

# The "Great Factory" at Dover, New Hampshire: The Dover Manufacturing Co. Print Works, 1825

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Between 1820 and 1825 several companies were in the process of introducing mechanical calico printing into New England. To accomplish this aim three corporations increased the scale of industrial buildings developed for the American cotton industry by erecting or consolidating a number of cotton mills with large print works. These were the Taunton Manufacturing Company, the Merrimack Manufacturing Company, and the Dover Manufacturing Company. Each was financed and governed by Boston investors, although only one was organized by that group of "Cotton Kings" known as the Boston Associates. This was the Merrimack Manufacturing Company in Chelmsford, Massachusetts, the first major corporation in what would soon become the city of Lowell. Formed in 1822 by several stockholders of the Boston Manufacturing Company in Waltham, where a complete factory system for the manufacture of cotton cloth had been successfully developed, the Merrimack Company sought to expand into printed cottons by erecting between 1822 and 1826 three factories, each modeled after the third Waltham mill erected in 1820 (Fig. 1 and 2).

In Taunton, Massachusetts a group of local and Boston investors formed the Taunton Manufacturing Company in 1823, which consolidated several existing cotton mills in that town under single corporate ownership to supply cloth to the new print works they erected by 1824.

The earlier cotton mills of Taunton (Fig. 3) were built of stone, and were slightly smaller in size than the brick mills of their competitors in Waltham and Lowell. The new print works was built of brick, but like the Taunton mills, was on a smaller scale than those of other companies.

The third firm to enter the race to manufacture calico prints, Dover Manufacturing Company of Dover, New Hampshire, had also been an established manufacturer of cotton cloth prior to the introduction of calico printing.<sup>1</sup> In 1812 the Dover Cotton Factory was chartered by the New Hampshire legislature and in 1820 was reorganized to permit the local investors to expand from the original forty shares "into as many shares the said proprietors shall think proper."<sup>2</sup> Between 1820 and 1822 the company attracted Boston investors who helped finance new land purchases along the Cocheco River below the site of the original "upper" factory. Known as the Lower Falls, this new water power site was developed for cotton manufacturing by the erection of two brick factories designated Mill Number Two and Three respectively and both modeled after the third mill at Waltham. Like the first Merrimack Company mills at Lowell, these were a standard 155 by 43 feet, the first mill of four stories and the second of five plus an attic. Like the first factory at Waltham, Dover's Mill No. Two held a cupola placed in the center of a clerestory monitor roof which lighted the attic stories. Both factories incorporated an integral tower or "porch" which placed

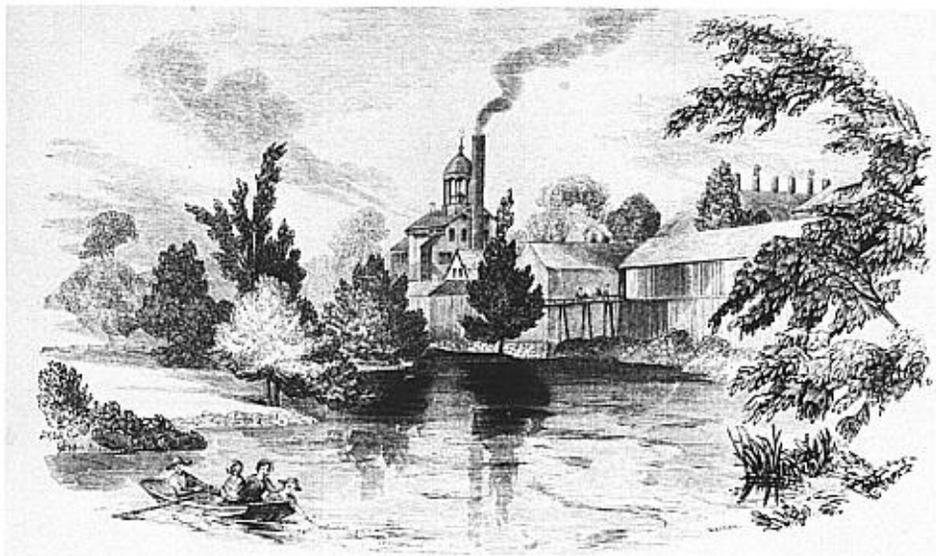


FIG. 1. BOSTON MANUFACTURING CO., MILL NO. 3 (BUILT 1821)  
WALTHAM, MASS. (photo SPNEA)

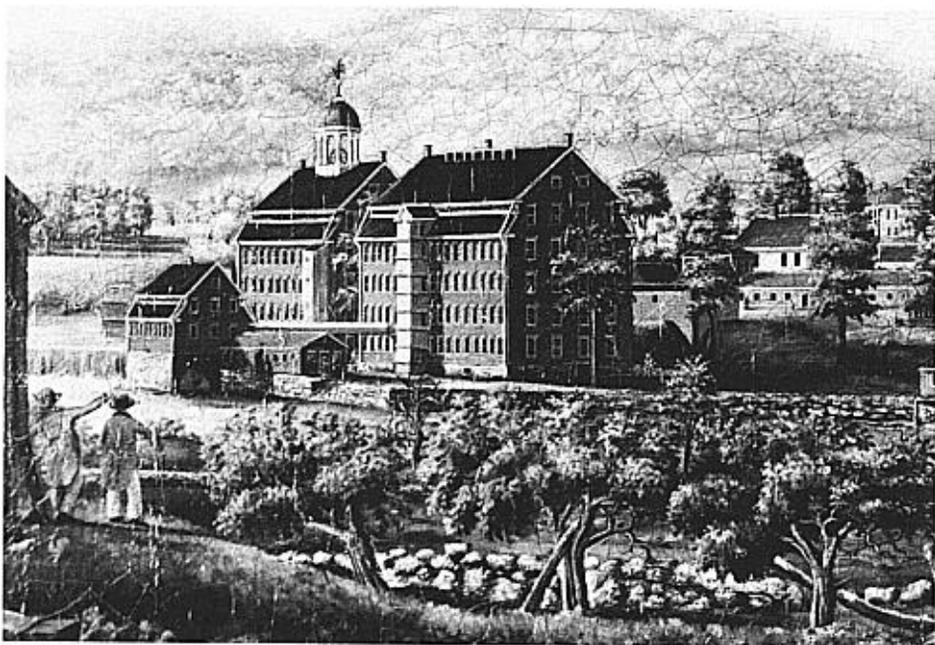


FIG. 2. BOSTON MANUFACTURING CO., MILLS NO. 1 (1814-16) AND NO. 2  
(1815-19). Detail from anonymous painting of Waltham c.1830. (photo OSV)



FIG. 3. HOPEWELL FACTORY (1818) TAUNTON MANUFACTURING COMPANY IN RUINS, 1903. (photo OSV)

the stairs and service doors outside the main structure.<sup>3</sup>

In 1824 the company was once again reorganized, changing its name to the Dover Manufacturing Company and increasing its capitalization from 50,000 to one million dollars. This move preceded plans, begun early in 1825, to expand into mechanized calico printing. For this purpose the new corporation began the erection of a factory building to house additional cotton manufacture and a new print works.

This new factory, Number Four, begun in 1825 and constructed during the next three years, differed substantially from the company's earlier mills in both scale and design. It incorporated several important innovations in its construction, and when built was larger than any contemporary textile factory in New England. When complete, it formed an "L"

measuring 167 feet along the river and 245 feet along Washington Street. It was six stories in height above the basement, with an attic lighted not by the usual windowed clerestory, but by skylights set into the roof (Fig. 4). Neither this L-shaped form, nor the scale of the building (described as "the huge works that we are preparing for a printing establishment"<sup>4</sup>), nor the skylighting of the attic story had been attempted in building for the American textile industry before.

Although built as a single architectural unit, the new factory was conceived as two totally different functional spaces. The 167 feet along the river, with an ell 55 feet long (running 100 feet along the street), was for manufacturing cloth. The remaining portion (145 feet by 45 feet) was devoted to a part of the printing operation itself. Separated into these functional components, the size of the build-

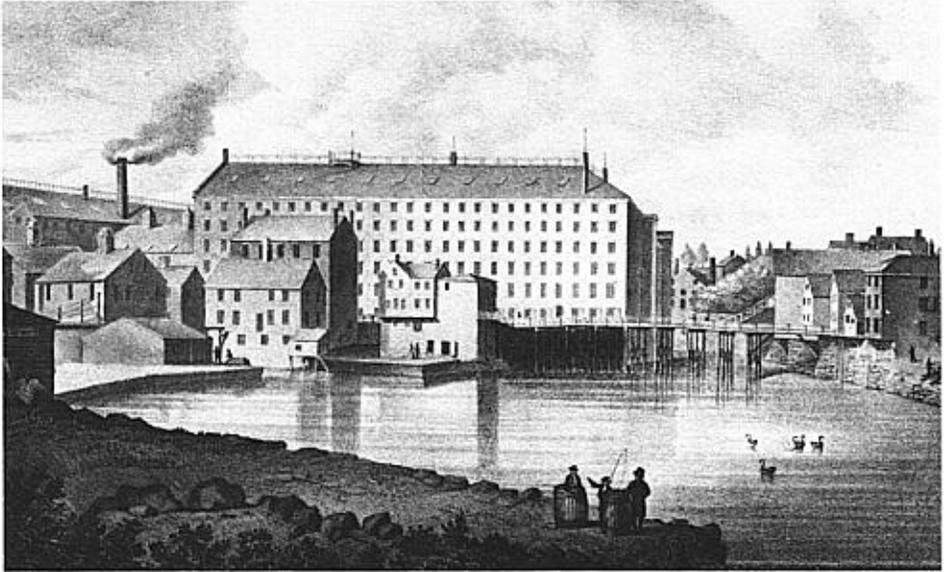


FIG. 4. THOMAS EDWARDS, "LOWER BRIDGE AND FACTORIES, DOVER, N.H.," SENEFELDER LITHOGRAPH, c.1830. (courtesy Boston Athenaeum and Merrimack Valley Textile Museum)

ing units can be seen as two fairly typical variations of the Waltham type of mill joined by the integral ell. Whether this unusual form was adopted for topographic, hydraulic, or other considerations is unclear; the street and bridge were already existing boundaries and most of the company's houses for its workers were located on the opposite side of the street. English workers already employed in the cotton mills could possibly have suggested the L-shaped form for the building. However, it is fairly certain that none of the individuals involved in the initial planning of the structures had actually seen similar English textile mills like the one at Rotherham, Yorkshire (Fig. 5), before the basic plan was agreed upon in March 1825.

Another feature of Mill Number Four is that together with a new bleachery and Mill Number Two, it formed a quadrangle

enclosing an area several acres square. Quadrangles seem to have been common to the early calico manufactories in the United States, perhaps because of English precedent. By the time Dover had decided to build a print works, the Taunton Company was already constructing their new complex on that plan (Fig. 6). Zachariah Allen, a Providence, Rhode Island mill owner, described a visit to Taunton in March 1824. "The calico printing establishment," he noted in his diary, "is built of brick in a quadrangular form."<sup>5</sup> The scale of Taunton's buildings, however, in no way matched that of Dover. While at Taunton, "a part of one side of the building is two stories and the remainder one story high,"<sup>6</sup> Dover facades ranged from three to seven stories (Fig. 7 and 8).

The construction of this "huge works" is particularly well documented in letters written by the company agent, John

Williams. They indicate that the digging of the foundation trench was begun in April 1825, but unforeseen difficulty along the river side delayed the beginning of foundation work until late August. The brick walls were begun in September, bricklayers and masons having been brought in from neighboring towns and even from Boston.<sup>7</sup> Working at the rate of 60,000 bricks a day, they continued until the weather forced Williams "to level up the fifth story and secure the wall if the weather should moderate after Thanksgiving."<sup>8</sup> He had been hoping to have the roof over the building before winter, and so as early as September he had been seeking designs for the brick cornice coving. Williams suggested two alternatives for the company treasurer in Boston:

William Shimmin will cause to be procured and sent us, a plan of the coving for stores about New [Quincy] Market

house. I have an impression that they are built up with solid brick work and covered with wood wholly detached from any part of the rough; so should that wood burn off, it would not communicate to the rough of the building. Also, a draft of the back coving in Kilby Street. If these do not suit you, please get Capt. Parris and Mr. Willard to give a draft of one which would suit our great factory. Let him know that it will be seven stories high, 420 feet long on [the] outside.<sup>9</sup>

Whether architects Alexander Parris and Solomon Willard were actually retained to design a coving for the "great factory" is not known, though employment on finish details was typical of the limited role an architect might play in early nineteenth century industrial building.

The fact that construction was begun without a complete design, but rather applying vernacular building practices common to the earlier Dover cotton mills to

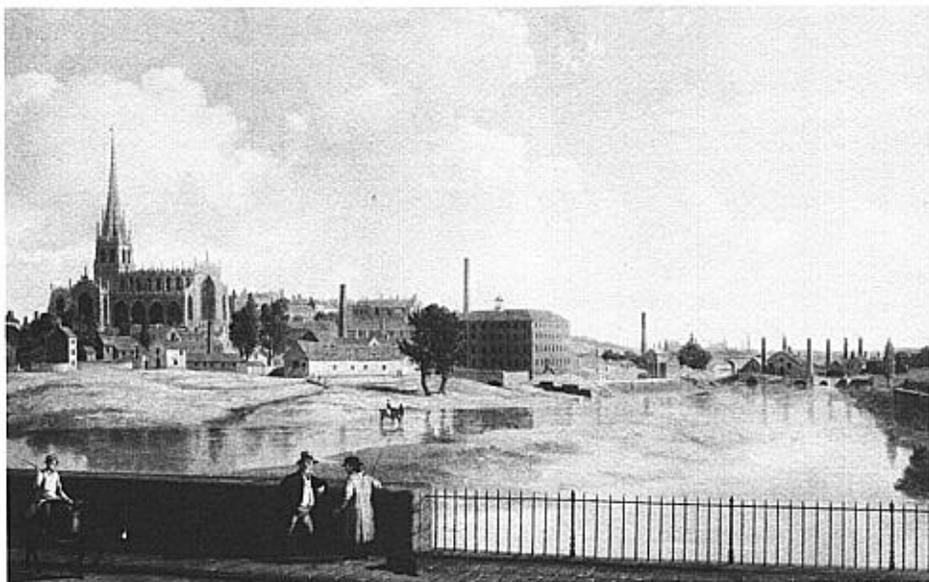


FIG. 5. THOMAS HEWES HINKLEY, "ROTHERHAM, YORKSHIRE, ENGLAND". (courtesy Museum of Fine Arts, Boston, M. & M. Karolik Collection)

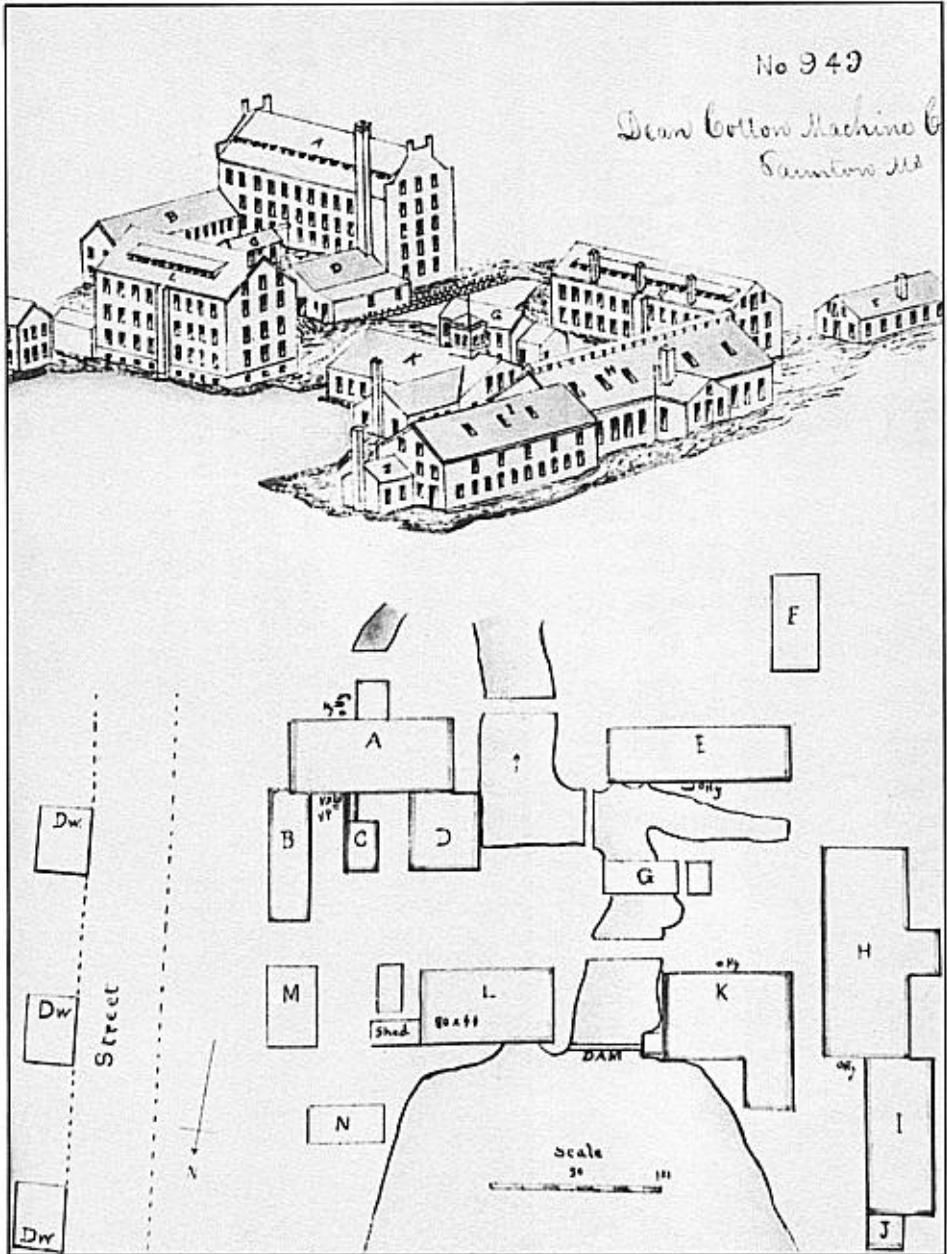


FIG. 6. PLAN AND ISOMETRIC VIEW OF TAUNTON MANUFACTURING COMPANY PRINTWORKS (LATER DEAN COTTON MACHINE CO.), TAUNTON, MASS. from c.1860-75. Insurance survey owned by Factory Mutual Engineering Company, Norwood, Mass. (photo R. Langenbach)

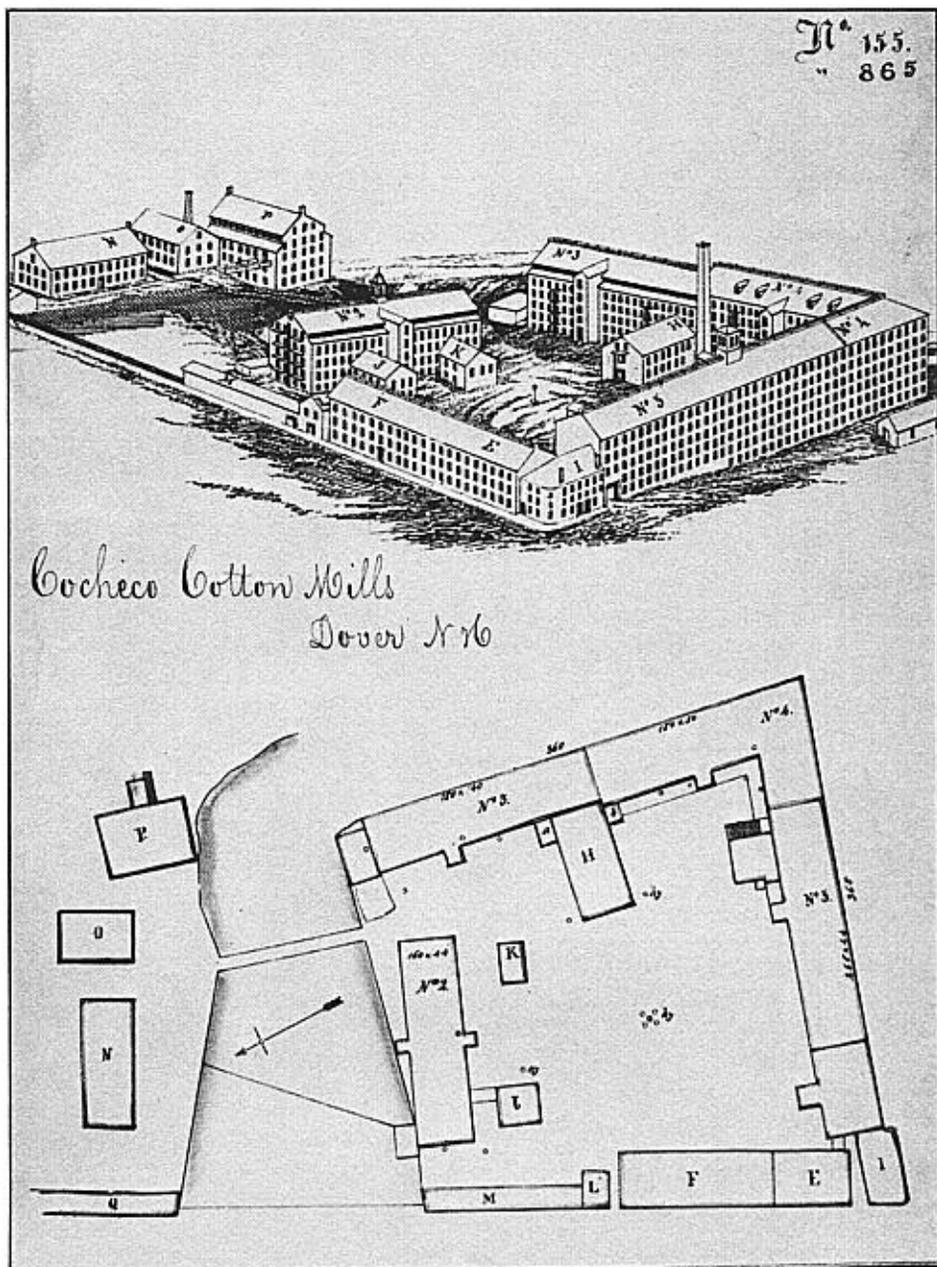


FIG. 7. DOVER MANUFACTURING COMPANY (LATER COCHECHO MILLS), DOVER, N.H. from c. 1860-75 Insurance survey owned by Factory Mutual Engineering Co., Norwood, Mass. (photo Randolph Langenbach)

the larger factory, is clear from Williams' correspondence. The company's master mechanic, Jonathan Fiske, planned the hydraulic system which would power the factory. He and Williams were responsible for initiating the dimensions of the new factory and the related structures adjoining it. These ideas were forwarded to the treasurer, William Shimmin, in Boston, who may have discussed specific proposals with the Directors financing the construction. For example, in April 1825 Williams wrote Shimmin about their plans for a bleach house noting:

Should you determine having stone window caps & hammered underpinning on the side towards the street; it is desirable to know, without delay, that arrangements may be made in season.<sup>10</sup>

Final decisions to exact building locations had also been delayed during May in expectation that George Bond, then Boston selling agent and major stockholder, might make a visit to the site:

I regret that Mr. Bond has deferred his visit; as I hope & trust he will come clothed with authority to decide on the Spot, on all the subjects in question as to all which is to be done here by the Co. this season and the manner of location viz. Factory No. 4, Printing and Bleach House and Machine Shop.<sup>11</sup>

While the directors might make the final decisions, it was only when an element of architectural detail or a matter of possible fire protection was a prime consideration that Williams turned from his local mechanics to look for technical advice or design ideas.

The major architectural innovation of the Dover factory was the incorporation of skylights in the roof. This plan evolved in the course of construction, originating with the management in Dover, with the advice and approval of the Directors. As the brick walls were nearing their full height, Williams expressed his thoughts on which of several alternative roof forms might best be employed.

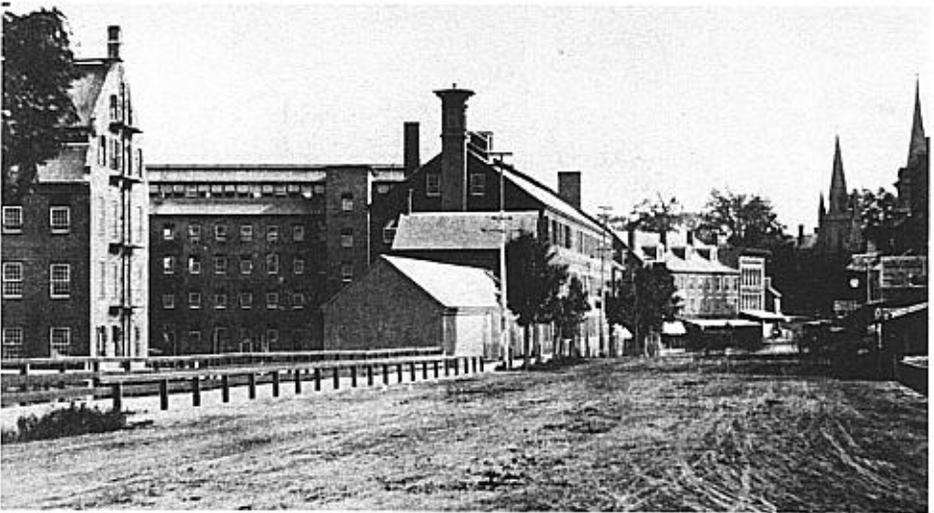


FIG. 8. DOVER MANUFACTURING COMPANY QUADRANGLE AND CANAL BRIDGE, from c.1870 stereoptican view. (photo SPNEA)

On reflection, we find a commodious dressing room may be arranged on the roof of it by adopting the Taunton plan of lighting it, which is done without expense of attic story. A plan from them perhaps would aid the directors in deciding on this subject.<sup>12</sup>

Confusion resulted from letters crossing between Dover and Boston, which elicited further specifics from Williams:

... Since writing the foregoing, I have received your [letter] ... Our original plan of lighting roof of No. 4 was as you suggest to have windows in ends of building only. Mr. Fiske was wholly unwilling to attempt to light the roof for use ... The other plan was to raise a false [roof] over the main roof of sufficient height, to put in one tier of square glass all along the roof, the appearance would not be very unlike our attic story but very much cheaper. I sent you an end view of it a few days since.<sup>13</sup>

A preliminary plan sent to Boston had shown a roof similar to the one on the wood machine shop at Dover, often described as a trap-door monitor, a common

roof type in industrial buildings throughout New England (Fig. 9). The window space was created by nailing a triangular board along the upper half of the rafters. The raised "false roof" created a narrow window opening which achieved the desired lighting without the expense of building a fully framed clerestory monitor like those employed in the earlier Dover cotton factories.

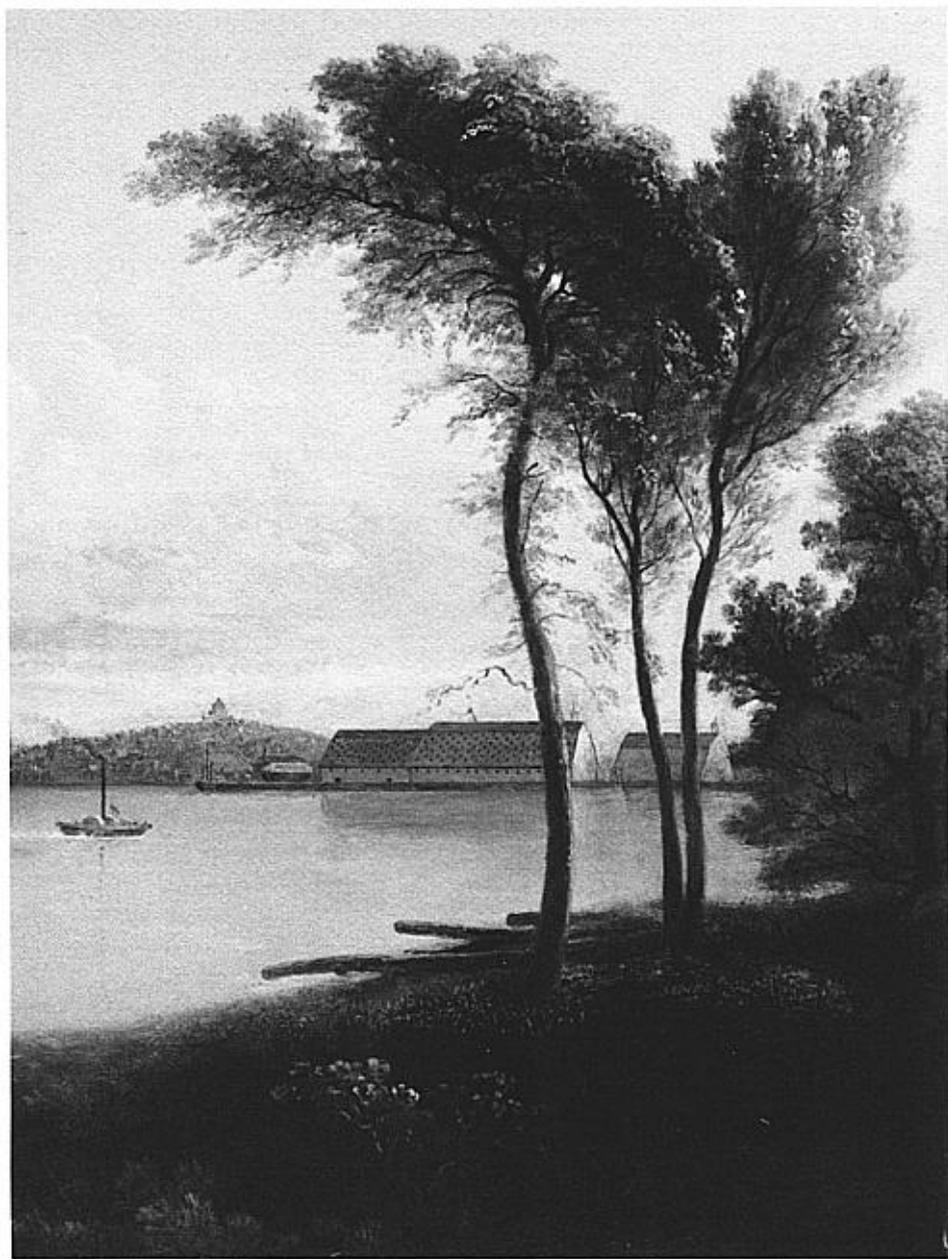
One alternative which Williams suggested, however, was based upon the most intriguing model of all:

By lighting roof of No. 4 we save one entire room which would be worth two thirds as much as any other room in the mill; ... We had thought of lighting it like our wood machine shop agreeable to the plan enclosed and of windows flat on the roof like the roof of Ship House at Charleston [sic].<sup>14</sup>

The final "plan agreed on", to employ flat skylight windows, "like the roof of the Ship House" at the Charlestown Navy Yard (Fig. 10), was a major development



FIG. 9. MACHINE SHOP (1825-30), CROWN AND EAGLE MILLS, N. UX-BRIDGE, MASS. (photo R. M. Vogel)



**FIG. 10. DETAIL OF THOMAS DOUGHTY "BOSTON HARBOR FROM CHELSEA LANDING", SHOWING THE SHIPHUSES AT THE CHARLESTOWN NAVY YARD c.1825. (photo courtesy Childs Gallery)**

in the evolution of American industrial architecture and was so successful that the large mills erected in nearby Newmarket, New Hampshire, immediately adopted the idea. The idea was not copied in Lowell until 1831, by which time it had become a widespread method of lighting factory attics.<sup>15</sup>

When completed, the print works formed the major corner of a quadrangle surrounding an interior mill yard, a practice followed by both English and American companies of the day. Its brick walls, with hammered foundation stone, and granite window lintels facing the street, slate roof, and exterior stair towers facing the inner yard were all elements common to northern New England factories influenced by the mills of Waltham and Lowell. Inside the building, the floors were supported by timbers nearly identical to those employed in the earlier Number 3 Dover Co. factory.

The timber of flooring is 14 by 16 within 8 feet of each other, filled with joist 6 by 5 inches, except the Upper flooring, main timbers some smaller, Joist same size.<sup>16</sup>

Beneath the roof line, the cornice was taken from the drafting boards of one of Boston's leading architects, either directly or by copying the new Quincy Market (1824-26) or recent commercial blocks in the city. Above the cornice, the Charlestown Navy Yard's "Ship House" supplied the idea of a skylighted attic story. In sum, it was a composite building designed by combining contemporary architectural and industrial precedents throughout eastern New England.

Yet, even as the roof enclosed the newly built walls, the huge factory was only partially completed. In order to begin production several subsidiary buildings remained to be constructed; the interior division of space for power transmission

and the location of printing machinery had yet to be defined. The wisdom of experienced practical mechanics who urged that the factory form be determined by the size and shape of the machinery to be installed was apparently ignored; and the corporate managers turned to the task of discovering how other calico manufacturers in New England and Great Britain laid out their factories.

As early as April 1825, when the factory was not yet begun, Williams had authorized their mechanic John Chase to "obtain as much information on the subject of Bleaching & Printing: internal arrangements of the same as you choose"<sup>17</sup> from the Nashua Manufacturing Company's chief mechanic and inventor, Ira Gay, "or anyone else." A similar charge fell to Dover's professional chemist, Dr. Arthur Porter, nearly a year later. Requested to prepare a plan for the company's own operation, he was also asked to "draw the comparison with the Chelmsford [Lowell] works, which please sketch."<sup>18</sup> Two weeks later Williams was sending that "plan of [the] printing establishment at Chelmsford, shewing [sic] the arrangement of vats &c for madder works as handed to me . . ." to Williams Shimmin in Boston with "a plan and estimate by Mr. Davis of expence of building [the] madder house"<sup>19</sup> in the millyard adjoining the printworks.

The limited experience in printing and bleaching shared by all these competing companies led the Dover Company to send Porter to English print works to observe production methods. As Porter was about to sail, Williams wrote, "Please ascertain . . . the manner of constructing the [bleaching] buildings, the right size and form of rooms, how lighted, . . . number and size of the vats, how made and how placed"<sup>20</sup> and numerous other specific details to be observed in England.

By mid-August, Williams was informed by the treasurer, that "Dr. Porter's plans and letters . . . [have] arrived. The Doctor has (in my opinion) shown a vigilance of thought and research in the objects of his Mission highly creditable to himself and promising lasting Advantage to the company."<sup>21</sup> In return, Williams kept in correspondence with Porter, sending him at Christmas "a plan of our new buildings," and noting that "the printery, with its one story appendage for Madder house, makes a fine appearance; is a heavier building than you would have expected, having taken, including single[le]ing and padding Rooms, about one million of Bricks . . ."<sup>22</sup>

Nevertheless, Williams was anxious for Porter's return. As the agent had written David Sears in October, he had been "requested by Doctor Porter to leave the interior arrangements" of the Printery "until he or his man should arrive to superintend the particular location of the Machines and vats." This delayed, in turn, other aspects of construction; "the gearing [for power transmission] cannot be placed unless we decide for ourselves." Perhaps a bit annoyed at being pushed into completing the factory and bringing it into production Williams added, "so much depends upon the return of Dr. Porter with his full and entire plans which may or not be adopted by the directors."<sup>23</sup>

The cost of constructing this complex, labor problems with the English calico printers which Porter had hired for the company, as well as the technological problems of mechanical printing conspired to delay and injure the young company. Not until August 1827, when Porter returned from England, could Williams write the anxious directors in Boston that "No. 4 building [is] now about com-

pleted" and offer his opinion that it would "afford a most valuable semi-annual dividend, even though we should be placed in a lower niche in the Temple of Fame than some of our neighbors."<sup>24</sup>

This veiled allusion to the greater success of companies at Waltham and Lowell was not unfounded. While Williams had overseen the design and construction of New England's largest building combining the manufacture and printing of cotton cloth under a single roof, the expense and difficulties compounded, bringing about his downfall. In 1827 a new charter was granted separating the print works from other operations, as the Cocheco Manufacturing Company, and authorizing a capitalization of one and a half million dollars. Yet by May 1828 company finances were in disarray and Williams was forced to resign. The Dover Company continued to experience financial problems and finally, in late 1829, David Sears, President of the Cocheco Company, purchased the printworks at auction for one dollar more than the debts of the parent company. None of those men who had contributed to the design of the buildings and their interior fitting survived the change in ownership. The recent mechanical engineers or mechanics, Chase and Fiske, the American chemist, Dr. Porter, as well as the agent, John Williams, all lost their positions as the new board of directors sought to replace the technical staff with experienced English workers. As one worker recalled in later years, "I was driven to part with [the company] for the new folks will not have an American on the works."<sup>25</sup> It was, undoubtedly, an ironic comment for a factory the cornerstone of which was inscribed "D.M.C./July 4, 1825."<sup>26</sup>

NOTES

- <sup>1</sup> For an extended discussion of the problems involved in the adoption of mechanical printing at Dover see Caroline Sloat *et al.*, "The Dover Manufacturing Company and the Integration of English and American Calico Printing Techniques, 1825-9", *Winterthur Portfolio* Vol. X (forthcoming).
- <sup>2</sup> *Acts of Incorporation and By-Laws of Dover Manufacturing Company*, June, 21, 1820, (Dover: John Mann, 1828).
- <sup>3</sup> "Inventory of Real Estate," c.1834, Cocheco Manufacturing Company, Baker Library, Harvard Business School.
- <sup>4</sup> *Letterbook*, Dover Manufacturing Company, New Hampshire Historical Society, Vol. I, John Williams to George Bond, July 16, 1825, (hereafter cited only by letter, volume and date).
- <sup>5</sup> Zachariah Allen, *Diary 1821-24*, Zachariah Allen Papers, Rhode Island Historical Society, entry March 20, 1824.
- <sup>6</sup> *Manufacturers and Farmers Journal* (Providence), December 4, 1823. In America besides Taunton and Dover, the Hudson Calico Printing Company, Stockport, New York, was built between 1826-30 as a quadrangle with its buildings ranging from one to four stories and secondary buildings within the square. George S. White, *Memoir of Samuel Slater, the Father of American Manufactures; connected with the history of the rise and progress of the cotton manufacture in England and America* (Philadelphia: 46 Carpenter Street, 1836), p. 402.
- <sup>7</sup> Matthew Bridge to William Shimmin, Vol. I, letter 68, June 29, 1825; John Williams to William Shimmin, Vol. I, letter 79, July 1825; John Williams to William Shimmin, Vol. I, letter 87, August 17, 1825; John Williams to William Shimmin, Vol. I, letter 88, August 20, 1825; John Williams to William Shimmin, Vol. I, letter 91, August 24, 1825; John Williams to William Shimmin, Vol. I, letter 95, August 31, 1825; John Williams to William Kent, Vol. I, September 19, 1825; John Williams to Professor Samuel D. Neumann, Vol. I, October 1, 1825; John Williams to Samuel Torrey, Vol. I, No. 108, October 1, 1825.
- <sup>8</sup> John Williams to William Shimmin, Vol. I, letter 131, November 23, 1825.
- <sup>9</sup> John Williams to William Shimmin, Vol. I, letter 99, September 7, 1825.
- <sup>10</sup> Matthew Bridge to William Shimmin, Vol. I, letter 30, April 9, 1825.
- <sup>11</sup> John Williams to William Shimmin, Vol. I, letter 42, May 5, 1825.
- <sup>12</sup> John Williams to William Shimmin, Vol. I, letter 136, December 2, 1825.
- <sup>13</sup> John Williams to William Shimmin, Vol. I, letter 144, December, 1825.
- <sup>14</sup> John Williams to William Shimmin, Vol. I, letter 139, December 7, 1825.
- <sup>15</sup> [John Williams] Annual Report to the Directors, Vol. I, January 21, 1826.
- <sup>16</sup> John Williams to William Shimmin, Vol. I, Feb. 12, 1825. Surviving portions of the print-works interior frame conform closely to this description of the earlier factory.
- <sup>17</sup> John Williams to John Chase, Vol. I, April 18, 1825.
- <sup>18</sup> John Williams to Arthur Porter, Vol. II, March 9, 1826.
- <sup>19</sup> John Williams to William Shimmin, Vol. II, letter 17, March 22, 1826.
- <sup>20</sup> John Williams to Arthur Porter, Vol. II, April 10, 1826.
- <sup>21</sup> John Williams to William Shimmin, Vol. II, letter 77, Aug. 19, 1826.
- <sup>22</sup> John Williams to Arthur Porter, Vol. II, December 22, 1826.
- <sup>23</sup> John Williams to David Sears, Vol. II, Oct. 21, 1826.
- <sup>24</sup> [John Williams], Report to William Shimmin, Vol. III, Aug. 24, 1827.
- <sup>25</sup> Samuel Dunster, letter of June 28, 1880, Historical Memoranda, III, number 394. Public Library, Dover, New Hampshire.
- <sup>26</sup> The cornerstones of each of the early Dover factories have been preserved by being incorporated into the factory wall along Washington Street, Dover, N. H.