Tile Association, based in Chicago, was instrumental in this effort. The association developed industry specifications for hollow clay building tile and collected detailed information on orders on file, stock on hand, shipments and production, and disseminated this to members. Also active in directly marketing tile, it collected information on prospective construction, mailed pamphlets and other literature, and then forwarded names and addresses to tile makers in relevant geographical regions.[256] In its area of the South, JBC then wrote these potential customers, who included Standard Oil in Birmingham and Montgomery architect Frank Lockwood, as well as residential clients, extolling the virtues of tile construction and emphasizing low cost, reduced maintenance and repair, lower insurance rate, and ease of construction.[257] In its promotional information, the company also stressed lower weight and shipping charges (compared with brick), economy in mortar, ease of handling, tie-ins with brick coursing, and scoring anchors for stucco and plaster.[258]

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[255]Jas. T. Howlington to JBC, 8/2/20.

[256]The Hollow Building Tile Association to JBC, 11/19/20; "Proposed Tentative Specifications for Hollow (Clay) Building Tile, c. 1922 (copy in JBC files). See also Min., Board, 7/27/21.

[257]Examples of JBC's marketing efforts can be found in: JBC to G.G. Sims, 12/6/21; JBC to W.J. Noble, 12/27/21;

[258]JBC to Frank Lockwood (well-known Montgomery architect), 3/18/21;

Increasing the variety of tiles it offered, JBC ordered new dies from the Louisville Machine Manufacturing Co. to compliment existing dies for the Brewer No. 88 auger/extruder it used for tilemaking.[259] The new tiles were less complex than the Denison pieces: one was a 5" x 4" block, and the other a 5" x 8" three-cell block, but JBC increased the thickness of the outside walls to 11/16" and the web to 9/16", adding "additional strength without going over-weight," the company wrote the die maker.[260] The Louisville company also persuaded JBC to change its order from a 5" x 4" single to a 5" x 4" double stream die, the first time JBC had used such a die.[261] Louisville claimed it was "the practice through this section (the midwest) where they are making these in quantities to have a double stream die."[262] Again, the larger sizes gave the company problems. JBC wrote Brewer that "the middle web of the 8x12x12 checks in drying, and the outside wall of the 4x12x12 cracks open to a considerable extent."[263] Both Jenkins and Brewer believed loosening up the clay with a grog would improve the tiles, but since other sizes lacked cracks and checking, Brewer ceded that the trouble was in the dies, and recommended adjusting the cores in opposite ways to alleviate the problems.[264]

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[259]The company also refurbished the machine with a new split collar for the clutch shift, a heavy pinion running the master gear, an expressing screw, and one-half set of spirals. JBC to H. Brewer & Co., 1/18/23. Later that year, it ordered a new expressing screw, barrel liners, and set of spirals. JBC to H. Brewer & Co., 4/27/23.

[260]JBC to Louisville Machine Manufacturing Company, 8/25/20.

[261]A double stream die permitted the machine to extrude a double rather than a single clay column. Louisville noted that "The double stream die will not require a great deal more room than the single stream die, as we make the space between the streams very close, so that these can be picked up from the cutting table together, running them on the 4" face, or on top of one another if so desired." (Louisville Machine Manufacturing Co. to JBC, 9/20/20.)

[262]Louisville Machine Manufacturing Co. to JBC, 9/20/20; JBC to Louisville Machine manufacturing Co., 9/25/20.

[263]JBC to H. Brewer & Co., 8/19/20.

[264]H. Brewer & Co. to JBC, 8/24/20.

Reflecting the growing popularity of terra cotta structural products in the 1920s, JBC experimented with another proprietary tile, the Heath Cube, a product of the Heath Unit Tile Co. of Tacoma, Washington, an 8" square building block also made in half and quarter cubes. Paying a royalty of $2.25/1000 cubes, JBC agreed to aggressively market the cubes in pamphlet literature and "through personal interviews with architects, construction engineers and contractors and to demonstrate the construction of Heath Walls with miniature Heath Cubes and to supply such interviewed parties with miniature sets of Cubes for their use and instruction."[265] JBC and several other Cube makers also planned to hire a promoter for the Cubes in the South.[266] The Heath company contacted The Louisville Machine Manufacturing Co. about providing dies for the Heath Cube, in particular about supplying "double stream for the two half cubes, and determin(ing) on a design for scoring that will be distinctive for our Cubes." Dies would be standardized for all Heath Cube manufacturers.[267] .The Heath company issued regular bulletins through its Heath Cube Service, based in Columbus, a brick and tile center, which suggested manufacturing practices for the several shapes.[268] Departing from its practice of using automatic cutters, JBC ordered a J.C. Steele & Sons' Universal Hand Cutter "for both standard shapes and Heath Cubes," requesting that Steele customize it to accommodate both, which the company agreed to do.[269] Over a year and a half after signing the agreement, though, JBC had yet to produce any Cubes. "I expect the Heath Cube owners are

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[265]License Agreement for Alabama and Mississippi between the Heath Unite Tile Company and the Heath Cube Service, Inc., and the JBC, September, 1925 (copy in JBC files).

[266]J.T. Howlington to JBC, 11/4/26.

[267]Frederick Heath to The Louisville Machine Manufacturing Company, 9/30/25.

[268]See copies of Production Bulletin No. 1, 2 , and 3 (all dated Nov. 17, 1925)in JBC files.

[269]JBC to J.C. Steele & Sons, 3/24/26. Steele wrote JBC that "Hand cutters are most generally used for hollow tile as the strain on wires is not great and cutter is made light. Strange to say the Universal hand cutter will cut more tile than the automatic." J.C. Steele & Sons to JBC, 2/22/26.

disappointed with this particular plant," Jenkins wrote J.T. Howlington, "but we have been where we couldn't help ourselves...This building job (rebuilding the No. 2 plant) has been a long one and I am getting pretty tired of it."[270] But production did not go smoothly even with the new plant in operation. Howlington and his Coral Ridge Clay Products filled JBC's Heath Cube orders, sometimes at a loss because of higher freight rates, advised JBC on remedying drying problems, and even offered to send over his superintendent.[271]

Eventually, JBC abandoned Cube production, admitting once again, as it had with Denison tiles before, that "Our clay gives a good deal of trouble in drying, and the loss we suffer from that score is too great."[272] "We were doing very well," JBC lamented, "with the standard shapes, without unusual trouble."[273] Over the next few years, JBC turned down opportunities to make a variety of specialty tiles, including "Du-Brick," "Speed-Tile," "Speed-A-Backer," and "Kwick-Lay," preferring to make the Interlocking building tile, which it had resumed producing in the mid-1920s, and straight shapes.[274]

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[270]JBC to J.T. Howlington, 11/4/26.

[271]Howlington recommended that JBC "try the new style open center bridge made for the Heath Cube die by the Louisville Machine Manufacturing Company, of Louisville, Ohio, and then baffle the four outside edges so as to throw more clay to the center. You are evidently setting up some strains in the ware by unequal pressures over the cross section of your column." He also suggested scratching the inner surfaces to facilitate faster drying. Coral Ridge Clay Products Co. to JBC, 4/12/27.

[272]JBC to J.T. Howlington, 11/29/27.JBC's frustration was palpable, having actually turned out some very good tiles despite considerable waste. "We have tried different clays, made die changes, tried changes in drying, and experimented along various lines to try to get the best results. It seems though that we must have clay which will not produce the unit to the best advantage..." In addition to the $500 deposit, JBC lost considerable money in the attempt. JBC to Frederick Heath, 6/14/27.

[273]JBC to C.W. Dixon, 10/18/28.

[274]See JBC to A.J. Bohn, 6/27/30; Wheeler Building Tile Co., Inc. to JBC, 2/10/30; JBC to Harry M. Strauss, 3/5/36. "We have investigated pretty thoroughly the various types of special shapes, and have produced at one time or another the different kinds of tile. It is my opinion that of these special shapes the Interlocking, or T type tile

Reflecting the success of plant improvements and a growing sophistication in its operation, by the late 1930s the company was capable of producing nearly any type of tile on demand, and frequently filled orders for specialties such as Quick-Lay as part of larger orders of brick and structural tile.[275] In 1938, JBC wrote the Heath company that "We still have the Heath Cube die, and while improvements have doubtless been made in these dies since we brought this one, we should be able to make tile with it. Our plant has undergone a good many improvements since the time we had our dealings with you, and we are better equipped than we were then."[276] JBC's growing facility with tile making was evident in the order for the Orange Grove Housing Project in Mobile, Alabama, in 1939, for three different tile styles (bearing, "Speed-A-Backer," and partition) in eighteen different sizes and shapes.[277] Yet, even at this late date, JBC reminded a specialty tile company that "Practically all of our tile sales are confined to partition units, or for floor slab construction, with very little tile being sold. We see slight chance of a change in this condition..."[278]

Post-War Plant Reconstruction

Following the first world war, JBC completely remade its Montgomery plant #2. War-related shortages

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is the best..." JBC to T.A. Monk, 10/5/36. It is unclear from the evidence when JBC resumed production of Interlocking tile. This appears to be the same as Denison Interlocking Tile, made by the company without much success during World War I. According to JBC, "we do not sell a great amount of this particular tile, we do not carry it regularly in stock. We have dies and equipment on hand to manufacture it, however, and can get out any quantity you need in about three weeks from the time the order is placed." JBC to J.G. Scherf, 9/26/41.

[275]For example, JBC informed a customer that "Smooth face tile is not standard stock material, and we make this grade up special for any orders we receive." JBC to Batson-Cook Company, 8/24/39. The company began exploring the manufacture of "Speed-A-Backer" tile in 1936, and had begun production by 1939. JBC to Harry M. Strauss, 1/30/36; JBC to Algernon Blair, 11/27/39.

[276]JBC to Frederick Heath, 11/26/38.

[277]JBC to National Fireproofing Corporation, 12/8/39.

[278]JBC to Kindem-Anderberg Company, 1/23/39.

of coal and rail cars had made the brick business difficult, but increases in post war demand and prices, and the introduction of new structural tiles and face brick products, suggested a good market for the next decade. The depletion of clay deposits at the No. 3 plant, and the plant's general inefficiency, also encouraged JBC to move its tile-making operations to the Furnace St. site.[279] In 1920, JBC installed two General Electric motors, a 2200 volt, 150 h.p., and a 220 volt, 30 h.p., marking the beginning of a significant transition in the company's operations.[280] The company bought new machinery, including feeder, pug mill, and auger/extruder, and installed a clay conveyor system. More significantly, JBC transformed its drying and burning operations, replacing the Richardson-Lovejoy kiln, so extensively modified by J.M. Jenkins I, with a set of dryers and round, down-draft kilns designed and constructed by the Minter Company, of Columbus, Georgia.[281] This was to be the last major change at the Montgomery plant #2 until it was phased out in the 1970s.

Jenkins paid for plant renovation, in part, by the sale of used machinery. Responding to ads in search of equipment appearing in the national brick trade journals, early in 1925 JBC offered "a full line of second hand brick machinery in good condition...at a reasonable figure. This has all been replaced with larger machines," Jenkins wrote a prospective buyer. Equipment for sale included "a Steele and Sons No. 4 machine, cutter, hoist, pug mill and disintegrator...two boilers, a 100 and a 150 horse power, with two

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[279]Min., Board, 7/11/23; 1/9/24.

[280]Min., Board, 1/14/20.

[281]"We want to build for a good tonnage production of tile and face brick. Our aim will not be to produce as great an output as some, but good ware at a low cost. We will use in building some material on hand which is below grade for the regular market, and a good deal of our machinery now in operation will be moved. This work will be done as economically as possible," Jenkins told the Board. (Min., Board, 7/11/23.)

engines."[282] Selling the clay preparation and brick making machines was not difficult, but the steam engines attracted little attention. "As you know," wrote the Birmingham Engine & Machinery Corporation, "due to many hydro-electric developments in recent years there has been thrown on the market many good used Corliss engines and competition for their sale has been very keen, with a consequent reduction in prices."[283] Although JBC hoped to get $750 for the 18" x 36", 100 h.p. Lane and Bodley Corliss and $1000 for the 16" x 36", 150 h.p. Hardie-Tynes Corliss, the company sold both to the Birmingham company for $750.[284]

Jenkins Brick Company consolidated its operations at the same time it modernized them, reducing to one plant for the first time since 1906, (the way it would remain until the opening of the Coosada plant in 1959).[285] As noted earlier, the company had closed the Wetumpka plant in 1912 because of the poor market for brick in that locality. In 1926, it closed the Holt facility and transferred tilemaking operations to the rebuilt, re-equipped Montgomery plant No. 2. With brick and tile operations in the same plant, the company rationalized the shaping process and transformed drying and burning. Clay "winning," on the other hand, remained virtually unchanged. The company continued operating the 1906 Thew shovel it originally purchased for Montgomery, and added a second (with 50 feet of track) purchased from Kahn Brick Co., of Selma. It also used the dump cars made in-house, and the dinky locomotives that pulled the cars to the incline, where they were hoisted to the top by cable and winding drum. In 1921, JBC installed

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[282]JBC to B.C. Bass, 3/6/25.

[283]Birmingham Engine & Machinery Corporation to JBC, 3/18/25.

[284]JBC to Stonehill Cabinet Co., 2/11/25; Birmingham Engine & Machinery Corporation, 4/1/25.

[285]Information in this section is based on "From Bee Hives to Brick Kilns," *The Clay-Worker* (Oct., 1927), 261-264).

"an underground belt conveyor for clay...about sixty feet long (and)...twenty inches wide."[286] The entire plant was electrically driven, with a single engine driving the feeder, pug mill and disintegrator; individual motors running the tile and face brick machines; and one motor operating the common brick plant.

Once clay arrived at the receiving department, it was fed into two hoppers. The first supplied machines for the production of face brick and hollow tile, while the second was reserved for common brick, still the mainstay of the Jenkins operation. Clay feeders were located directly below the hoppers, and were no longer the once-ubiquitous Rust Clay Feeders but, rather, J.C. Steele & Sons. Hopper no. 1 fed clay to the face brick and tile operations, passing it first into a Steele disintegrator, then to a Steele pug mill, and then into a second, split hopper. Capable of independent feeds, the split hopper distributed clay to either a W.A. Riddell Company No. 290 hollow tile machine,[287] or to a Steele no. 4 auger/extruder, one of the older machines at JBC, to be formed into face brick. Although JBC had purchased a type D Bensing cutter and off- loading table from Kahn Brick Company of Selma, Alabama, to accompany the Steele & Sons tile machine in Heath Cube production, it used the Steele & Sons hand cutter purchased for Denison tile in the new plant. A Steele automatic cutter cut face brick.[288]

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[286]Kahn Brick Company to JBC, 2/23/21; JBC to Stephens-Adamson Manufacturing Co., 2/24/20; JBC to Kahn Brick Co., 2/24/21; JBC to Kahn Brick Co., 2/26/21; Kahn Brick Co. to JBC, 3/11/21; Kahn Brick Co. to JBC, 3/24/21.

[287]It is likely that this is the same American #290 used at the Holt facility. There is no indication in the JBC records that a new machine was purchased. Moreover, the W.A. Riddell Co. was the successor to the Hadfield-Penfield Steel Co., which had succeeded the American Clay Machinery Co. The largest line of equipment in the Riddell catalogs was still called the "American" line, and successor companies had even maintained the same numbers. See W.A. Riddell Company, *Catalog No. 110* (Bucyrus, Ohio: 1929).

[288]Kahn Brick Company to JBC, 3/12/24; JBC to Kahn Brick Company, 3/11/24; Kahn Brick Company to JBC, 3/19/24. JBC and Kahn disputed whether the connection shaft was part of Kahn's tile machine or the cutter it sold JBC. JBC to Kahn Brick Company, 5/22/24. JBC attempted to trade in its older cutters for "a new automatic cutter with delivery table." JBC to Fate-Root-Heath Co., 10/23/23.

The selection of the Riddell tile machine over a similar model made by J.C. Steele & Sons came only after substantial research and inquiry. True to its favorite equipment manufacturer, J.C. Steele & Sons, JBC inquired about its 5A machine. It is "the best we have been able to produce," Steele wrote JBC, "primarily a Hollow Tile Machine, but is readily convertible to make sidecut brick," and came equipped with a side-cut, oil-lubricated brick die.[289] But JBC evidently let Steele & Sons know that it was shopping around for a tile machine, and that the purchase of one from Steele & Sons was not a foregone conclusion. "You will see, therefore, that the trick works both ways," Steele & Sons reminded JBC. "Some prefer ours, and while of course some prefer others."[290] Indeed, JBC asked a number of other brickmakers – from a list undoubtedly supplied by Steele & Sons – what they thought of the Steele & Sons 5A Tile Machine, and received glowing reports from most, if not all.[291] Reflecting its specific earlier problems with the Brewer machine (see above), JBC "wondered if the machine had been tested on either partition tile or the larger sizes."[292] Possibly because of end-thrust difficulties it experienced on its Steele & Sons No. 6 machine, JBC ultimately purchased a custom-outfitted #290 American Standard Hollow Brick Machine made by the Hadfield-Penfield Steel Company of Bucyrus, Ohio, equipped with "a special #23-50 front to take on ...Jenkins Brick Co.'s Hollow Block Dies,...(and) Special #23-42 Front to take on the above company's drain tile Die Adaptor." Both were fitted with a flange to match sketches provided

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[289]J.C. Steele & Sons to JBC, 12/15/23.

[290]J.C. Steele & Sons to JBC, 12/21/23.

[291]Companies responding positively about the 5A were: Choctaw Brick & Gas Company of Mansfield, Arkansas, The Kansas Buff Brick and Manufacturing Co. of Kansas City, Kenyon Brick and Tile Company of Oklahoma City, St. Anne Brick and Tile Company of St. Anne, IL. See Choctaw Brick and Gas Company to JBC, 12/26/23; Kansas Buff Brick and Manufacturing Company to JBC, 12/31/23; Kenyon Brick and Tile Company to JBC, 1/3/24; St. Anne Brick and Tile Company to JBC, 1/7/24.

[292]JBC to The Kansas Buff Brick & Manufacturing Company, 1/4/24.

by JBC.[293] Concerned with its position as the leading supplier of brick and tile equipment in the region, Steele & Sons wrote JBC: "It is not the loss of the sale of machine at all that we regret so much, as we can sell all we can build anyway, but it is the effect and talking point that this may give to other manufacturers throughout the South."[294]

The second hopper fed clay for common brick into a feeder, disintegrator, pug mill, and a No. 6 auger/extruder, all manufactured by J.C. Steele & Sons. The common brick plant was set up for substantially higher output than either the tile or face brick operations, producing 125,000 common brick/day. (No comparable figures are given for tile or face brick.) Arrangement of the equipment was somewhat unusual. After pugging, clay dropped onto a conveyor belt that returned it overhead to the auger/extruder placed ahead of the pug mill. *The Clay-Worker* reported that the reason for this setup was "to enable them to operate the brick machine at a point much farther back in the building, extending the length of the off-bearing belt."[295] Waste clay was also returned to the pug mill by conveyor.

The Minter System: Drying and Burning

If the organization of brick and tile production at the redesigned plant broke from past practices at JBC, the new drying and burning operations were even more radical in their departure from the company's original plant. As described above, the original plant contained a semi-continuous kiln in which brick was dried and then burned. At the new plant, JBC installed dryers and kilns designed by M.M. Minter of Columbus, Georgia. Like the Richardson-Lovejoy kiln, the Minter System reused waste heat from the

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[293]Hadfield-Penfield Steel Company to JBC, 1/23/24. As equipped, the machine cost $2500.

[294]J.C. Steele & Sons to JBC, 2/8/24.

[295]"From Beehives," 264.

kilns to dry and water-smoke brick, although drying and burning were now carried on in separate structures. The new kiln system increased the company's flexibility, permitting the burning of tile, face and common brick simultaneously, something it could not do at Plant no. 2 in its original kiln.

"Burning one kiln, thru another was a dream for years and a nightmare whenever it was tried," wrote M. M. Minter, the dryer and kiln system's inventor, in 1924.[296] Born in Milledgeville, Georgia in 1871, Maurice Martin Minter began working for the Stevens Pottery Company in Baldwin County, Georgia, at the age of eighteen, using the company's plant as his laboratory for experimentation on fuel conservation in drying and burning. Trying "in various was to apply the principle of regeneration," Minter designed "the first flue system for connecting periodical kilns" at the Stevens plant in 1896, refining the use of flues and dampers through numerous failed experiments with overhead flues, cast iron dampers, and other devices: "We rebuilt the flue system seven times," Minter noted, "and finally secured control of operation and completely utilized the waste heat. We followed this up with a drive for speed and doubled the average periodic kiln capacity, reducing the fuel consumption for all purposes 50 per cent. Next we began to improve the waste heat dryer and succeeded as well with the dryer as with the kilns."[297] Minter finally patented his kiln system, "the application of the principle of the continuous kiln to periodic kilns," in July,1918.[298]

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[296]Ceramic Engineering Co., "Bulletin No. 2: The Minter System," (a pamphlet printed by the Minter System, Columbus GA, 1924), 2. The pamphlet disputed an earlier broadside by W.J. Richardson claiming credit for the coking table and flue system used in the Minter System.

[297]"Bulletin No. 2," 4.

[298]Patent No. 1,272,495 (July 16, 1918).

At first appearances, an individual installation of the Minter "system" was little more than a group of down-draft kilns connected by a labyrinth of underground flues. Unlike the substantially modified Richardson-Lovejoy semi-continuous kiln JBC used for almost two decades, conventional down-draft kilns avoided direct-firing the brick by directing heat from fireboxes located around the perimeter of the kiln to the arched crown via flues in the walls or baffles in front of the fireboxes.[299] The crown then dispersed the heat evenly over the inside of the kiln, burning the brick from the top down. One of the Minter System's virtues was its adaptability to round, down-draft kilns already in use, to which could be added similar kilns designed and built specifically for the Minter System.[300] Flues snaked underground among and between kilns, and were connected to an induction fan that produced a forced draft through the system: branch induction flues linked each kiln to the main induction flue and fan; the continuous circuit flue was a "beltway" around the perimeter of the kiln battery, tied to each kiln by a connecting flue. A pair of segmental flues formed a discontinuous ring around each kiln, delivering the heat products of cooling kilns through graduated pipes at heat grates.[301]

Part of Minter's marketing strategy brought prospective clients into direct contact with brickmakers using the Minter System. "We want you to know," he wrote *The Progressive Brick Manufacturer,* "that it is our policy to meet every interested party in the Minter System at any or all of our plants where we can

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[299]One leading kiln authority noted that the "down-draft kiln is the type most widely used and in it are burned the greatest variety of products – common bricks, face bricks, fire bricks, paving blocks, drain tile and fire-proofing, salt-glazed conduits, sewer pope and building blocks, stoneware, terra cotta in some degree, and the smaller lines of special ware." Lovejoy, *Burning Clay Wares*, 187.

[300]Kilns used by the Minter system ranged from 27' to 32' in diameter.

[301]For an illustration of the flue set up of a nine-kiln installation, see *Brick and Clay Record* (Dec. 1918), 1121.

help them to get the necessary figures he will require to know if the equipment he is now using is producing the best ware possible with his raw material and at the lowest investment cost possible as well as greatest economy in plant operation on a capacity basis."[302] Minter directed a number of brickmakers to the Jenkins plant to observe the system in operation; the JBC showed them around and offered additional information in written answers to questions on installation and operating costs, use on firebrick, internal temperatures, and recommendations on business dealings with Minter.[303] In addition, Minter aggressively advertised his system in the leading brick journals, often soliciting testimonials from brickmakers using his system, including Jenkins.

The elaborate flue system was the key to Minter's success. "My primary objective," Minter set forth in his patent, was "a system which may be economically operated, which will be continuous in its action, avoid shut-downs, permit of the burning of different materials in successive kilns, and provide for cutting out of operation any one or more kilns undergoing repair without affecting the action of the others or the system as a whole."[304] To accomplish these goals, Minter utilized waste heat, conducted through flues, in the various stages of drying and burning.[305] Unlike the Scott process first used at JBC, the Minter system utilized separate drying chambers, after which brick was transferred to the kilns for burning. The Minter dryer used deflectors to spiral air currents in a balanced, humidity-controlled environment that

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[302]The Minter System to *The Progressive Brick Manufacturer*, June, 1926 (copy in JBC files).

[303]JBC to John Callaghan, 4/13/29; John Randolph Martin to JBC, 4/23/29; JBC to J.R. Martin, 4/26/29; JBC to Streator Drain Tile Company, 12/28/29.

[304]Patent No. 1,272,495 (July 16, 1918), 1; quote from advertisement, *Brick and Clay Record* (Oct., 1918).

[305]Lovejoy, *Burning*, 323.

dried ware without case-hardening it.[306] An induction fan at the end of the main flue provided draft for the heat. Cooling kilns were the most readily utilized heat source, lacking coal gases emitted during the burning process. In the cooling phase, fires were extinguished, external kiln doors were opened, and cool, atmospheric air was drawn into the kiln at the same rate that heat products were removed through the connecting flue. Clean waste heat was carried to the dryer, where it dried brick without whitewashing or cracking, and prevented corrosion of cars and other equipment. Cooling kilns were also the sole heat source for watersmoking, and their heat product was combined with exhaust heat from burning kilns for preheating. With the aid of a portable fan, cooling kilns provided a portion of the air used in combustion in kilns in the burning phase. As each kiln moved through the phases of the burning process, dampers redirected heat to and from the appropriate flues and kilns.[307]

Minter kilns at the JBC were constructed according to the best principles of round, down-draft kiln practices. The Minter System designed and built the thirty-feet diameter kilns at JBC, subcontracting the actual construction jobs. Six kilns and a complete flue system for nine were constructed in 1923-4, and the last three kilns of the first battery built in 1925.[308] The company accepted quotations for dry-press refractory brick from fire brick makers for fireboxes, bags, linings and crowns.[309] Kilns were banded with Tecktonius bands and lugs, an industry standard. JBC had long experience with Tecktonius kiln hardware, using it first in 1903 on the down-draft kilns in Wetumpka. After building the second battery of

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[306]Advertisement, *Brick and Clay Record* (June, 1930), 245

[307]Advertisement in *The Clay-Worker* (Oct., 1929), 317.

[308]Min., Board, 1/14/25; 7/8/25.

[309]The Minter System to Ray Ivey (Minter System Field Representative, copy in JBC files)), 3/10/26; Dover Fire Brick Company to Jenkins Brick Co., 3/17/26; The Stowe-Fuller Refractories Co. to JBC, 3/19/26.

Minter kilns, J. Michael Jenkins, Jr. told *The Clay-Worker* "We have been using these kiln bands and lugs for years and wouldn't think of building a kiln without them."[310] In a testament to the durability of this hardware in an environment of intense heat and thick dirt, in 1940 Tecktonius wrote JBC: "We haven't had the pleasure of shipping you any Tecktonius products since 1926..."[311]

Minter made elaborate claims for his system's efficiency, economy, flexibility, and adaptability. Taking advantage of the heat-retention qualities of kiln construction materials – both refractory and common brick – the system's flues and fans facilitated utilization of most of the waste heat generated in the burning phase. Both Minter and his clients claimed that this efficient use of heat permitted the burning of nearly twice as much brick as ordinary down-draft kilns. Prior to installing the Minter System, the Citadel Brick & Paving Block Co., of Bois Chatel, Quebec, burned an average of 8,000 brick per day in three periodic, down-draft kilns; afterward, it burned 40,000 brick per day in seven Minter Kilns.[312] The company attributed the increased efficiency to preheating and the even distribution of heat within kilns.[313] Similarly, the Hill Brick Company, at East St. Louis, Illinois, turned its ten Minter System kilns "two and one-half times a month, which is the equivalent of twenty ordinary periodic kilns, of same capacity."[314] Fuel costs at the Dixie Brick Company, of Macon, Georgia, were reduced by half, reflecting the use of

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[310]"From Bee Hives...," *The Clay-Worker* (Oct., 1927), 264.

[311]E.C. Tecktonius manufacturing Co. to JBC, 10/2/40.

[312]Advertisement, *Brick and Clay Record* (Nov., 1920), 724.

[313]"Cut Monthly Coal Bill by More Than $5,000," *Brick and Clay Record* (November, 1920), 749.

[314]"Making 80,000 Brick Daily on Ten Kiln Plant," *The Clay-Worker* (Sept., 1926), 217.

waste heat for drying, preheating and watersmoking.[315] The use of dampers and flues permitted the kilns to operate periodically, semi-continuously or continuously, allowing brickmakers to "burn various materials in successive kilns, such as...brick, hollow blocks, tubes, pipes, and...other...material that scums and discolors..."[316] Minter also claimed that his system needed one-half the drying tunnels as an installation of conventional down-draft kilns; when added to the money saved from reduced kiln expenditures, total savings on a 50,000 brick daily capacity plant amounted to $45,000.[317] By the late 1920s, Minter had extended service "to include the entire plant – and to insure a plant which is synchronized to operate in harmony with an economical drying and burning cycle..." Apparently, brickmakers found these promises appealing, as Minter boasted in 1929 that "Minter engineers have built almost half a hundred successful drying and burning systems"[318] "scattered from Florida to Quebec, Canada."[319] Economies notwithstanding, Minter claimed "as a matter of fact however the users of The System consider the quality of the product of greater value than the economy of operation,"[320] a claim supported by a number of users.[321]

As was Minter's custom, he worked closely with JBC to adapt existing and new burning technologies to

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[315]"Sixteen Million Fine Face Brick Annually with only Nine Twenty-seven Foot Kilns," *The Clay-Worker* (May, 1926), 397.

[316]Patent No. 1,272,495 (July 16, 1918), 4.

[317]Advertisement, *The Clay-Worker* (May, 1923), 707.

[318]Advertisement, *Brick and Clay Record* (Oct., 1929), 173.

[319]Advertisement, *The Clay-Worker* (March, 1930), 328.

[320]The Minter System to JBC, 11/3/23.

[321]See copies of letters in JBC files from other brick makers.

provide the optimal kiln and dryer configuration.[322] In considering installation of the Minter System in 1922, JBC planned to operate Minter kilns on hollow tile and the older, semi-continuous kiln on common brick.[323] One of the virtues of the system was the ability to erect kilns in installments, thereby gaining the benefits of the System and spreading costs over a period of time. Initially, layout called for five kilns and eleven dryer tunnels, but a sixth kiln was added within months and four more in 1925, as well as five additional dryer tunnels.[324] Since the company intended to operate the Minter System and the Richardson-Lovejoy kilns together, JBC and Minter explored the possibility of installing a flue between the old kiln and the main supply flue of the Minter System to utilize waste heat from the semi-continuous kiln. "There is no doubt whatever that this can be done to advantage as far as recovery of waste heat is concerned," Minter wrote JBC. But he had some reservations about the prospects for success, pointing out that "some practical difficulties may develop...owing to the fact that you must have a supply of air for combustion in your firing zone and pulling from one side which would be necessary in your kiln, might 'unbalance' your draft in the firing zone." Minter noted that, while the theory underpinning the use of kiln-generated waste heat was applicable to both, the differences in the kilns were important, insofar as the Minter System had "a balanced draft due to central discharge and equalized circulation, in all stages of all processes."[325] Eventually, Minter found a way to connect the old and new kilns "through damper controlled flues in such a way as to be able to assist each other very materially," particularly in case of a

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[322]By 1930, the Minter System worked even more closely with brickmakers than it had with JBC. A synopsis of the company's method claimed that "in building plants not only co-ordinates the entire plant from the mine to the loading cars by working in close harmony with machine manufacturers, but after plant is finished the Minter System operates the plant for its client for a period of at least three months..." *The Clay-Worker* ("Equipment Number," 1930), 127-8.

[323]JBC to J.T. Earhart Brick Co., 11/24/24.

[324]The Minter System to JBC, 12/7/23;12/11/23; JBC to The Minter System, 12/10/23; 4/23/25.

[325]The Minter System to JBC, 4/21/24.

breakdown in one of the fans.[326]

JBC and Minter also examined other aspects of the brickmaking and burning process. Reflecting JBC's continual concerns with fuel costs, they explored the possibility of "reducing the fuel consumption by burning one kiln through another and storing the heat in it," an idea Minter had considered but dismissed. "...(I)n the last analysis when the manufacturer has business sufficient," Minter wrote the company, "all the capacity possible pays better than the fuel that could be saved by a little slower operation." Reflecting his belief that a fully integrated plant was the most economical, Minter emphasized to JBC that "To secure the ultimate limit of economy in operation a definite cycle of operation must be established, the price of the product and fuel, as well as demand must be considered to determine what method of operation pays best...." By 1925, Minter was "prepared to make...relative tests of raw material...to show what the material from various parts of a large deposit will do under identical conditions in a way that the practical men in charge can understand." Relating this directly to the burning system, he claimed "Its value lies in the fact that it shows the difference in material in different parts of the deposit and indicates the difference in temperature necessary in burning material from different locations."[327] Yet, in one crucial respect, The Minter System differed little from the traditional method of improvements in the industry. There was no substitute for experience: "the flexibility of the System is so great," Minter reassured JBC, "that only those who have used it are able to properly appraise it."[328]

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[326]The Minter System to JBC, 2/19/26.

[327]The Minter System to JBC, 3/5/25; 6/15/25.

[328]The Minter System to JBC, 3/5/25.

JBC encouraged Minter to adapt the System's dryer to the company's mix of common and face brick and building tiles, but ultimately derived less satisfaction from Minter System dryers than kilns. Making tile was an important concern, given its increasing popularity and tendency to crack in the drying process. Minter had "made some progress with the dryer in connection with drying tile," he wrote JBC, obtaining "better control of humidity in the tunnels" and reducing losses to a minimal three percent. JBC had two options, either maintaining maximum flexibility by drying brick and tile in all tunnels, or customizing several tunnels and dedicating them to tile. Minter outlined the possibilities:

> We suppose that you would wish to keep your tunnels inter-changeable for both brick and tile, using two deck cars, however, if you think of setting aside a part of it (dryers) for tile we can make the deflectors more effective for tile than for both brick and tile. If a certain number of tunnels most distant from the fan can be set aside for the tile, we can add a little moisture to the air used through them. Keep the tunnels used for brick drying separate in operation, and by regulation of air volume a lower temperature and higher degree of humidity can be kept in the tile section.[329]

JBC and Minter also discussed installation of a "hot room" as a "pre-dryer," but JBC concluded "that the eleven tunnels we now have will provide us with ample opportunity to experiment with the additional fan and an auxiliary flue."[330] By 1927, the company had added seventeen additional drying tunnels, with each

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[329]The Minter System to JBC, 4/24/25.

[330]JBC to The Minter System, 5/6/25.

tunnel in the configuration holding thirteen cars.[331] The waste heat dryer, while efficient, was "similar to others of this kind," JBC wrote another brickmaker.[332] Indeed, J.M. Jenkins, II, wrote another brickmaker, "I always had my doubts as to anything distinctive in their dryers that could be patented. We paid for their dryer plans, but if I had it to do over, I think I would build a good waste heat dryer..."[333] Nonetheless, it performed satisfactorily: the company dried brick "in a day, setting one day, the brick that were put in the day before."[334]

JBC built additional Minter System kilns and drying tunnels at two different times, in 1926 and 1940. "Perhaps the best evidence of our opinion"of the benefits of the Minter System, JBC wrote the Associated Clay Products Corporation, "might be the fact that we are at this time tearing out an old continuous kiln which has been in operation for twenty years and are replacing it with an additional nine Minter kilns, together with the added dryer necessary."[335] The Richardson-Lovejoy kiln, modified by J.M. Jenkins, I, had provided satisfactory service but, JBC told the Darlington Clay Products Company, of Society Hill, South Carolina.,"(T)his kiln, like any other piece of equipment in use twenty year, does not keep up to the highest mark of efficiency as compared with modern kilns..."[336] The new battery of Minter kilns was located on that part of the site occupied by the old semi-continuous kiln, which had to be

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[331]"From Beehives...," *The Clay-Worker* (Oct., 1927), 262.

[332]JBC to J.R. Martin, 4/26/29.

[333]JBC to L.L. Stephenson, Jr., 2/8/36.

[334]JBC to Streator Drain Tile Company, 12/28/29.

[335]JBC to Associated Clay Products Corporation, 8/24/26.

[336]JBC to Darlington Clay Products Company, 6/3/26.

removed to allow for the new construction, temporarily reducing the company's capacity.[337] After the new kilns were installed, JBC estimated the average cost of Minter System kilns at "$4500.00 each, this figure covering underground flue work, royalties, etc."[338] Jenkins also added another battery of drying tunnels at this time.

In 1940, perhaps anticipating additional war-time demand from base construction, JBC installed two more kilns. By this time, patent rights for the Minter System had been assigned to The First National Bank of Columbus, Georgia, from which JBC obtained a waiver of rights of $250 per kiln, one-half the royalties.[339] J.H. Minter still designed and built the kilns and dryers, providing

> Engineering and Supervision; all skilled and common labor necessary for completing the excavation, brickwork and banding of the kilns, and to keep the legal insurance and tax coverage on same for the duration of this contract. And to furnish: all necessary equipment for building, as tools for excavating, mortarmaking, brick and mortar transporting, scaffolding, etc. And to complete: These two kilns in accordance with the Plans & Specifications made by The Minter System, and to the depths and measurements of these plans. All work as excavation, wall thicknesses, or depths that exceed these measurements due to being constructed on fill earth to be as extra, and to be figured and paid for at cost."[340]

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[337]JBC to the *Brick and Clay Record*, 11/23/26.

[338]JBC to John Callaghan, 4/13/29.

[339]The First National Bank to JBC, 10/4/40; contract between JBC and The First National bank, 10/21/40.

[340]J.H. Minter to JBC, 10/5/40.

The cost of two additional kilns and associated flues was approximately $6,700, or $1250 per kiln less than the original installation. The work included modification of the flue system for the main kiln batteries that required extension of the circuit flue surrounding the battery by 240 feet. Adding additional kilns and flues to an operating plant necessitated careful planning, as James J. Minter, son of Maurice M. Minter, the system's inventor, wrote JBC: "we will have to put in this flue first thing up to where the connections will be made, and make these connections at a time when the kilns on the East line of your present battery are not in use, or at least not on the Induction Main."[341]

"The kiln System," which JBC considered to be "the main part of the installation," worked well for the company.[342] Brick were dried and ready for the kiln in twenty-four hours. With the Minter system, JBC "watersmoked brick over a period of forty-eight hours" using kiln-generated waste heat.[343] Once the smoke was driven off, and the kiln was heated to 700 degrees, fires were built and burning begun. Kilns burned at 1850 - 1950 degrees for approximately thirty-six hours, after which they cooled and the waste heat reuse cycle began anew, as the heat products from burning were directed to dryers and kilns in the preheating and watersmoking stages.

From Coal to Gas

A key point of departure in the changeover from the open-top, semi-continuous kiln to the Minter system was in the fuel used for burning. The Richardson-Lovejoy kiln, as modified by Jenkins, burned clean slack

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[341]J.H. Minter to JBC, 10/7/40.

[342]JBC to J.R. Martin, 4/26/29.

[343]Watersmoking was necessary because hygroscopic water was not driven off in the drying process. Lovejoy claimed that "Few clay wares, particularly common wares, are fully dry when set in the kiln...; in fact, wares from dryers having temperatures as high as 300 degrees F. seem to contain some moisture..." Lovejoy, *Burning Clay Wares*, 33.

coal, essentially coal dust, applied directly on brick in the lower portions of the kiln. When forced to use other coals, JBC wrote the United States Fuel Co. at Birmingham, "we have had some unsatisfactory burns. The larger coal does not ignite as quickly as the slack, so that it accumulates in the bottom of the kiln. Finally, all this becomes hot, with the result that the intense heat over-burns where this accumulation occurs."[344] In 1926, JBC informed its current supplier that the company "had begun tearing down the continuous kiln in which we use slack coal and are going to require a smaller tonnage of this for the next few months as the kiln is taken down, with the result that by the last of the year we will not require any more of this grade."[345] In the tradition of round, down-draft kilns, Minter System kilns burned lump, rather than slack, coal.

JBC "made rather complete tonnage tests" with a variety of coals, "with the result that we have just about concentrated on Hills Creek six inch mine run...a Cahaba coal."[346] Despite the company's long history of burning Alabama coal, freight increases in the 1930s made it more expensive and eventually brought int into the range of natural gas prices, a fuel that was growing in popularity among brickmakers.[347] In 1936, JBC wrote Alabama Congressman J. Lister Hill, that passage of the Guffey Bill,"would centralize authority over coal prices in a politically appointed commission, and would force unionization of all miners" leading to "a great increase in prices....The difference in (price) between natural gas and coal is very small," he continued, "and any increase in coal prices would undoubtedly

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[344]JBC to United States Fuel Company, 12/6/22.

[345]JBC to Montevallo Coal Mining Co., 4/26/26.

[346]JBC to C.W. Dixon, 11/10/27.

[347]JBC to Mr. A.W. Vogtle, Chairman, Transportation and Marketing Committee, Alabama Mining Institute, 4/30/35.

result in the further displacement of coal mined in this State with Alabama people by natural gas produced elsewhere."[348] Within a year of that letter, JBC notified its coal supplier that the company was switching from coal to natural gas to burn its brick.[349] When Brenners notified JBC of reductions in delivered prices of coal, the brick company noted that it might have stayed with coal, had the reductions been made prior to the switchover, but now that the company had "invested quite a lot of money in gas burning equipment, the proposed reductions come to late."[350]

JBC's switch from coal to gas as its primary burning fuel took nine years from the time the company first explored the option until gas was finally installed. Minter considered "natural gas ideal fuel for operation of Minter System kilns," and he put brickmakers interested in changing from coal to gas in touch with those already using gas.[351] The considerable cost of equipping JBC's nineteen kilns for gas, estimated at $2760, an average of $145 per kiln, persuaded the company to experiment with one kiln first to see if the economic benefits would be worth the cost of conversion. Contracting in 1928 with the Southern Natural Gas Corporation, of Birmingham, for gas burning equipment on one kiln, JBC agreed that "After trial if we find the costs of burning with gas approximates the estimate given by your engineer, we will then install the equipment on the rest of our kilns, as fast as plant operating conditions permit." The company also reserved the right to cancel the contract if burning brick and tile with gas proved inefficient or

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[348]JBC to Honorable J. Lister Hill, House of Representatives, 5/25/36.

[349]T.H. Brenners & Co. to JBC, 9/8/37; JBC to T.H. Brenners, 9/9/37; T.H. Brenners & Co. to JBC, 9/8/37 (2nd letter). "Your nice letter softened the blow considerably," Brenners wrote, "your company being one of the oldest and most highly prized customers on the books of our company..."

[350]JBC to T.H. Brenners, 12/8/38.

[351]The Minter System to Chattahoochie Brick Company, 6/20/28 (copy in JBC files).

uneconomical.[352] Encouraging conversion to gas, Southern Natural Gas, "As a gentleman's agreement," promised "to cooperate...in securing the best results with gas in your brick plants. After the pipeline is constructed, we propose to maintain a combustion engineering department for the specific purpose of helping our consumers to get the best product at minimum fuel and labor costs; also to advise in regard to the best equipment for each process."[353] The gas company's engineer, Ernest Moeller, researched gas conversion for brick kilns, contacting the Hope Brick Works of Hope, Arkansas, a Minter System firm, for information. Hope Brick informed Moeller that gas provided a consistent, uniform temperature of 2250 degrees in its kilns, consuming approximately 10 cubic feet of gas per 12,000 bricks. Gas-fired kilns needed little maintenance, reduced labor costs by using only one watchman/burner for three or four kilns, and reduced the need for excessive flashing (burning a finish on the brick). In sum, Hope Brick found gas to be "Cleaner, Cheaper, Better."[354] The efficiency of JBC's operation far exceeded Hope Brick's: Southern Natural Gas estimated that JBC required 5950 cubic feet of gas per 1000 bricks (the equivalent of 700 lbs of coal per 1000 bricks), or approximately 10,412,500 cubic feet per month. The monthly fuel cost would be $2290.44, at $.22 per 1000 cubic feet, and $210 for two men, totaling about $2500 per month, or $1.43 per 1000 bricks.[355]

As the above paragraph reveals, at least part of the drive toward conversion from coal to gas came from the utility companies themselves. Desperate to cover costs for their massive investments in pipelines, and

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[352]JBC to Southern Natural Gas Corporation, 9/18/28.

[353]Southern Natural Gas Corporation to JBC, 9/21/28.

[354]Ernest Moller, engineer for Souther Natural Gas Corporation, to Hope Brick Works, and response, 7/9/28 (copy in JBC files).

[355]"Memorandum Report," Southern Natural Gas Corporation, 9/18/28.

suffering declining revenues from the depression, they actively pursued new customers, competing against each other their business. At least in the case of Southern Natural Gas, its engineer, Ernest Moeller, developed a kiln burner, the Moeller Gas Burner, that was successfully marketed to brickmakers.[356] The company also sent Moeller to observe JBC's first face brick flashing using gas.[357] Less than a year after JBC declined the offer from Alabama Utilities, Southern Natural Gas Corporation sent Moeller to investigate the burning operations at three Minter System plants: Bickerstaff Brick Company and Dixie Brick Company, both of Columbus, Georgia, and Jenkins Brick Company of Montgomery, with the intention of discovering ways of improving burning at the Jenkins plant through the use of gas. At the Bickerstaff plant, Moeller discovered "a very large number of gas leaks in their pipe system and burner connections...about 420 cu.ft. per hour." Bickerstaff was also using "a very large amount of excess air especially during the finish of the burn....This, of course, resulted in the use of an excess amount of gas..." He found that the Dixie plant was not operating two of its twelve kilns, and was not following the Minter System of preheating kilns with the waste heat product of burning kilns. Moeller estimated he could increase the efficiency of both plants by correcting the problems. He also noted the differences in the way the three plants measured the temperature of their burning wares. Dixie used pyrometers and a sampling method, but did not attempt to alter gas consumption should samples dictate an early end to burning. Bickerstaff timed burning solely using settling, or "shrinkage," which measured the distance the setting dropped during the burn. JBC used a combination of Seger cones, setting, and pyrometers, burning tile to #02, 01, 1, common brick to #01, 1, 2, and face brick #1, 1, 2. "In summary of this," Moeller

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[356]JBC to Ernest Moeller, 12/7/37; Southern Natural Gas Co. to JBC, 12/9/37; Southern Natural Gas Co. to JBC, 4/1/38. JBC ordered several shipments of Moeller Gas Burners between September and June, 1939. Moeller also supplied glass tubing for gauges on the burners. Southern Natural Gas Co. to JBC, 4/14/38.

[357]JBC to Ernest Moeller, 10/21/37.

concluded, "I would say that the economy which could be obtained at the Jenkins plant would be somewhat greater than at the Dixie or Bickerstaff plants, due to the method of operation."[358]

Although the depression, during which JBC produced little brick between 1931 and 1934, delayed further implementation of gas burning, in 1935 JBC again explored the possibility of converting both kiln batteries. Alabama Utilities estimated that JBC would use approximately 9000 cubic feet of gas per 1000 bricks, based on 738.4 lbs of coal per 1000 bricks. This would save Jenkins an average of $200 per month on production of 750,000 bricks, including savings in labor costs. In providing comparative figures for other plants, Alabama Utilities estimated that the Minter System would save JBC approximately 25% in fuel used. Burner costs for five kilns, and total yard piping, bustles and down-comers for nineteen kilns would cost $3325; although Alabama Utilities would discount this 50%, to $1662.50.[359] J. Michael Jenkins, I, disagreed with Alabama Utilities, arguing that the utility company underestimated JBC's potential gas consumption by more than 2,000 cubic feet per 1000 bricks, and informed the company that "we would not be justified in adding to our manufacturing costs, and for that reason are not prepared to undertake the gas installation.."[360]

JBC made the somewhat reluctant decision to install gas, which was piped to Montgomery from the gas fields at Monroe, Louisiana, during the summer of 1937.[361] "For a long time," the company wrote its chief

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[358]Resume of Investigation at Jenkins Brick Company, 6/22/36; Resume of Investigation at Bickerstaff Brick Company, 6/22/36; Resume of Investigation at Dixie Brick Company, 6/22/36 (copies in JBC files).

[359]Alabama Utilities Service Company to JBC, 9/17/35.

[360]JBC to Alabama Utilities Service Company, 9/18/35.

[361]JBC to James M. Lange, Brick & Clay Record, 4/11/39.

coal supplier, T.H. Brenners, "we have been figuring on putting in gas, delaying the step longer than perhaps we should have."[362] Operating with gas was very different than with coal, as JBC wrote fellow brickmaker W.E. Dunwody: "We find there are a good many things we will have to learn about gas firing, but I believe it is going to prove satisfactory."[363] The company's superintendent (possibly Harry Meek) "learned how to handle gas, and in turn teaching his foreman. It is not automatic by any means..."[364] Piping to nineteen kilns and burners for ten, including labor, supervision and transportation, and overhead, cost $5,410.91.[365] After six months of burning experience, JBC found that the cost of burning gas was "greater than when we were burning coal," yet estimated the total expense, when factoring in labor savings, was about equal. It is worth noting that Jenkins was not burning all its kilns at the time the estimate was made, and lost efficiency reheating and drying out kilns and the ground below, which became cold between burns. The company estimated it was "burning brick with about 10,000 cubic feet of gas per thousand brick."[366] Brick quality steadily improved, the company achieving "brighter, clearer colors, and fires were "more easily controlled,"[367] but some "scumming" "had to be worked out."[368] In 1940, JBC placed an order with the Southern Natural Gas Company to pipe its two new kilns, making them the only two on the site that never burned coal prior to the failed experiment in the 1970s.[369]

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[362]JBC to W.A. Brooks, T.H. Brenners, 9/7/37.

[363]JBC to W.E. Dunwody, 10/27/37.

[364]JBC to S.T. Coleman, Cherokee Brick Company, 4/20/38.

[365]Southern Natural Gas Corp. to JBC, 8/18/37.

[366]JBC to S.T. Coleman, Cherokee Brick Company, 4/20/38.

[367]JBC to James M. Lange, Brick & Clay Record, 4/11/39.

[368]JBC to S.T. Coleman, Cherokee Brick Company, 7/19/38

[369]Southern Natural Gas Company to JBC, 10/9/40.

Additional Equipment Changes

The installation of natural gas for burning and the construction of two additional kilns several years later were part of a general reconstruction and modernization program at JBC's original Montgomery plant, the first since the post-World War I reconstruction. Lasting approximately three years, roughly the time it took to renovate the plant in the 1920s, JBC re-evaluated and renovated every facet of its operation. The company purchased two gas powered Thew Universal Lorain-30 shovel equipped with 16' shovel booms 13'4" dipper sticks and ½ cubic yard dippers for the clay pit.[370] The two shovels mined different types of clay, each filling one-half of a Steele mine car pulled by Jenkins' new Fate-Root-Heath Plymouth locomotive. By blending its clay at the pit, the company avoided intermediate storage and/or blending, and was able to send clay directly to the crushers.[371] At the other end of the operation, Jenkins also instituted a new cleanup method using a Dempster Dumpster on a 1-1/2 ton International truck. Purchasing twelve interchangeable 1-1/2 ton bodies, the company placed one at each kiln being set and one at each being unloaded, to catch culls and rejects; one at the clay bank for vegetation and other trash; and another for cutter scrap. Use of the dumpsters eliminated one of two men formerly on scrap duty. A Steele & Sons dump car was used to clean dryer tunnels, reducing cleaning time from two hours to fifteen minutes.

Renewed building activity following the depression led the company to replace some of its older machines with similar, but improved, models taking advantage of new developments in extruding and cutting. In 1937, JBC notified J.C. Steele & Sons that it had "completed the extension to our building to take care of

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[370]The Thew Shovel Company to JBC, 6/1/40.

[371]"Jenkins Brick Co. Dries Hollow Tile by Radiation with Less than 1% Loss," *Brick & Clay Record* (Oct., 1948), 53.

our machinery re-arrangement, and are at work now on other features of the alterations."[372] Jenkins replaced the Chambers Brothers #290 machine used to make tile, and the Steele #4 machine used to make face brick, with a new J.C. Steele & Sons 5A machine that would make both.[373] The 5A was ordered with a "#50 size Feeder, Sealer with de-airing dome...for operation with the 5A Machine sealed for de-airing, and with the necessary sealed chute for connecting the Feeder, and Sealer with the Machine..."[374] The #50 was the largest de-airing machine Steele built, and the company wrote JBC that "There is more to these machines than meets the eye...Due to the nature of the brute, we have to build it in two parts, as it is so high, and then after it is all built we have to assemble it to see that all the parts have the proper relation, and then disassemble it again to ship it. It is too high to build all in one piece to start, owing to the fact that it has to clear the cutter."[375] The new machines required additional heavy equipment to construct and Steele found "a tremendous amount of machine work being necessary."[376] JBC also purchased from Steele a "separate pugfeeder, and smooth roll crusher," and a new, high-speed cutter, but believed "that the design (of the #50) with its large vacuum chamber is about the last work in clay working machinery."[377] To defray the cost of the new equipment, Jenkins returned to Steele the old

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[372]JBC to J.C. Steele & Sons, 2/11/37. The re-arrangement was due to the "unique installation" of the Steele #50. "Due to existing construction," read a Steele advertisement, "the machine had to be mounted with the Pug-Sealer over the cutter." *Brick & Clay Record,* 1944.

[373]JBC to Chambers Brother, 2/10/38; 2/16/38; Chambers Brothers to JBC, 2/8/38; 2/14/38.

[374]J.C. Steele & Co. to JBC, 12/11/36.

[375]J.C. Steele & Sons to JBC, 2/13/37.

[376]J.C. Steele & Sons to JBC, 5/1/37.

[377]JBC to J.C. Steele & Sons, 1/6/37; JBC to The Manufacturers Equipment Co., 10/11/37. Although running at reduced speed to compensate for its extra capacity, JBC still turned out "20 to 27 tons of hollow ware per hour, or 7,500 face brick, which is more than we were getting from the same motors and machines of another make prior to putting in de-airing."

cutters, pug mill and No. 4 machine, and sold the Chambers #290 back to Chambers Brothers, which had an order for it from another customer.[378]

In an industry characterized by stable technology, few developments stirred researchers, machine makers and brickmakers like the de-airing machine. The *Brick & Clay Record* called it "the first radical departure in stiff mud processing technique," and predicted it would "have a profound influence in the development of the clay products industry."[379] B.T. Bonnot, President of Bonnot Co., of Canton, OH, an early developer of the machine, claimed "de-airing will do more to broaden the outlook for the industry at large, to raise the standard of its products, to simplify the difficulties of production, to eliminate losses and rejections, and to meet on a highly favorable basis the inroads of competitive products than any development in the clay industry over a great period of time."[380] Imperfectly understood but widely interpreted as "a form of superlative aging or weathering accomplished instantaneously and with a minimum of effort and expense,"[381] the evacuation of air from clay (de-airing) had been the subject of experimentation and patents from the turn of the century, saw its first commercial developments in the early 1930s, and by 1935 was installed in over 150 plants.[382] Clay men believed that de-airing stripped a

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[378]JBC to J.C. Steele & Sons, 1/9/37; Chambers Brothers to JBC, 2/8/38; 2/14/38; 4/7/38; 4/11/38; 4/15/38; 4/23/38; 4/27/38; JBC to Chambers Brothers, 2/10/38; 2/16/38; 4/5/38; 4/13/38; 4/25/38.

[379]"De-Airing of Clayware: A Composite of the Industry's Experiences," *Brick & Clay Record* (Jan., 1935), 12.

[380]"Commercial De-Airing of Clays," *The Clay-Worker* (March, 1935), 107.

[381]"Commercial De-Airing," 107. There is good reason to doubt this interpretation since, according to ceramics engineer Ellis Lovejoy, "Clays in weathering undergo physical and chemical changes," such as the disassociation of pyrites and consequent development of sulphuric acid that dissolves other minerals, the production of gypsum and other salts, and changes in color. Ellis Lovejoy, *Fundamentals and Economies in the Clay Industries* (Wellsville, NY: Randall Publishing Co., 1935), 121-23.

[382]"De-Airing of Clayware, 13; "Commercial De-Airing," 108.

thin air film from the colloidal particles in the clay batch, permitting water, "the medium by which plasticity is developed," to move more freely among the particles.[383] The result was an improvement in binding tendency yielding a denser and stronger, yet more plastic and workable, clay. In the Steele & Sons de-airing machine purchased by Jenkins, clay was forced into the long vacuum chamber that reached the entire length of the machine barrel, permitting "all of the air to be evacuated completely and uniformly before being compressed within the auger and die..."[384] Reflecting the greater density of the closely interlocked grains, de-aired clay, although differing from clay bank to clay bank, generally required lower temperatures but greater air circulation for drying, more time for water-smoking but less for vitrification and heat soaking. Final products, including common and face brick and structural tile, were denser and stronger, had better edges and corners with little or no lubrication, and had fewer laminations and a greater percentage first quality.[385]

Common brick production was renovated as well. JBC replaced the Steele #6 machine with a Steele #65 "Straight Line Machine." Straight lines were an innovation of the mid-1930s, incorporating pug mill and extruding functions in one machine. Jenkins could not install the new #65 straightline machine without extensively modifying the pulley and drive system, since the old #6 was a "left hand" machine, and the #65 was made in only "right hand" models.[386] JBC resolved the problem, writing Steele that "We can utilize the machine running in the direction described in your letter of April 15 by turning it around" and

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[383]"De-Airing is Important Subject of Structural Clay Sessions," *Brick & Clay Record* (April, 1936), 141.

[384]De-Airing with the Steele Machine," *Brick & Clay Record* (Jan., 1935), 16-7.

[385]"De-Airing of Clayware," 14-15.

[386]J.C. Steele & Sons to JBC, 4/13/40.

changing the direction of the cutter.[387] Several months later, JBC purchased a new Steele #18 cutter, used it vigorously over the next few years, and replaced it in 1945 with a new machine, same model.[388] Unlike other equipment, Steele noted that "Few drastic changes have been made in the cutter recently," with modifications strengthening existing designs.[389] Steele suggested that, rather than "conglomerate the landscape with a lot of pug mills, etc," JBC would be better served with an 18" roll crusher which could be installed atop the straight line machine, with plenty of room to spare.[390] Jenkins did not believe the 18" crusher would provide enough capacity, and questioned the arrangement of the disintegrator in conjunction with the crusher, but Steele claimed the "rated capacity of the #18 Crusher of 14,000 brick an hour is purely arbitrary," with "a great many of these crushers...being used for a much higher capacity than this." Jenkins intended to trade in the pug mill and #6 machine but, reflecting the dominance of straightline machines, Steele notified the company that "there is very little demand now for separate pug mills...the same is true of separate auger machines such as the #6."[391]

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[387]JBC to J.C. Steele & Sons, 4/22/40.

[388]Noting that "Mr. Meeks (JBC superintendent) takes exceptional care of equipment, and that your reel possibly has a lot more life in it," Steele inquired as to the provision of a new reel to use with the new chassis. JBC bought a new reel as well. J.C. Steele to JBC, 8/22/41; J.C. Steele & Sons to JBC, 6/1/45.

It is worth noting that JBC told Steele not to rebuild the old cutter, "as we prefer to buy new equipment when it is needed." (JBC to J.C. Steele & Sons, 8/23/45) This is a new direction from past practice, in which JBC regularly bought refurbished equipment - even as recently as 1941 and the purchase of the #6 machine.

[389]J.C. Steele & Sons to JBC, 8/27/41.

[390]J.C. Steele & Sons to JBC, 4/4/40. JBC was not satisfied with the design of the new crusher, agreeing "thoroughly with the recommendation given (in earlier pamphlets) for the use of sectional (rather than one piece) rolls. As stated by you, the sections can be reversed and used to advantage even after considerable wear. With the sold roll this advantage is eliminated..." JBC to J.C. Steele & Sons, 6/11/40.

[391]J.C. Steele & Sons to JBC, 4/13/40. Steele also offered JBC a much more attractive trade in on a new straightline #65 than on a rebuilt machine, an offer declined by JBC. J.C. Steele & Sons to JBC, 11/15/40.

As part of the World War II-era plant modernization, JBC also revamped drying operations. The company installed additional twelve-car dryer tunnels, making thirty-eight in all, put in a new dryer-car puller system made by the Manufacturers' Equipment Corporation (MECO),[392] and replaced its two-tier dryer cars with "Style #3 Triple Deck Dryer Cars" from Chase Foundry & machine Co.[393] H. Monroe Meek, the plant's superintendent, developed a method of drying tile on the triple-deck cars by installing heat baffles on the ends of the cars to direct heat downward and then up through the tile. Baffles reached within two inches of the ceiling and hung approximately half-way down the car. Both the distance baffles hung down the car and the frequency of their placement were determined by experience and experimentation. Alternate dryers were used for brick and tile, with the brick tunnels radiating heat to tile tunnels. Meek also designed a mechanical car pusher powered by "a continuous chain with dogs spaced at 21 in. intervals, powered by a 5 h.p. G.E. motor and which moves at 18 f.p.m. (feet per minute)." The car pusher saved hackers the trouble of pushing dryer cars along the hacking belt, giving each hacker "the best chance to complete as many cars as he is able..." In operation, as described in the *Brick & Clay Record*, "When a hacker finished his car he goes to the control station, warns the other hackers by an electric bell, and starts the pusher to move the string ahead one car length. He then proceeds to the end of the off bearing belt and starts a new car."[394] JBC also installed a unique system for exchanging full and empty cars from the transfer track: "Between the transfer track and kiln," described the *Brick & Clay Record,* "the dryer car tracks are equipped with a spring loaded switch which makes it possible to deliver a full dryer car and take on an empty, without respotting the transfer car," saving time for the

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[392]Manufacturers Equipment Co. to JBC, 9/7/45.

[393]The Chase Foundry & Manufacturing Co. to JBC, 3/26/40; 2/10/41.

[394]"Jenkins Brick Co. Dries Hollow Tile by Radiation with Less than 1% Loss," *Brick & Clay Record* (Oct., 1948), 55.

setting gang and transfer car operator.[395]

Conclusion

In 1955, the year its assets surpassed $1million for the first time, Jenkins Brick Company had to notify customers that excessive demand for its brick and tile had put the company four to five months behind in shipments, and that it was unable to open any new accounts.[396] Evidently prompting consideration of expansion, in 1959, the company opened a state-of-the-art brick plant at nearby Coosada. In the planning stages for three years, the new plant mined 120 acres of clay running eight to fifteen feet deep, with pits of three different qualities: one "highly plastic, sand free, close grained...; the second...highly sandy clay chosen for control of shrinkage and reduction of cracking and the third...a material that resembles a mixture of the first two," according to the *Brick & Clay Record*. The company blended the first two, and could use the last without blending, but the three different types also offered flexibility as precise clay pit composition changed. A Loraine drag line was used to mine the clay, dumping it into White trucks. Breaking from past practice, clay was dumped into feeders and given preliminary grinding in a J.C. Steele & Sons disintegrator before being stored in a clay storage building for later blending. The three clays were mixed in precise quantities on a conveyor belt, and then moved through a secondary crushing operation using a smooth roll crusher and disintegrator. Once thoroughly blended and reduced to their final size, clays were moistened, pugged, extruded and cut, all with Steele machinery. Bricks were then placed in a conditioning room, another departure from practice at the Montgomery plant, to prevent unbalanced drying resulting from drafts and temperature extremes. According to the *Brick & Clay Record*, the drier, designed by Robinson Ventilating, "represent(ed) a most advanced design of modern

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[395]"Jenkins Brick Co. Dries ...," 54.

[396]On JBC assets, see "Jenkins Brick Company, Balance Sheet, December 31, 1955"; JBC to J.L. Hamilton Engineering Co., 5/27/55; JBC to Gadsen Mill Works, 8/28/55.

brick driers..." Holding fifteen cars in each tunnel, the drier recycled warm air from the cooling end of the kiln, blending it with outside air in a mixing box and increasing needed heat with an auxiliary burner. The 285 feet long kiln was zoned for "recirculation, preheat, furnace, rapid cool and ware cooling," and contained a gas flashing system at the end.[397]

Six years later, in 1965, the company opened a second new plant, this one in North Montgomery only a few miles from the original Montgomery plant. Like the Coosada site, this one was designed by the Pittsburgh engineering firm of Swindell-Dresser, which also installed its own tunnel kilns and driers. Doubling production, the two new plants together produced 140,000 bricks daily. Unlike the Coosada and earlier Montgomery plants, though, preliminary crushing was performed by an Eagle single-roll crusher and a Paschal hammermill rather than the J.C. Steele & Sons equipment generally favored by Jenkins. Both the brick machine and cutter were made by Steele.[398]

In the 1970s, with newer plants at Coosada and Montgomery in operation, J. Michael Jenkins IV tried to revitalize the old Montgomery Plant No. 2 in the context of new plants at Coosada and Montgomery. No longer did the old plant produce a mix of common and face brick, and tiles. Instead, the Coosada and newer Montgomery plants were dedicated to the production of "only face brick with new textures," noted company president Harry Meeks. "(T)ile production (was) expanded at the old plant and all common brick...produced there."[399] Yet Jenkins, great grandson of the company founder who acceded to the

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[397]"Latest Methods Up Capacity 60%," *Brick & Clay Record* (Jan., 1960), 84-88.

[398]"Jenkins Doubles Brick Capacity with Twin Plant," *Brick & Clay Record*, (Oct., 1965), 51.

[399]"Latest Methods," 88.

presidency of Jenkins Brick after stints in the yard, held out hope that the old plant could be made productive. At some point in the 1960s, the Minter System was discontinued and holes were added in the top of each kiln, making them traditional downdraft kilns. In the 1970s, when the price of natural gas was high and coal was more economical and its use government subsidized, kilns were retrofitted for coal, and two large coal boxes and interior brick baffles were installed, and the original coal arches (later used for gas) were bricked up. Despite the efforts, the modifications didn't make the plant competitive. "We tried every way to keep this open," long time employee Doc Varner lamented, but "labor got so high" and output couldn't match that of the other plants at Montgomery and Coosada.[400] The plant closed in the mid-1970s, and has not operated since.

The Jenkins Brick Company remains one of a dwindling number of independently-owned brickmaking operations in the United States. Now a modern operation using automatically controlled tunnel kilns, the company is one of the most successful brickmakers and is branching out into allied products. The original Montgomery plant is now the site of the company's architectural stoneworks, with remaining kilns overgrown and the mill, dryer tunnels, and fan buildings in ruins. There is little to suggest the rich history of innovation in burning and drying technologies, the consistent modernization of brickmaking machinery, the close collaboration with equipment makers, or the extent to which this small plant was the primary brick supplier for a region stretching from central Alabama southeast to Florida.

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[400]Interview with Elisabeth Dubin, Summer, 1999.

Appendix I
Jenkins Brick Company Output, Selected Years, 1907 - 1944

Year	Common Building Brick			Face Brick	Structural Tile		Drain Tile	Miscellaneous
	number			number	short	lin. Feet	linear feet	
	Plant # 2	Plant # 3	Total	Plant # 2	Plant # 2	Plant # 3	Plant # 3	Plant # 3
1907	1,881,925		1,881,925					
1909	8,604,891		8,604,891					
1910	9,413,440	2,929,564	12,343,004					
1911								
1915	1,884,669	4,774,206	6,658,875				221,925	
1916	5,561,984	2,141,159	7,703,143				190,020	
1917	6,467,365	511,605	6,978,970			437,240	223,031	
1918	9,621,000		9,621,000			0	0	0
1919	7,896,000	2,189,000	10,085,000			230,000	653,000	28000 (stove
1920							600,000	
1923				500,000				
1924	12,340,000	3,000,000	15,340,000			173,809	223 (tons)	1317 (tons, floor
1927	16,201,000		16,201,000	3,271,000	2,675			
1928	16,488,000		16,488,000	3,940,000	7,989			
1929	12,086,000		12,086,000	4,336,000	8,481			
1930	6,689,000		6,689,000	1,798,000	4,692			
1931	7,273,000		7,273,000	1,555,000	6,142			
1932	4,134,000		4,134,000	423,000	3,455			
1933	3,561,000		3,561,000	555,000	4,214			
1934	4,071,000		4,071,000	553,000				
1935	6,792,000		6,792,000	1,575,000	1,637			
1944	2,739,000		2,739,000	95,000	427			

Sources:

1907: Report at Semi-Annual Meeting of Directors, 7/23/07, p. 21. Figure is "Number of Bricks Sold," Jan. - June, 1907.
1908, 1909, 1911: Report at Regular Semi-Annual Meeting of Directors, 1/11/11, p. 60.
1915, 1916, 1917: taken from a coal report attached to the company's balance sheet for Dec. 30, 1916.
1918: Report to Board of Directors, 1/8/19.
1919: Census of Manufactures, General Schedule.
1920: Report to Board of Directors, 1/10/21.
1923: Report to Board of Directors, 1/9/24. Face brick total is approximate.
1924: Dept. of Commerce, Annual Census, Jan. 19, 1925.
1927, 1929, 1931, 1933, 1935: Census of Manufactures, Clay Products and Other Refractories
1928, 1930, 1932, 1934: Dept. of Commerce, Annual Census of Production.
1944: Bureau of Census, War Production Board, Structural Clay Products: Manufacturers.

Appendix II

Average Number of Employees, Selected Years

Year	Jenkins Brick Company	U.S. Brick & Tile Plants
1909		18
1919	70 (inc. 36 at #3)	
1925	75	38
1927	95	
1929	97	37
1931	51	
1933	39	
1935	47	24
1937	65	
1939	101	
1951	100	

Sources:

1909: Miriam E. West, *Productivity in Selected Industries: Brick and Tile* (Philadelphia, PA: Works Progress Administration, 1939), 12.
1919: U.S. Census of Manufacturers, General Schedule
1925, 1927, 1929, 1931: U.S. Census of Manufacturers, Clay Products and Other Refractories
1933, 1935, 1937, 1951: Accident Reports, Jenkins Brick Company

Sources Consulted

Note on Primary Sources: The preparation of the detailed history presented above, from the company's founding until the 1940s, was possible because original files on the company's equipment and business practices were maintained and stored untouched in buildings around the Furnace Street plant. In all, they amounted to approximately 200 letter boxes of letters, receipts, orders and miscellaneous documents, arranged in rough chronological order. These permitted, indeed encouraged, the telling of the Jenkins Brick Company in the words of its founder and second president. Unfortunately, records for the post World War II period, particularly correspondence, either did not exist or were not similarly preserved, making reconstruction of that era in similar detail difficult, if not impossible.

Trade Journals Consulted: In the course of research for this report, the following brick and clay trade journals were consulted. For citations to the most important articles, please see footnotes in the body of the report.

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ADDENDUM TO:
JENKINS BRICK COMPANY, PLANT NO. 2
Furnace Street
Montgomery
Montgomery County
Alabama

HAER AL-185
HAER AL-185

FIELD RECORDS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001