

YANKEE ENTERPRISE! THE HOUGHTONS OF MASSACHUSETTS & THE RISE AND FALL OF 'CORNING INCORPORATED,' 1851-1871

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ABSTRACT

Corning Incorporated's early history testifies to the difficulty of shifting from the commercial world of small proprietors to that of corporate manufacturers. The glorified and exceptional experiences of the Vanderbilts, Carnegies, and Rockefellers too often obscure the common and contributory efforts of small business owners like Corning's Amory Houghton. Through the example of remarkable, yet less influential entrepreneurs, one can often better appreciate the underside of the country's dynamic business history—the challenge of cash flow management, the threat of labor opposition, the complexity of new manufacturing technologies, the possibility of accidental disasters, and the rise of distant competition.

One night in 1851, two gentlemen, one an immigrant glassblower from England, the other a local entrepreneur, patronized a tavern in Cambridge, Massachusetts. The pair became engrossed in conversation regarding a new commercial venture. The “bluff” Englishman, Mason W. Teasdale, wanted his pub companion, the successful merchant Amory Houghton, to invest in his fledgling glass factory. Gaffer Teasdale and his partner, Norman S. Cate, had purchased a small Cambridge glass works two years earlier. Depleted of cash, the glassmakers were attempting to raise vital working capital by incorporating their operation. Probably influenced by the visible success of the New England Glass Company—one of the region's largest and most lucrative enterprises—Houghton agreed to join the Teasdale-Cate corporation as a minority stockholder. From that day forward, Amory and his descendants assumed a definite interest in the manufacture and development of glassware, one that eventually led to the organization and triumph of the renowned Corning Incorporated.¹

Corning Inc. is one of the United States' longest surviving companies. In 2001 the firm celebrated its 150th anniversary. Once the largest manufacturer of light bulbs and glass kitchenware, Corning today is the world's leading producer of optical fiber. For more than a century, the company has enjoyed remarkable growth in sales and profits and, with its 40,000-plus employees, has expanded around the globe. The firm's market capitalization peaked in August 2000 near \$100 billion. But despite its long and illustrious history, relatively little is known about Corning's inauspicious origins, which can be traced back to the Jacksonian period.²

Historians (Blackford and Kerr, 1994) have identified three key stages in the early development of American business system, which provide a crucial context for under-

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standing Corning's fateful beginnings. In the first stage, before the American Revolution, general merchants and planters dominated the business scene acting as "all purpose firms" with investments in an array of activities from production to shipping to retailing. The second stage, spanning approximately seven decades to 1850, featured a rapid increase in commercial opportunities that stimulated the proliferation of small, specialized businesses, including sawmills, flour mills, cotton factors, and iron dealers. The third stage of business development, ending in 1920, witnessed the evolution of an increasingly competitive dual system that featured the steady rise and eventual dominance of capital-intensive "big businesses" such as railroads and steel mills. This article, which reconstructs the origins and development of Corning Incorporated through 1871, illustrates the immense difficulties faced by entrepreneurs who, while successful in the second stage of the American business system, were unable to replicate that success as leaders of larger and more complex enterprises in the third phase.³

Corning Incorporated's early formation revolved around one central character, founder Amory Houghton. Houghton proved a pioneer of American capitalism in the nineteenth century. Tracing his forty-year career, from 1828 to 1871, not only reveals Corning's origins, but it also reflects upon key aspects of America's transformation amid the Industrial Revolution. Through his experiences one senses the rapid development of the nation's towns, cities, and suburbs, and the commercial opportunities and threats inherent in an industrializing economy. Above all, his story testifies to the dire challenges encountered by entrepreneurs who attempted to graduate from operating small proprietorships to large manufacturing concerns.

Amory Houghton and the Origins of a Family Glass Company, 1813-1854

The ownership and managerial history of Corning Incorporated and its many fore-runners is a history dominated by the Houghton family. Amory Houghton made his first direct investment in the glass industry in 1851. After 1868 when he established a new glass factory in Corning, New York, a member of his family served as president, chief executive officer, or chairman through 1996. About the family patriarch, his great-grandson wrote, he "was an entrepreneur" who "made and lost many fortunes."⁴

The United States has been described as a nation of immigrants, and the saga of the Houghton family in America begins with the Puritan migration. The first Houghtons are said to have arrived in the New World in 1635 aboard the vessel *Abigail*. Little more than a decade later, the families of Ralph and John Houghton and a few other daring souls journeyed inland to the picturesque valley of Lancaster, Massachusetts. Situated on the western frontier, these pioneers endured "unparalleled toils and danger" including intermittent conflicts with local native tribes. Their settlement later achieved lasting fame after one resident published a harrowing account of her Indian captivity brought on by "the massacre of 1675." Despite the many hardships of frontier life, the Houghton clan persevered. Over succeeding generations they proved not only able farmers but also dedicated community leaders serving as town clerks, church deacons, surveyors, soldiers, and representatives to the general court.⁵

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Two hundred years after “the Great Migration,” John’s descendant Rufas Houghton and his wife Abigail struggled to eke out a living on their inherited homestead in Bolton, Massachusetts (sections of old Lancaster had been subdivided and renamed). The Houghtons, like most American farmers, were inclined to large families, and during the War of 1812, Abigail gave birth to Amory, her tenth of thirteen children. With four elder brothers, Amory’s prospects for a substantive inheritance must have always appeared dim. At the age of twelve, the adventurous youth took leave from the family fields to attend school in Lancaster proper, where he earned tuition and board by performing routine chores. The strict regimen of academics, however, proved too constraining for a country boy of boundless physical energy. After only a year’s study, he returned home to Bolton. His stay was brief. Determined to escape the drudgery of farm life, young Amory found himself easily lured to the bustling village of Cambridge, some thirty miles east.⁶

Cambridge sat on the west bank of the Charles River. Though home to Harvard College since the early colonial period, the town and surrounding area developed as a farming community. Aided by the construction of several bridges after the Revolutionary War, the regional economy evolved from subsistence to commercial agriculture with village farmers supplying food staples to Boston, then the nation’s third largest city. Wagons and carts filled with meat, eggs, potatoes, and dairy produce found their way to the thriving port city. By the 1820s, Cambridge, like many small New England townships, began shifting from the agricultural and livestock trades to light industry. The outgrowth of factories, shops, taverns, and smithies created a prolonged construction boom. Carpenters seemed always in high demand.⁷

Young Houghton moved to Cambridge in 1828 to take a joiner’s apprenticeship, a fortunate occurrence. Under the guidance of a master craftsman, he demonstrated skill and adeptness for woodwork. Within a few years, he began planning for his own shop. In 1833, he arranged a several hundred dollar loan and bought out the last year and a half of his apprentice contract. At the age of twenty, he became the proprietor of a carpentry and contractor business. Often working late into the night by lantern, Amory garnered a valuable reputation as one of Cambridge’s most energetic and reliable tradesmen. He conducted considerable business and soon retired his outstanding debts. Only seven years after his arrival in the riverside community, he had accumulated a net worth of \$3,000, a tidy sum for the day.⁸

A single business decision in 1836 proved indicative of the Houghton family’s future business philosophy. Rather than spend or bank his profits, Amory invested his holdings in a new but related enterprise. Drawing on his contacts within the community, he began a wholesale supply concern dedicated largely to the building trades. The new firm, A. Houghton & Co., dealt in timber, coal, bark, lime, and cement from a rented wharf in East Cambridge. Unburdened by debt and capitalized with ample personal funds, both of Houghton’s companies survived the banking crisis of 1837 and the economic downturn that swept over most of the country. Through the success of his building and mercantile businesses, Amory had established himself as one of Cambridge’s most wealthy citizens.⁹

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The recession of the late 1830s proved only a temporary shock to the nation's economic progress during the Jacksonian period. Spurred by the development of turnpikes, canals, and railroads, the era's "mobility revolution," as one historian describes it, reflected the massive scale of America's early industrial achievements and accelerated its urban development. The construction of new transportation networks had profound effects on regional and local economies. In fringe towns like Cambridge and adjacent Somerville, large farms routinely gave way to manufacturing and processing plants and eventually to residential neighborhoods inhabited by city commuters. By mid-century, Cambridge boosters could boast not only of a significant glass industry but also of factories producing soaps, cordage, candles, barrels, brushes, and bricks. Incorporated in 1848, the city's population had nearly tripled to 14,000 since the time of the Bolton boy's arrival two decades earlier.¹⁰

The enterprising Houghton capitalized on the business opportunities presented by Cambridge's economic transformation. His desire to invest more directly into the community's expanding industrial base led to his meeting with the English glassblower Teasdale. They agreed on the immense commercial potential of glass manufactures, a belief substantiated by enormous factory expansion of the New England Glass Company. On October 9, 1851, the Teasdale-Cate glass operation (until then known as Cate & Phillips), which produced a variety of flint (lead) glassware from lamps to flasks, was incorporated as the Bay State Glass Company. The mercantile firm A. Houghton and Co. owned two shares of company stock, valued at \$1,000. The investment, while sizable for the times, represented less than four percent of the firm's total capital position. Nevertheless, Amory and two other minority shareholders were elected as board directors. Houghton quickly became enamored with the manufacture of glass.¹¹

Although Americans had been making glass since the establishment of the Jamestown colony, few operations demonstrated any longevity until the nineteenth century. International trade disputes and America's second war with Great Britain led to trade protection for many fledgling industries such as glass manufacturing. As a result of high tariffs and strong population growth, the seventeen years following 1820 was an expansive and transitional period for the American glass trade. The manufacture of windows and bottles dominated industry output, although tableware was becoming increasingly important. According to census data, there were thirty-three glass houses in operation in 1820, and an estimated sixty-four new factories were built by 1837, including the famed Boston and Sandwich Glass Company, the Phoenix Glass Works, and the Brooklyn Flint Glass Works. A majority of the plants struggled financially, suffering from the rapid increase in domestic competition and from the fits and starts of the business cycle. More than a dozen glassmakers, for example, including several of the newer factories such as Cambridge's New England Crown Glass Company collapsed under the depression of the late 1830s.¹²

But the history of the American glass industry and the Houghton family's involvement in it, is a study of resiliency. Between the U.S.-Mexican War and the Civil War, the nation built more than fifty new glasshouses. In Massachusetts, this included start-up

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concerns such as the Boston Flint Glass Works, the Boston Silver Glass Company, and the Houghton-subsidized Bay State Glass Company. The latter's tableware, medical and chemical wares, and lamps and lanterns appear to have met with immediate success. To better manage its extensive sales growth, Bay State increased its capital position twofold within twenty-four months of incorporation. Houghton became completely infatuated with the new venture and began selling off his other business interests to increase his stake. This he did five times over.¹³

Yet Amory remained a minority shareholder without controlling interest. Already an accomplished and wealthy entrepreneur, he grew increasingly restless, wanting to run his own large manufacturing operation. As a youth, he had bolted from his apprenticeship in the joiner's trade to make his own mark in the construction industry. In January 1854, at the age of forty-one, he liquidated his holdings in Bay State Glass and started his own factory in neighboring Somerville, Massachusetts. Like Cambridge, the Somerville community had toiled in the shadow of the Boston metropolis. But with sweeping improvements in transportation, particularly the arrival of the Boston & Lowell and Fitchburg railroads, the town established its own identity by attracting industry and a bevy of "well-heeled" Bostonian commuters. By the time Houghton purchased his property there, Somerville already possessed a reputable group of manufacturers of bricks, paints, pumps, and tinware. The most impressive factory was the recently constructed American Brass Tube Works.¹⁴

Much of Houghton's experience through 1851 was indicative of the second stage of the American business system, which witnessed the widespread increase of small, specialized companies and the decline of "all purpose" firms operated by general merchants and planters. In the seven decades after the War of Independence, population growth and revolutions in transportation, communications, agriculture, and industry all contributed to explosive economic expansion across the United States. This created momentous opportunities for daring, white male entrepreneurs like Amory Houghton. Certain personality and behavioral traits such as aggressiveness, self-discipline, strong will, dependability, and a dedicated work ethic often contributed to entrepreneurial success. Also important were shrewd business strategies such as minimizing debts, reinvesting profits, and diversifying products and services. In Houghton's case, these traits and practices helped his business operations survive the broad economic downturn stemming from the panic of 1837. His decision to become a minority stockholder in the Bay State Glass Company not only reflected his ongoing attempt to seize market opportunities, but also represented the classic business alliance between cash-flush merchants and skilled artisans (Porter and Livesay, 1971).

Houghton's decision three years later to completely abandon his small contracting and wholesale supply companies in favor of constructing a big glass factory was a more radical maneuver. The skills and strategies that had led to successful small business management in the 1830s and 1840s were not necessarily adequate to lead a large, complex, industrial enterprise in the 1850s and 1860s.

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The Union Glass Company, 1854-1864

When Houghton organized his new company, the conflict over slavery was dividing America. He decided to name his enterprise the Union Glass Company. The firm, like so many American ventures and all future Houghton endeavors, was a family affair. Amory delegated many daily administrative responsibilities and the presidency to his younger brother Francis, a minor stockholder who years earlier had been brought into his brother's wharf business. Their older brothers Moses and Barnard also joined the staff, as would Amory's sons, Amory Jr. and Charles Francis. Amory Sr. assumed the title of treasurer and his hefty \$40,000 investment, representing two-thirds of the firm's capital base, guaranteed him controlling interest.¹⁵

The Somerville plant's design, construction, and size were fairly typical of new glass houses built in the antebellum period, and flint (lead) glass works like Houghton's were, by then, becoming nearly as prominent as window and bottle factories, which had previously dominated the U.S. industry. With several buildings for mixing, melting, blowing, grinding, and storage, the plant adjoined a wide street with immediate access to rail transportation. The factory employed two nine-pot furnaces, whose parallel chimneys reached more than a hundred feet skyward. Each clay pot, or crucible, was capable of holding over three thousand pounds of molten glass. The crown furnaces were fired directly by coal fuel and took a natural air draft from below. Manufacturing a broad array of flint glass products such as lamps, lamp trimmings, bottles, windows, lenses, tableware, the Union Glass Company employed 100 men and acted primarily as a wholesaler competing directly against many northeastern firms, including Cambridge's New England Glass Company and Bay State Glass.¹⁶

Unlike the spectacular success that Houghton enjoyed in the carpentry and supply trades, his twenty-year association with the glass business brought only qualified successes and frequent setbacks. Internal and external factors such as poor cash flow, fire hazards, and depressed market conditions continuously plagued operations. The Somerville plant opened in 1855 and generated impressive first year sales of \$120,000. But gauging from the few surviving financial records, the firm struggled immediately. As is common with even the most successful start-up ventures, Union Glass seems to have suffered from insufficient cash flow. This forced Amory to loan the outfit some \$32,000. When this infusion failed to "stop the bleeding," he and brother Francis began selling shares of the company to outside investors. As early as 1856, Amory had been reduced to a minority stockholder in his own enterprise. Although sales records have not survived, circumstances deteriorated even further. On the night of June 5, the plant's "large building" caught fire and brought forth several volunteer fire companies from nearby towns. The fire hazards associated with batch glass manufacturing would haunt the Houghton family for years to come. In 1857 and 1858, the glass works suffered severely amid a nationwide financial crisis. With the economic recession came price competition, and average-sized firms like Union Glass were pressed to compete with behemoths like the New England Glass Company whose workforce, annual output, and capitalization were four

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to five times larger. But Amory remained determined to make the Somerville glass company succeed. Probably drawing on the balance of his personal holdings, he took advantage of New England's depressed economic conditions and reacquired a majority interest in the glass works and injected sorely needed cash. A summary balance sheet dated February 21, 1859 indicates that the firm's capital position had increased forty percent to \$100,000 and that Amory owned all but six percent of the outstanding stock. The only minority shareholders were now family members, including Francis who remained the firm's president. Unfortunately, the massive restructuring failed to halt the company's slide into insolvency. In 1860, on two separate occasions, local fire crews were called out to the "Houghton Glass Works." Amory reorganized yet again. Hoping to expand sales in the New York City area, he arranged for Union Glass to lease a five-story warehouse in lower Manhattan¹⁷.

Business conditions in the late 1850s were harsh, and the glass industry suffered generally. Despite the construction of many new glass factories (like Union Glass) earlier in the decade, census data reports that there were actually six fewer companies operating in 1860 (a total of 88) compared to 1850. Demand for the nation's manufactures were finally stimulated in 1861 by the outbreak of the Civil War, and the conflict had very positive effects on the depressed glass trade. Before long, requisitions for bottles, lamps, lantern globes, and chemical and medical ware lifted sales and profits at many firms, including Union Glass. Moreover, in a strategic move that would later be emulated and greatly perfected by his namesake Amory Jr. (who joined the firm in 1857 as a "chemist") and by his eldest grandson Alanson Bigelow (born in 1863), Houghton sought to differentiate some of Union Glass's products. He aimed to improve quality and to develop specialty goods. The latter led to the art of silvering glass, one of the firm's most lucrative lines that included lamp reflectors, gazing globes, and curtain and door knobs. The scarcity of corporate records for the war period prohibits any comprehensive analysis of the firm's changing managerial and capital structure. However, Amory devoted increasing attention to the New York market, and by the time Grant laid siege to Lee's troops in Virginia, he was making plans to sell off his Somerville company. Francis was soon replaced as president and three new investors joined the firm. By August 1864, the Houghton family had sold its entire interest in Union Glass and opened negotiations to buy one of New York's most reputable, if financially troubled, glass factories, the Brooklyn Flint Glass Works.¹⁸

The Brooklyn Glass Companies, 1864-1868

There were striking parallels between Brooklyn's mid-nineteenth century social and economic development and that of the Cambridge and Somerville communities most familiar to the Houghtons. Evolving in the shadow of booming metropolises, these coastal communities had experienced rapid growth and increasing industrialization. Their populations included large proportions of Irish-Catholic immigrants and wealthy Protestant commuters. The primary differences between the fringe economies surrounding Boston

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and those of New York City were related to scale. By the time of the Civil War, Brooklyn's headcount approached 300,000, ranking as America's third largest city. Moreover, its Long Island waterfront had attained international importance as a center for commodity trading, specializing in the transshipment of western grains. Brooklyn also developed a diverse array of multimillion-dollar industries, which featured the emergence of large corporations engaged in sugar refining, shipbuilding, brewing, baking, printing, and distilling. Although local glass manufacturing and other fields such as oil refining were in comparatively early stages of scale development, the conical chimneys of the Brooklyn Flint Glass Works towered alongside the city's marquee factories: American Steel Company, Bushwick Chemical Works, New York Agricultural Works, Havemeyer and Elder Company, Peter Cooper's Glue Factory, and Liebmann's Brewery.¹⁹

Long Island's glass works like much of the national industry had taken form during the construction boom of the Jacksonian period. The manufacture of window panes, bottles, and flasks continued to dominate the field's gross output, but some firms began specializing in fine table and lighting wares, an increasingly important segment of the American market. During the Civil War, more than a half-dozen glass factories were operating in Brooklyn including the long established Isabella Glass Works, Williamsburgh Flint Glass Works, and the Dorflinger Glass Works. The Brooklyn Flint Glass Works had preceded all of these operations by at least two decades. The company produced a diverse mix of flint ware including plain, press, cut, and colored glasses. A primary factor in the firm's longevity had been its reputation for extraordinary quality. The company received its first of many industry prizes in 1823 at the Franklin Institute's Third Exhibition. Several decades and dozens of awards later, the Brooklyn works won multiple medals for its displays at the inaugural Crystal Palace Exhibition in London. In the early 1860s, the company manufactured lenses, lamps, lanterns, chandeliers, paperweights, and transportation signal ware.²⁰

The Brooklyn Flint Glass Works appeared an ideal acquisition for the Houghton family. They too were experienced flint ware manufacturers who had labored to make diverse product lines. In addition, the Brooklyn company's reputation for superior quality fell into accord with Amory's recent flirtation with higher standards. He purchased the plant on October 6, 1864 for \$60,000 cash and an agreement to assume a \$58,000 mortgage. The next month, he moved his family to Brooklyn and organized the new Brooklyn Flint Glass Company of Long Island with himself as president. Unfortunately, little is known of the firm's financial operations. According to a 1864 report by R.G. Dun's credit agency, Houghton's wealthy brother-in-law, Josiah Oakes, had vouched for his "honesty and straightforwardness" in commercial transactions. Incorporation documents dated 1865 list the company's capital position at \$100,000. Regardless, one can be certain that all did not go as planned. Within two years, Amory had sold the company for \$50,000 and leased-out the plant works.²¹

At the same time the Brooklyn Flint Glass Company was sold, the Houghton family helped to organize another concern on Long Island. It too came to an unpredictable end. The first meeting of the Brooklyn Flint Glass *Works* was held on March 10, 1866. Al-

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though somewhat unclear, it seems that Amory Sr. played more of an ancillary role in this latest enterprise. Its majority stockholders were his brother-in-law Josiah Oakes, with fifty-four percent interest, and Amory Jr. with twenty percent. Amory Sr. and each of the other four minority stockholders held roughly five percent of the outstanding stock. The shareholders appointed "A. Houghton" (presumably Amory Jr.) chairman and president with Henry P. Sinclair (also a brother-in-law of Josiah Oakes) as secretary. This marked the beginning of the Sinclair's thirty-six year relationship with various Houghton family enterprises. Oakes and Amory Jr. successfully negotiated the purchase of an existing Brooklyn "Glass House property" owned by one "Mr. Marrett," who also operated several precision glass cutting shops in Boston and New York City. In addition, they acquired the Manhattan warehouse previously occupied by the Union Glass Company.²²

The winter of 1866/67 brought progressive developments for the city of Brooklyn but delivered more challenges for the Houghtons. The urban government had finally decided that gaslights should illuminate the city streets "every night," and more important, the state legislature granted a corporate charter and \$5,000,000 to begin development of the Brooklyn Bridge. Progress at the Houghtons' new glass venture, however, proved halting. The firm struggled almost immediately and relied upon the financial resources of Amory Sr. and his wife Sophronia. An analyst at Dun's credit agency reported the firm laden with debt and "in a bad way." Complete disaster struck when the company's main factory building became engulfed in flames. Brooklyn's inadequate volunteer fire companies battled the blaze throughout the night. Upon surveying the damage the next morning, the plant's owners decided it "not expedient" to rebuild. The company's largest creditor, Sophronia Houghton, assumed legal responsibility for the property, debts, and all salvageable assets.²³

In the summer of 1867, after the devastating fire, the Houghtons incorporated yet another Brooklyn Flint Glass Works. With Amory Jr. as president, the new firm purchased the surviving assets of its predecessor in hopes of once again establishing a going concern. They built a new and enlarged factory to manufacture diverse lines of flint ware. But both distant and immediate factors plagued the new works. The transportation and communication revolutions of the nineteenth century, so crucial to America's business development, not only created new internal markets for manufacturers but also encouraged national competition, which intensified after 1850. Sales and cost competition significantly hindered the success of the Brooklyn plant. Well established and new large-scale glass factories in West Virginia, Missouri, and especially western Pennsylvania enjoyed significant cost advantages over their competitors on the Atlantic seaboard. Fuel and production supplies were simply cheaper and more plentiful in the West. Moreover, living expenses and wage pressures in the interior were often substantially less for factory employees.²⁴

In addition to facing eastern and western competitors and "persistent creditors," the Houghtons also felt threatened by New York's rising labor movement. Compared to other artisan groups in America, glass blowers earned comparatively high wages as their

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numbers always seemed in short supply. This led to worker organization. One Brooklyn glass blowers union, headed by James Smith, even began operating its own plant, “producing blanks for cutting, chemical wares, shades, and iron mould goods.” By the time the Houghtons had moved to New York, the labor situation was especially acute on Long Island given a proliferation of new glass works and Smith’s efforts to enlarge his union of flint glass workers. Such circumstances placed glass blowers in strong bargaining positions regarding wages and shop operations and encouraged them to be among America’s “pioneers in the use of the strike.” The owners of the Brooklyn Flint Glass Works bristled at the possibility of unions influencing production or payroll, and they adamantly opposed all “outside interference” in the management of their factory. The full extent of their labor problems remains somewhat clouded, but the firm was operating in the red, leading an analyst at Dun’s to remark in March 1868 that the company “is not looked upon as desirable and caution is necessary in dealing with [it].” By May the owners of the glass works had completely lost faith in Brooklyn’s potential as a center for operations, stating, “it has been deemed expedient for some time past to remove [our] manufacture of glass from this city...”²⁵

After a daunting four-year run in the Brooklyn glass industry, the Houghtons’ fortunes turned on a chance encounter with Elias B. Hungerford of Corning, New York, which was located some 300 miles west (just north of western Pennsylvania). A businessman and inventor, Hungerford had recently patented an interior window shutter with colored glass slats. He had been traveling the northeast to contract a manufacturer for his design. In the process, he developed a basic understanding of the glass business and became increasingly convinced that the small town of Corning, with its excellent rail and water transportation and proximity to abundant raw materials, offered real promise as a glass plant site. His representations of Corning, more than those of his glass shutters, captured the attention of officials at the Brooklyn Flint Glass Works. The core of the American glass industry was moving west, and the Houghtons would chose to move with it.²⁶

The Corning Flint Glass Company, 1868-1871

Farmers had settled the Corning area after the War for Independence and it existed in a “primeval state” until the rise of the transportation revolution in the 1830s. The construction of the Chemung Canal (with its ultimate link to the Erie Canal) and the north-south running Blossburg (Pennsylvania) Railroad allowed development outfits such as the Corning Company of Albany to exploit the region’s rich natural resources. The completion of the Erie Railroad in 1851, with a terminal in Corning, only strengthened the town’s position as a commercial transport hub. It distributed primarily locally harvested timber and grains and northern Pennsylvania coal. The local economy expanded rapidly during the Civil War with mill production and commodity trading leading the way. Small factories also began to appear including machine shops producing drills and portable engines. In the 1860s, Corning, like so many American towns, was in the midst

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of transforming itself from a rural outpost to a small manufacturing center. The local paper reveled in the town's business prospects: "there is a general feeling of confidence in regard to the future."²⁷

Upon further investigation, the Houghtons and other company stockholders concluded that the Corning "proposition looks favorable" as it offered the potential to reduce operating expenses. Ample fuel supplies were situated just forty miles south of town in the vast coal fields of northwestern Pennsylvania. The Erie and Blossburg Railroads and the Chemung Canal running through city center provided for the convenient and inexpensive transport of fuel, supplies, and finished goods. Moreover, the firm might free itself from the hazards associated with Brooklyn's highly competitive labor pool.²⁸

With such good prospects, the factory owners began formal negotiations with city boosters to move the glass operations to Corning. The company's requirements were considerable. In addition to a superb plant site close to town with direct rail and water access, the manufacturers demanded that local investors purchase at least \$50,000 of company stock. For its part, the glass works promised to put more than one hundred workers on payroll and contribute an additional \$75,000 in investment capital. Hungerford worked tirelessly with the support of local leaders to raise the necessary funds in Corning. The stockholders of Brooklyn Flint Glass Works proceeded to dissolve their Long Island firm and organized a new corporation. The fifty-six year old Amory Sr., seeking perhaps his final chance at lasting success in the glass industry, contributed a large portion of the new company's capital and was elected president.²⁹

On May 30, 1868, Hungerford presented Houghton with a \$50,000 certified check. The funds had come largely from three individuals, Joseph Fellows, Erastus Corning, and Theodore Olcott; each had invested \$10,000. The Corning Flint Glass Works was born. The Brooklyn factory was quickly vacated and its property assigned to the new enterprise. Ovens, pots, molds, and other equipment were loaded onto flatboats bound for western New York. Utilizing the nation's mature canal network, the fixtures were transported more than three hundred miles, first navigated up the Hudson River to Albany, through the Erie and Seneca canals to Geneva, across Seneca Lake to Watkins, and via the Chemung Canal to Horseheads and then to their final destination.³⁰

Plant construction for the new Corning glass works began in June. The company had negotiated a two-acre site situated just north of the downtown streets. The parcel was bounded by the Chemung River to the north and by the Erie Railroad to the south. Drawing on their experiences in Somerville and Brooklyn, the Houghtons designed carefully the layout of the new plant to maximize production efficiency. The main blowing room, later known as "A Factory," faced the river. It housed two handfired coal furnaces, one eight pot and the other a ten pot. Each was attached to a large cone-shaped chimney measuring 30 feet at the base and towering 100 feet upward. On the blowing room floor rested an elongated oven for annealing, positioned to move goods southward near an adjoining three story brick building. The ground floor of the latter building provided space for product finishing, inspecting, packing, and shipping. Its second story included offices for the company and for a paying tenant, Hoare & Daily Company, an enthusias-

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tic Brooklyn customer that occupied the building's entire third floor for fine glass "cutting" operations. The second floor was connected on the west side by a covered wooden bridge that led directly into the Machine Shop responsible for the wooden and iron molds used in the manufacturing process. Below the machine works stood the Power House wherein steam engines provided the energy needed by the glass works to grind clay melting pots and by Hoare & Daily to cut glass blanks. In addition, the two main buildings were surrounded by a half dozen barns and sheds used for the storage of raw materials and supplies. The *Corning Journal* reported that the facility had "been erected with due regard to convenience.... It is said that no Flint Glass Co. in the United States has buildings so well arranged and adapted for work."³¹

The relocation of the Brooklyn glass works provided a "miraculous" boost to western New York's "southern tier" economy surrounding Corning. Construction crews at the plant drew heavily from local businesses, particularly timber mills and quarries. More than a half million clay bricks were specially manufactured for the factory. New hotels and shops were built, while established ones were refurbished. One local resident noted, "Corning seems to be growing fast this year. There have been six stores built since Spring and there are four more now building. This is a very busy world." The influx of nearly one hundred glassworkers and their families, all who had chosen to abandon Brooklyn life, stimulated a frantic housing boom. The Long Island workers had been promised dependable wages and improved living conditions. And, according to a local historian, the voluntary westward migration of so many people also stood as "testimony" to the Houghtons' fair treatment of labor despite their vigorous opposition to union organization.³²

Employing roughly 120 men, the Corning Flint Glass Works celebrated its grand opening on October 22, 1868. Amory Houghton Jr., who, a newspaper proclaimed, had "no superior in preparing the 'metal,'" mixed the first five barrels of ingredients dumped into the hot crucible. Townspeople stood in awe as the inaugural batch of glass began to melt. Journalists reported the towering plant "a great curiosity" that "must be seen to be appreciated." Many folks ventured inside the factory. They witnessed highly skilled craftsmen shape the molten liquid into familiar products of tableware and lampshades. The items were then placed in a large annealing oven to bake. On the next day, the people could return to see the finished pieces ready for packing and shipping. In addition to the common household items produced at the plant were specialty lines of tubing for thermometers and barometers, and various "druggist" and railroad ware. The works' primary product, however, became the manufacture of "best glass blanks," high quality glass blocks that were later worked into finer ware by "cutting firms" such as Hoare & Daily. Over the next three decades, a proliferation of cutting companies in Corning would give rise to the city's lasting moniker as "the Crystal City."³³

Despite the fanfare and praise lavished on the Houghtons, the Corning Flint Glass Works, like its Brooklyn predecessors, struggled to turn a profit. The firm encountered production problems from the outset. The firm's new fuel supply, the bituminous coal mined in nearby Blossburg, proved ill-suited for the specially designed furnaces. The substandard soft coal burned too unevenly for the consistent manufacture of quality flint

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glass. The news got worse. Several chimney arches gave way due to faulty construction and destroyed the expensive melting pots positioned underneath. The arches were repaired and new crucibles crafted. But because the new pots were never “properly seasoned” they cracked, causing further delay and expense. The company also suffered from fierce national competition. After the Civil War, many small and mid-sized manufacturers throughout the country were threatened by the largest, best equipped factories. More established glass operators, especially those in the Pittsburgh area, benefited from superior quality coal and sand, and from long established trade relations with regional customers and in the expanding western markets.³⁴

Corning Flint Glass reported large operating losses. In May 1869, the firm was forced to issue mortgage bonds to extinguish mounting short term debts and cover operating expenses. The firm’s inability to sell its old Brooklyn facility placed further constraints on its rapidly dwindling capital. By 1870, the company found itself in dire financial straits, unable to meet its obligations. In September, the district court in Rochester appointed a bankruptcy receiver to oversee Corning’s operations. One of the firm’s final batches of “best metal blanks” was memorable. The Houghtons assisted Hoare & Daily with a \$1,000 custom order to manufacture Executive Mansion stemware for President Ulysses S. Grant. Nevertheless, just before Christmas, Amory Jr. soberly informed his father of the bleak situation, “Our bank a/c [account] is about \$25. We owe Freight \$700—and some bills which should be paid. We are all out of orders. Payroll next Saturday.” The Corning operation had been a complete financial disaster. In late 1871, financier Nathan P. Cushing of Boston, one of the firm’s longtime creditors, assumed control of the company.³⁵

More than forty years after moving to Cambridge to become a carpenter’s apprentice and after twenty turbulent years in the glass industry, Amory Sr. abandoned Corning and glass for a farm in Westchester County, New York. It would be Amory Jr. who would eventually reacquire the firm on credit, and with the help of his brother Charles and sons, Alanson and Arthur, position it to be the going concern that survives today as Corning Incorporated. Unlike Amory Sr., they were all children of the modern, third phase of the American business system, and furthermore, they all benefited from privileged upbringings, including above-average schooling, and significant work experience in large industrial enterprises.³⁶

Conclusion

Amory Houghton’s achievements and failures reflect upon key aspects of America’s economic transformation in the mid-nineteenth century. Above all perhaps, Corning Inc.’s origins and early development demonstrate that prosperous small business entrepreneurship during the “second stage” of the American business system (1781-1850) did not necessarily equate to success in leading larger industrial enterprises during the third phase of the nation’s business evolution. Houghton’s rewarding ventures as a carpenter, contractor, and wharf merchant in Cambridge (1828-1850) are symbolic of the wide-

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spread business opportunities presented by America's explosive growth in the early nineteenth century, which witnessed the proliferation of small, specialized firms. Moreover, he possessed requisite personality and behavioral traits, such as aggressiveness and dependability, that enhanced the chances for commercial profitability, and he adopted judicious business strategies like debt minimization and earnings reinvestment that bolstered his business operations.

Houghton's 1851 investment in the Bay State Glass Company represented the long-lived and vital collaboration of wealthy merchants on the one hand, and cash-poor artisans-mechanics on the other, each attempting to prosper from industrialization. But Houghton's decision three years later to forsake his traditional and lucrative businesses in favor of starting a large-scale glass manufacturing operation was, if not unconventional, extremely risky. Not only was he entering an industry relatively new to him, he was entering a new stage of development in the American economy, one that featured intensifying regional and national competition, favoring large, well-entrenched firms. In the pre-1850 era of small business domination familiar to Houghton, competition was largely local, and a firm's typical capital requirements were comparatively minor. During this period, a prosperous entrepreneur who did not squander his profits could expand operations amid times of the economic expansion, and retrench them to survive market contractions. Houghton demonstrated this ability before and after the panic of 1837.

Unlike his contracting and supply trades, Houghton's large glass works required huge capital contributions to meet the sizeable fixed (property, plant, equipment, etc.) and variable costs (payroll, raw materials, etc.) associated with such enterprises. Due to the scale of the operations effective cash flow management became ever more critical. Houghton's various glass companies demonstrated that both strong and weak sales performance could quickly drain cash reserves, forcing firms to either sell stock or assume costly debt. Many desperate entrepreneurs like Houghton were compelled to do both. Moreover, large capital-intensive companies were less able to withstand the challenges of broad economic recessions like the one following the financial crisis of 1857, which overtook many glass houses and threatened the Union Glass Company. Nor was it easy for big firms with large fixed investments to recover from accidental hazards such as plant and warehouse fires.

Houghton's story of "Yankee enterprise" does move almost mythically from farm boy to trade apprentice, to skilled craftsman, to wharf merchant, to corporate investor, and finally, to industrial capitalist. But his business experience, like America's economic evolution, was obviously far from seamless. The sum of his business record, like that of most entrepreneurs, is a mixture of good and bad fortune, dedication and hardship, achievement and failure. Historians (Balleisen, 2001) recognize that much can be learned from both entrepreneurial successes and failures. Through the example of less well-known and yet remarkable entrepreneurs like Houghton, one can often better appreciate the underside of the country's dynamic business history—the challenge of cash flow management, the specter of labor opposition, the complexity of new manufacturing techniques, the possibility of accidental disasters, and the challenges of widespread competi-

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tion. As Glenn Porter notes, America's ascent as a great economic power was "a troubled, painful, experimental process that produced more failures than successes."³⁷

Notes

1. Arthur A. Houghton, Jr., *Remembrances* (Queenstown, MD: A.A. Houghton, 1986), 19-20; George Buell Hollister, "Historical Records of the Corning Glass Works, 1851-1930," typescript, 1951, revised 1960, 8, Corning Incorporated Archives, Corning, New York; Susan E. Maycock, *East Cambridge* (Cambridge, MA: Cambridge Historical Commission, 1988), 176-87.

2. Very few pre-1868 records have survived. The most comprehensive account of Corning Incorporated's origins and early development is Jeffrey J. Matthews' "The Pursuit of Progress: Corning Glass Works, Alanson B. Houghton, and America As World Power, 1851-1941" (Ph.D. diss., University of Kentucky, 2000). Aspects of Corning's later development are also discussed in two other dissertations: William A. Liddell, "The Development of Science in the American Glass Industry, 1880-1940" (Ph.D. diss., Yale University, 1953), and Regina L. Blaszczyk, "Imagining Consumers: Manufacturing and Markets in Ceramic and Glass, 1865-1965" (Ph.D. diss., University of Delaware, 1995). Two company-sponsored histories are due to be published by late 2001.

3. Mansel G. Blackford and K. Austin Kerr, *Business Enterprise in American History* (Boston: Houghton Mifflin, 1994).

4. Houghton, *Remembrances*, 19-20.

5. Annie L. Burr and Thomas H. Gage, "John Houghton of Lancaster, Mass., And Some of His Descendants," *New England Historical And Genealogical Register* (October 1925): 1-11; Abijah P. Marvin, *History of the Town of Lancaster, Massachusetts: From the First Settlement to the Present Time, 1643-1879* (Lancaster, MA: The Town, 1879); Houghton, *Remembrances*, 13-17; John W. Houghton, *The Houghton Genealogy: The Descendants of Ralph and John Houghton of Lancaster, Massachusetts* (New York: F.H. Hitchcock, 1912); Joseph Willard, *Topographical and Historical Sketches of the Town of Lancaster in the Commonwealth of Massachusetts* (Worcester, MA: C. Griffen, 1826); Mary Rowlandson, *Narrative of the captivity and restoration of Mrs. Mary Rowlandson* (Cambridge, MA: Joesph Poole, 1682).

6. Houghton, *Houghton Genealogy*, 78, 346, 374-75; *Corning Evening Leader*, November 6, 1909.

7. Maycock, *East Cambridge*, 15-68; Henry C. Binford, *The First Suburbs: Residential Communities on the Boston Periphery, 1815-1860* (Chicago: University of Chicago Press, 1985); Arthur Gilman, *The Cambridge of Eighteen Hundred and Ninety Six* (Cambridge, MA: Riverside Press, 1896); Lucius R. Paige, *History of Cambridge, Massachusetts, 1630-1877* (Boston: H.O. Houghton and Company, 1877); Samuel A. Eliot, *A History of Cambridge* (Cambridge, MA: Cambridge Tribune, 1913).

8. "Houghton 'Family Tree,'" typescript (2 pages), May 15, 1987, Corning Incorporated Archives; *Corning Evening Leader*, November 6, 1909; Christopher Anderson, *Young Kate* (New York: Henry Holt, 1988), 29-30.

9. "Houghton Family Tree," 1; *The Cambridge Almanac and Business Directory* (1847-64), Cambridge Historical Society, Cambridge, MA; *Corning Evening Leader*, November 6, 1909.

10. Binford, *The First Suburbs*, 27-77; Maycock, *East Cambridge*, 174-75.

11. Maycock, *East Cambridge*, 69-77, 187; Hollister, "Historical Records," 8, 160a-b; "Houghton Family Tree," 1.

12. Maycock, *East Cambridge*, 186-87; George and Helen McKearin, *American Glass* (New York: Crown Publishing, 1945); Warren C. Scoville, *Revolution In Glassmaking: Entrepreneurship and Technological Change in American Industry, 1880-1920* (Cambridge: Harvard University Press, 1948).

13. Maycock, *East Cambridge*, 186-87; McKearin, *American Glass*; Scoville, *Revolution In Glassmaking*; Hollister, "Historical Records," 160-160c.

14. Binford, *The First Suburbs*, 142-62; Charles D. Elliot, *Somerville's History* (Somerville, MA: City of Somerville, 1896); Carole Zellie, *Beyond the Neck: The Architecture and Development of Somerville, Massachusetts* (Somerville, MA: City of Somerville, 1990).

15. Houghton, *Houghton Genealogy*, 374-75; *Cambridge Almanac*; Hollister, "Historical Records," 8a, 160d-160g; Elliot, *Somerville's History*, 41; "Industries Of Somerville, No. 1. Union Glass Company," prepared

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for the *Somerville Journal*, November 27, 1875, "Somerville V.F. Industries, Union Glass Co., Somerville Public Library.

16. Lura Woodside Watkins, "The Union Glass Company," *Antiques* (November 1936): 222-25; McKearin, *American Glass*, 160; Katharine Crosby, "Somerville To Lose Glass-Makers' Magic," *Boston Herald*, July 31, 1927; Binford, *The First Suburbs*, 156; Hollister, "Historical Records," 160d-160g.

17. "Industries Of Somerville, No. 1;" Elliot, *Somerville's History*; Lom Bard, "The Volunteers, 1842-1866," typescript, undated, Local History Room, Somerville Public Library; H.H. Easterbrook, "History of the Somerville Fire Department," typescript, undated, Local History Room, Somerville Public Library; The American Legion, *Centennial History of Somerville, 1842-1852* (Middlesex County, MA: Middlesex County, 1942); "An Industrious Past: Business Has Grown In Step With City For Centuries," *Somerville Journal*, December 14, 1989, 1,13; Union Glass Folder, Corning Incorporated Archives.

18. Hollister, "Historical Records," 8a, 160d-160g; "Industries Of Somerville, No. 1," 222-25; *Corning Daily Journal*, November 6, 1909; Houghton, *Houghton Genealogy*, 432, 498; Estelle Sinclair Farrar and Jane Shadel Spillman, *The Complete Cut & Engraved Glass of Corning* (Corning, NY: Corning Museum of Glass, 1979), 2.

19. Joshua Brown and David Ment, *Factories, Foundries, and Refineries: A History of Five Brooklyn Industries* (Brooklyn: Brooklyn Education and Cultural Alliance, 1980); Harold C. Syrett, *The City of Brooklyn, 1865-1898* (New York: Columbia University Press, 1944), 11-16, 138-40.

20. McKearin, *American Glass*, 584-613; Jane Shadel Spillman and Estelle Sinclair Farrar, *The Cut And Engraved Glass Of Corning, 1868-1940* (Corning, New York: Corning Museum of Glass, 1977), 20-27.

21. Hollister, "Historical Records," 160, 160h-160k, 161; Dun Papers, Harvard Business School, 126: 232; Brown and Ment, *Factories, Foundries*, 10-12.

22. Hollister, "Historical Records," 160, 160h-160k, 161; G.B. Hollister, "Amory Houghton, Jr.," *Bulletin of the American Ceramic Society* vol. 15, no. 9 (September 1936): cover page, 322; Houghton, *Remembrances*, 20; Farrar, *Glass of Corning*, 2.

23. Hollister, "Historical Records," 160, 160h-160k, 161; Dun Papers, 126: 232; Hollister, "Amory Houghton, Jr.," 322; Farrar, *Glass of Corning*, 2; Syrett, *City of Brooklyn*, 146-50; David McCullough, *The Great Bridge* (New York: Simon and Schuster, 1972).

24. Hollister, "Historical Records," 160, 160h-160k, 161; "Houghton 'Family Tree,'" 1; *Corning Evening Leader*, November 9, 1909; McKearin, *American Glass*; Scoville, *Revolution In Glassmaking*; Thomas P. Dimitroff and Lois S. Janes, *History of the Corning-Painted Post Area: 200 Years in Painted Post Country* (Corning, NY: Corning Area Bicentennial Committee, 1977), 60.

25. Thomas W. Rowe and Harry H. Cook, *History Of The American Flint Glass Workers' Union Of North America* (Toledo, OH: American Flint Glass Workers' Union of North America, 1957), 5-7; Hollister, "Historical Records," 8-9; *Corning Journal*, July 26, 1883; Dimitroff, *History of Corning-Painted Post*, 60, 64, 86; Dennis M. Zembala, "Machines In The Glass House: The Transformation of Work in the Glass Industry, 1820-1925" (Ph.D. diss., George Washington University, 1984), 28, 107, 119, 132-33, 373; Houghton, *Remembrances*, 33; Dun Papers, 16:1; Brown and Ment, *Factories, Foundries*, 12.

26. *Corning Journal*, February 2, 1869; Dimitroff, *History of Corning-Painted Post*, 60; *Corning Daily Journal* and *Corning Evening Leader*, November 6, 1909; Clayton C. DeLong, "The Geographic Basis For The Development Of The Corning Glass Works" (master's thesis, Syracuse University, 1934), 1-30; Hollister, "Historical Records," 9.

27. W.W. Clayton, *History of Steuben County, New York* (Philadelphia: Lewis, Peck and Company, 1879); Irvin W. Near, *A History of Steuben County, New York and its Peoples* (Chicago: The Lewis Publishing Company, 1911); Dimitroff, *The History of Corning-Painted Post*, 1-60; *Corning Journal*, May 7, 1868.

28. DeLong, "Geographic Basis," 1-30; *Corning Evening Leader*, September 10, 1928.

29. *Corning Daily Journal*, April 30, 1868; *Corning Journal*, March 21, 1868; *Corning Daily Journal* and *Corning Evening Leader*, November 6, 1909; Dimitroff, *History of Corning-Painted Post*, 60; Hollister, "Historical Records," 9-10.

30. Dimitroff, *History of Corning-Painted Post* 60-61; *Corning Evening Leader*, September 10, 1928; Hollister, "Historical Records," 9-10; Farrar, *Glass of Corning*, 2.

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31. *Corning Journal*, June 11 and November 5, 1868; *Corning Daily Journal* and *Corning Evening Leader*, November 6, 1909; *Corning Evening Leader*, September 10, 1928; Hollister, "Historical Records," 10, 14-15; Dimitroff, *History of Corning-Painted Post*, 60-1, 71.

32. Dimitroff, *History of Corning-Painted Post*, 61-2; Richard H. Slavin, "The 'Flint Glass Workers' Union' vs. The Glassware Industry: Union-Management Policies In A Declining Industry," *Labor History* 5 (Winter 1964): 29-39.

33. *Corning Journal*, October 22 and November 5, 1868; Hollister, "Historical Records," 10; *Corning Evening Leader*, September 10, 1928 and October 21, 1968 (these issues, coinciding with Corning Glass Works's fiftieth and hundredth anniversaries, contain many valuable articles on the history of the company); Dimitroff, *History of Corning-Painted Post*, 71-75; Farrar, *Glass of Corning*; Spillman, *Glass of Corning, 1858-1940*, 36-77..

34. *Corning Journal*, April 29, 1869; "Houghton Family Tree," 1; Hollister, "Historical Records," 11; DeLong, "Geographic Basis," 40-2; *Corning Evening Leader*, September 10, 1928; Dimitroff, *History of Corning-Painted Post*, 61.

35. Hollister, "Historical Records," 11-12; *Corning Journal*, September 15, 1970; *Corning Daily Journal* and *Corning Evening Leader*, November, 6 1909; *Corning Evening Leader*, October 21, 1968; Amory Houghton, Jr. to Amory Houghton, Sr., December 3, 1870, Box 1-2-4, Corning Incorporated Archives; Dimitroff, *History of Corning-Painted Post*, 61-2; Farrar, *Glass of Corning*, 3.

36. Amory Houghton Sr.'s ultimate failure, and his son and grandsons' ultimate successes supports the major conclusions reached in William Miller, "American Historians and the Business Elite" and "The Recruitment of the American Business Elite," and Frances W. Gregory, "The American Industrial Elite in the 1870s: Their Social Origins," in William Miller, ed., *Men In Business: Essays on the Historical Role of the Entrepreneur* (Cambridge: Harvard University Press, 1952), 193-211, 309-19, 329-38; Blackford and Kerr, *Business Enterprise*, 156.

37. Glenn Porter, *The Rise of Big Business, 1860-1920* (Arlington Heights, IL: Harlan Davidson, 1992), 21.

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