THE TEXTILE INDUSTRY 1800’s

The establishment of the cotton textile industry is central to the story of the development of manufacturing in the United States. It also illustrates the conversion of merchant-ship owner wealth into manufacturing capital, the disruption of the traditional economic alliance with England, and the role of the entrepreneur, or economic innovator, in business. At first America produced little cotton or woolen cloth, relying almost exclusively on imports. During the Revolution and for several decades afterwards, domestic spinning and weaving industries proliferated.

Near the turn of the nineteenth century, small-scale manufacturing began, characterized by Samuel Slater's mills in which labor, management, and household industries were closely related. Beginning in 1813 with the Waltham mill, modern, large- scale integrated corporate manufacturing came of age and spread rapidly, spinning off supporting industries and the nucleus of the machine-tools industry, which became the heartbeat of industrial expansion.

Samuel Slater arrived in New York from England in 1789. The New York Manufacturing Society employed him. It was a promotional organization inspired by Alexander Hamilton for developing manufacturing industries in America. However, Slater, for whom the underfinanced Slater's Mill in 1793 initiated the development of the New England textile industry.

Early American Manufacture and ill-directed association offered little opportunity, was soon in contact with Moses Brown of Providence, Rhode Island. Moses and his three brothers had developed a prosperous West Indies and rum trade before the Revolution and operated candle-manufacturing plants in Providence, Newport, Boston, and Philadelphia. After the war, Moses diverted his efforts to manufacturing, and other family members soon followed. Brown and Slater, with the aid of the Wilkinsons, a Pawtucket, Rhode Island, family of artisans, designed and constructed a small textile mill on the Arkwright design.

Richard Arkwright in England had patented the latter in 1769. Arkwright's water frame produced a cotton thread strong enough to be used as warp on a power loom. Slater, who formerly managed an Arkwright mill in England, evaded the British prohibition on the emigration of mechanics, and he avoided the restrictions on transferring plans and blueprints of machinery by memorizing the details of the mill machinery, which he reconstructed in America on a smaller scale and with some mechanical improvements. His 72-spindle, water-powered mill, the first mechanical weaving process in America, began operation in 1790.

In 1793, a new partnership—Almy, Brown, and Slater—opened a second mill in Pawtucket. Nicholas Brown, Jr., established the Blackstone Manufacturing Company near Providence in 1808, and David Anthony, trained in the Slater mills, initiated the organization of textile mills along the Fall River in Massachusetts in 1813. The Slater operation remained relatively small, and although Samuel Slater is estimated to have accumulated a fortune of $690,000 by 1829, the operations of Francis Cabot Lowell, rather than Slater, established the model for the future expansion of the textile industry.

Francis Cabot Lowell, born in Boston in 1775, enjoyed extended family connections among the merchant-ship owners of Massachusetts. The Revolution, which the merchant-ship owners had supported, followed by the Napoleonic Wars and the Embargo of 1807, circumscribed opportunities for foreign commerce and disrupted vital overseas commercial alliances. Lowell went to England in 1810, for studying English textile manufacture. Having a photographic memory and a talent for mathematics, he returned and began building and perfecting what would soon be the Waltham power loom, an improved version of Cartwright's 1784 loom.

During the War of 1812, Lowell received ready financial sup- port from Boston merchants who were looking for new opportunities, since foreign commerce was at a standstill. This is not to say that Lowell had no detractors, many thought his scheme could only fail. Had it been a period of "business as usual," Lowell would have had far greater difficulties in attracting investors. As it was, Nathan Appleton, Patrick Tracy Jackson, and Lowell founded in 1813 the Boston Manufacturing Company at Waltham, Massachusetts, with a capital of $400,000, a sum probably greater than that of the combined Slater and Fall River operations. Lowell's organizational innovations were also striking.

The Waltham system created an integrated process for manufacturing cloth at a single plant. Whereas in England the spinning and weaving and the dyeing and printing processes were performed by separate firms,

Early American Manufacture 63 Lowell combined them in one establishment. Labor, mostly women, was divided into specialized functions and organized by departments. The product was standardized and, compared to English production, unrefined. Lowell introduced a cost-accounting system, and he systematized the purchase of raw cotton and the sale of finished cloth.

Although Lowell died shortly after the Waltham mill began operation, by 1822, the enterprise had returned profits in excess of the capital outlay, and the investors desired to expand. The search for additional waterpower sources led them to investigate the Pawtucket Falls area of the Merrimack River. About 1790 a merchant, Moses Hale, built water wheels on the nearby Concord and Merrimack rivers to generate power for gristmills, sawmills, carding machines, and for the manufacture of gunpowder.

Local investors completed construction of a canal around Pawtucket Falls in 1797, and another canal, the Middlesex Canal completed in 1804. They diverted trade from the Merrimack above the falls directly into Boston Harbor. This left the original "Proprietors of the Locks and Canals on Merrimack River" with a nearly worthless property.

About 1822 Thomas M. Clark, the director of the Locks and Canals Company, became the agent of the Waltham group and purchased the 600 shares of canal-company stock and almost 400 acres of adjoining farmland for about $100,000. An additional $160,000 was spent in enlarging and deepening the canal around the falls, and a new and virtually untapped power source became available for manufacturing.

The Waltham group incorporated the Merrimack Manufacturing Company in 1822, began construction of a plant on the "Waltham system," and appointed Ezra Worthen the first superintendent or manager. Cotton buyers stationed in the South made direct purchases of raw cotton and arranged for shipment to the mill through Boston.

Briefly, the milling process involved passing the baled cotton into a "whipper" for loosening the compacted fiber, then to a "conical willow" that opened it more, and to a "picker" that removed trash and lumps. A "lapper" wound the fiber around a wooden cylinder into sheets. Women took over most of the remaining processes. In the carding room, the fiber sheets were finished and passed to a drawing room where the fiber was twisted into ropelike sheets.

A "double speeder" formed the roving and a "stretcher" drew the roving out before passing to the throttles in the spinning room where the yarn was made. The yarn was sized and dressed in the dressing room and became available for the looms. In the cloth room, a red-hot copper cylinder singed away the nap, and workers trimmed and measured the cloth. In the last department the finished cloth was bleached, washed, and printed.

The Waltham system involved not only compartmentalization and the specialization of labor, but it also depended largely upon the labor of women and children—a hitherto underutilized labor pool. The proprietors specifically sought to attract female employees of good character from rural communities. The company offered what was then attractive wages, good hours, and comfortable accommodations in company-built boarding houses. "Learners" received fifty-five cents per week and could work up to average levels of $1.93 per week plus room and board. For most women in

Early American Manufacture America, who had almost no opportunity to earn cash wages, the mills offered a unique opportunity and, paradoxically, may have marked the first step in liberating women from household employment. Working hours varied with the hours of daylight and averaged a little over ten hours a day for a six-day workweek. The boarding houses, and the "Lowell girls," were carefully supervised.

Child labor and the "Lowell girls" provided the mill owners with a relatively abundant and cheap labor supply—and ultimately introduced a pernicious system of exploitation. The Merrimack Company proved an immediate financial success. By 1845, it operated five cotton mills and was capitalized at $5 million. The company produced 250,000 yards of cloth a week on 41,600 spindles and 1,300 looms. Employees included 1,250 females and 550 males. However, the Merrimack Company was only the first of a coterie of cloth and manufacturing firms located in and around Lowell, Massachusetts.

In 1825, the Locks and Canal Company reorganized with 1,200 shares of stock issued at $500 per share. The company sold "mill-powers," or water rights, with a mill-power roughly equivalent to the power necessary to operate 3,584 spindles. Shares were allocated to new companies on an essentially nonprofit arrangement. Beginning with the Hamilton Manufacturing Company in 1825, ten new cotton and woolen mills located in Lowell by 1839. Most of these remained in operation through World War I, but many disappeared before 1930.

Supporting industries quickly sprang up around the new industrial center: a flannel mill, blanket mill, paper mill, planning mill, card and whip factory, and foundry; loom, lock carriage, and sash-and-door manufacturers; and grist and sawmills. In 1825, the Merrimack Manufacturing Company established an independent machine shop with an investment of $150,000 under the supervision of Paul Moody. This and other shops established in Lowell a machine-tools capacity that became integral to industrial expansion throughout the region.

The machine shops that serviced the textile industry became the nucleus of the American machine-tools industry, making possible the mass production of machinery parts and, in turn, facilitating the creation of mechanical devices of an endless array and variety including steam engines and railroad equipment. The mechanical or industrial revolution in America sprang largely from the machine shops of the new textile centers of Lowell, Taunton, and Worchester, Massachusetts; Providence, Rhode Island; Wilmington, Delaware; Paterson, New Jersey; and Richmond, Virginia.