CHAPTER FIVE

A Record-Breaking Feat of Modern Construction

Woolworth and Gilbert's determination to build the highest skyscraper in the world was rivaled only by the ambition of the men who vied to construct it, among the most vocal of proponents for modernizing the city. "From 1905 to 1914 . . . there seemed to be among modern builders an epidemic of heroic design, a veritable competition in lofty ambitions." New York's skyline was reshaping itself seemingly overnight, and from the perspective of the builder, "nothing man-made" produced "an equivalent thrill." Such a context of competition, described in the building the Skyline, should not enter the Union Club through the front door, but instead through the tradesman's entrance. But Gilbert also knew that Starrett, as president of the George A. Fuller Company, signed an economically powerful, thoroughly twentieth-century phenomenon. Starrett headed one of New York's large enough to compete for the contract to build the Woolworth Building. Power as the chief protagonist in the creation of the Woolworth Building once construction began. Louis Horowitz, president of the Thompson-Starrett Company, the firm that ultimately triumphed over Starrett's Fuller Company to secure the project's contract, later asserted that "an architect could dream and plan, but we could make the dream come true." Both Thompson-Starrett and Fuller had recently ascended to their position of dominance in the industry as "national builders," prevailing during an extended period of labor conflict in New York—an outgrowth of the tens of thousands of industrial strikes nationwide. During the 1880s and 1890s, the conflict had left the body politic reeling from the shock, and especially from the violence of the Haymarket (1886) and Homestead (1892) strikes, throwing up a seemingly impassable barrier between capital and labor. In reaction, Fuller promoted strategies of "peaceful" labor conciliation, designed to mask the day's deep division between the employer and the employed. The Woolworth Building's promotional literature supported and furthered the deception: It was not the "national builder," but rather "master builders" and their force of artisanal "free labor" that collaborated to construct New York as a modern skyscraper metropolis. In actuality, however, Thompson-Starrett and Fuller had thoroughly reorganized the construction industry in the effort to circumvent such conflict. They had employed their own forces of construction labor along with that of subcontractors under the new single-contract system. In aiming to complete large-scale projects in record time, they had imposed a new level of modern rationalization, efficiency, and financial control over the entire construction process. Horowitz later elucidated the builders' enterprising zeal and conviction about changing the skyline of major American cities, his spirit of conquest resonating with the widespread enthusiasm for technology and for feats of daring construction. Everyone of us in the company felt himself to be an adventurer. We envisioned the cities of America rising to dizzy, gleaming heights. We dreamed of unshaped inventions that would become part of the fabulous, mechanistic structures we were going to build." "New York was the place for the man who wanted to build skyscrapers," Paul Starrett added. It offered the optimal economic and geographic conditions for conquering vertical space in the open "frontier" of sky. Popular magazines such as Everybody similarly lauded the builders' force of structural ironworkers as "cowboys of the skies," a reference to the heroic masculinity identified with Theodore Roosevelt's "rough riders" of 1898, the self-taught regiment of cowboys who charged up Cuba's Kettle Hill toward San Juan Ridge during the Spanish-American War (fig. 5.1). The enterprise of constructing skyscrapers, the magazine further suggested, reflected the nation's preparedness for battle, its persisting belief in manifest destiny, and its current policy of expansion overseas.

In competing for the contract to construct the Woolworth Building, builders such as Paul Starrett and Louis Horowitz were, in fact, reacting to the localized, speculative market pressures inciting expansion skyward—pressures that Woolworth had likewise exploited as a source of capital and an instrument for attaining his headquarters' visibility. They and their contemporaries in the building industry had invented new mechanical devices, techniques, and methods of construction, besides systematizing the entire process toward the end of modernizing the city at a breathtaking pace. Exemplary of this modernization, during what Thomas Hughes has called the "era of technological enthusiasm," the Woolworth Building was characterized by excesses. These were evident in the depth of its caisson-construction foundation and the record-breaking height of its structural steel as well as in the workers' assembly of that steel in record time. Such evidence of modern
New York. From and Frederick Colburn Clarke.  

The George A. Fuller Company, founded in Chicago in 1882, pioneered the single-contract system of general contract construction in the Tacoma Building project of 1886–89. For the first time, Fuller built a skyscraper within a contractually predetermined frame of time for a predetermined price, then “delivered” it as a product to its owner, the Chicago lawyer and businessman Wirt D. Walker, ready to occupy. Subsequently, the Fuller Company built up its reputation on taking full financial responsibility for such projects, either on its own or through letting subcontracts to others. It incorporated in 1890 and by 1896, set up an office in New York. In 1899, Theodore Starrett founded with Henry S. Thompson a rival organization modeled on Fuller, the Thompson-Starrett Company. Fuller moved its headquarters to New York, and Paul became president of the Fuller Company in 1905. Well before competing for the Woolworth Building contract, both Thompson-Starrett and Fuller had taken charge of and, for a fixed percentage fee, had systematically organized all aspects of the large-scale construction process: planning, financing, and engineering, along with the subcontracts required to assemble labor and materials, chief among them the big contracts for structural steel. Thompson-Starrett and Fuller predicted their growth nationally as corporations on procuring big projects through strategic salesmanship, that is, on their ability to convince a speculator of a proposed project’s future income-earning capacity. This markedly distinguished both firms from the mid-nineteenth century’s local builders, that is, the small, independent, and skilled tradesmen renowned for their artisanal orientation. Strategic salesmanship generated volume, and volume facilitated the rapid expansion of Thompson-Starrett and Fuller across the country in branch offices after they set up headquarters in New York. Before 1909, Thompson-Starrett had founded offices in Chicago, San Francisco, Philadelphia, Washington, Pittsburgh, Salt Lake City, and Portland—and steel-framed speculative office-building projects composed by far the largest proportion of the firm’s total volume of construction. Similarly, Fuller had established offices in Chicago, Boston, Pittsburgh, Baltimore, Washington, D.C., San Francisco, Chattanooga, Kansas City, and Philadelphia. By 1911, Horowitz had developed Thompson-Starrett into what he called a “modern building organization”: a still larger, more systematized, and more efficient variation of Fuller’s original single-contract system. Regardless of Thompson-Starrett’s and Fuller’s new national scope, however, New York remained the industry’s dominant center. If we are to believe Starrett, Fuller constructed 80 percent of Manhattan’s new buildings during the years around 1900 alone. Within such a context, Woolworth’s skyscraper offered not only a profitable contract, but also the potential for advertising that contract, and with it, the builders’ skills, organization, and modern methods of construction in record time.

The Single-Contract System and the Rise of the “National Builder”  
The George A. Fuller Company, founded in Chicago in 1882, pioneered the single-contract system of general contract construction in the Tacoma Building project of 1886–89. For the first time, Fuller built a skyscraper within a contractually predetermined frame of time for a predetermined price, then “delivered” it as a product to its owner, the Chicago lawyer and businessman Wirt D. Walker, ready to occupy. Subsequently, the Fuller Company built up its reputation on taking full financial responsibility for such projects, either on its own or through letting subcontracts to others. It incorporated in 1890 and by 1896, set up an office in New York. In 1899, Theodore Starrett founded with Henry S. Thompson a rival organization modeled on Fuller, the Thompson-Starrett Company. Fuller moved its headquarters to New York, and Paul became president of the Fuller Company in 1905. Well before competing for the Woolworth Building contract, both Thompson-Starrett and Fuller had taken charge of and, for a fixed percentage fee, had systematically organized all aspects of the large-scale construction process: planning, financing, and engineering, along with the subcontracts required to assemble labor and materials, chief among them the big contracts for structural steel. Thompson-Starrett and Fuller predicted their growth nationally as corporations on procuring big projects through strategic salesmanship, that is, on their ability to convince a speculator of a proposed project’s future income-earning capacity. This markedly distinguished both firms from the mid-nineteenth century’s local builders, that is, the small, independent, and skilled tradesmen renowned for their artisanal orientation. Strategic salesmanship generated volume, and volume facilitated the rapid expansion of Thompson-Starrett and Fuller across the country in branch offices after they set up headquarters in New York. Before 1909, Thompson-Starrett had founded offices in Chicago, San Francisco, Philadelphia, Washington, Pittsburgh, Salt Lake City, and Portland—and steel-framed speculative office-building projects composed by far the largest proportion of the firm’s total volume of construction. Similarly, Fuller had established offices in Chicago, Boston, Pittsburgh, Baltimore, Washington, D.C., San Francisco, Chattanooga, Kansas City, and Philadelphia. By 1911, Horowitz had developed Thompson-Starrett into what he called a “modern building organization”: a still larger, more systematized, and more efficient variation of Fuller’s original single-contract system. Regardless of Thompson-Starrett’s and Fuller’s new national scope, however, New York remained the industry’s dominant center. If we are to believe Starrett, Fuller constructed 80 percent of Manhattan’s new buildings during the years around 1900 alone. Within such a context, Woolworth’s skyscraper offered not only a profitable contract, but also the potential for advertising that contract, and with it, the builders’ skills, organization, and modern methods of construction in record time.

The Woolworth Building Contract  
Even before Woolworth began discussing his project with Irving National Bank’s board of directors in 1908, several of New York’s largest builders—the George A. Fuller Company and the Thompson-Starrett Company among them—began aggressively competing for the contract to construct his skyscraper. Word of Woolworth’s intentions had leaked out early, Paul Starrett later recalled, and the building community was electrified. “The rumor had been about for a long time
CHAPTER FIVE

F. W. Woolworth was playing with the idea of a gigantic skyscraper in New York, to bear his name, and all the leading builders had their ears pricked up. This would be a prize worth fighting for! Horowitz later remarked, "I became all my power, during several years, to get the contract for the vast project." He described such projects as "a masonry of chance encounters, vague ambitions, and even less substantial elements." But as the architect H. A. Shreve more directly put it, Horowitz was "aggressive in conceiving projects himself and then in cajoling into partnership necessary human elements possessing desire and site and capital to the end that there would be another big building against the skyline." Horowitz, in fact, called himself a "contract hunter"; he targeted big, lucrative projects during the years he headed Thompson-Starrett, when the company completed $600 million worth of projects. These, he claimed, represented "a conspicuous part of the skylines of the nation's major cities, but "most of all, New York." Woolworth's choice of a builder involved a tedious, exhaustingly drawn-out process of investigation and interviewing. As Horowitz later recounted: "All my nightmares had to do with the black despair of failing to get that mighty contract. Woolworth's method of selection was extremely aggravating for those of us who waited for his decision. It was a slow process of elimination. He talked to everybody; and time and time again he seemed to have his mind made up, only to change it and begin to hunt all over again. Some of his meetings with me and with my rivals were in his office; some were in the office of Cass Gilbert, the architect, where the excitement was enough to keep me on fire with hunger for the job." Woolworth eventually signed a contract with Horowitz and the Thompson-Starrett Company five months later, on April 20, 1911. As an architect, Gilbert had the clout to decisively influence Woolworth's selection of a builder, and both Paul Starrett and Louis Horowitz knew it. After Starrett discovered that Horowitz and his Thompson-Starrett Company had indeed won the contract to construct the Woolworth Building, he instantly sent his competitor a congratulatory note, adding that he was "heartbroken" and blaming Gilbert—"Woolworth told me Gilbert wouldn't have it." Earlier, Starrett had mailed Gilbert a copy of the sales letter he wrote to Woolworth, noting that he "would appreciate very much any assistance you feel warranted in giving to me in this matter." Unfortunately for Starrett, Gilbert had already made up his mind; he had developed a mischievous view of Fuller's new parent organization, the United States Realty and Construction Company. After the death of Fuller in 1901, Fuller's son-in-law, Harry S. Black, took over the George A. Fuller Company, making it part of his new venture, the United States Realty and Construction Company, a giant, consolidated corporate enterprise that he capitalized at $66 million. Black aimed to control all aspects of acquiring, financing, constructing, and leasing space in the largest New York properties. Paul Starrett observed that "Black loved amalgamations and expand"; he knew little about construction, but he had reportedly built up the Fuller Company into a $15 million corporation from a mere fifty-thousand-dollar enterprise in just a few years. Starrett characterized Black as "a business genius, a gambler, a financial juggler," as a person he was "highhearted and selfish... and rather unscrupulous." In 1909, during his term as president of the American Institute of Architects, Gilbert argued vociferously against the very phenomenon in construction represented by Black and the United States Realty and Construction Company. Such big, amalgamated corporations attempted to monopolize all aspects of large-scale construction and so presented a "serious menace to the interests of the architect." Gilbert proposed as a solution that architects return to the nineteenth-century's "old-fashioned system" of letting certain contracts for large-scale projects to minor contractors. Gilbert may have read the accounts about the Fuller Company's having hired in-house draftsmen with the objective of controlling all aspects of design and construction, among them the architect's function of "drawing up the plans." The Fuller Company and the Purdy and Henderson team had already put Gilbert's professional role as an architect to a severe test during the Broadway Chambers project. Now, beyond question, Gilbert aspired to reestablish the architect in the central function of administering all aspects of a building's design and construction. Besides viewing corporations such as United States Realty as a "menace," Gilbert had little trust in Black's business practices. Julia Finch Gilbert described Gilbert's encounter with the construction firm in Palm Beach in March 1911: Black, Finch Gilbert wrote, was "working the East Coast" with the ambition of acquiring the Woolworth Building and other big construction contracts for the Fuller Company. Knowing that Black had been previously "untrue" to Gilbert—a reference, perhaps, to the Broadway Chambers project—Finch Gilbert performed "social gymnastics" to keep Black from "having heart to heart talks with Mr. Woolworth," hoping to see Black "beautifully turned
a project known for its rapid construction and during which he functioned all at once as the owner, developer, and general contractor. Such a job for a major retailing concern, more importantly, may have helped Horowitz seal the Woolworth Building contract. Bernard Gimbel, Horowitz later recalled, "put on his hat" and went to see Woolworth for him. 45

Horowitz defined the "modern building organization" as "a machine that can take contracts at a fixed figure, for a fixed fee, and deliver the buildings to their owners in a guaranteed time, as methodically as a tailor handles an order for a suit of clothes." 46 Railroad builders had by the mid-nineteenth century achieved unprecedented rates of speed by building several railroad lines at once and by employing interchangeable work gangs or "machines" of men. 47 More recently, both Fuller and Thompson-Starrett had utilized the single-contract system in similar fashion to construct several large office buildings in several cities at once with the objective of a comparable rationalization and speed. But in Horowitz’s view, both big contractors still unfortunately practiced "brokerage pure and simple!" They still hired out major portions of the typical large building's construction to subcontractors, each of whom had a profit to make. Such a method of cobblding together too many subcontractors and the fees for their work slowed down the process of construction and increased expenditures, and given the real estate speculator's requirement of rapid completion and a timely financial return, it unnecessarily augmented a project's total cost. 48

Horowitz further argued that the administration of the modern building organization must be as systematized and efficient in its component parts as the current state of the construction industry would permit—a business still known for its labor disputes, craft practices, and the diversity of its building trades. Managed from a central office, the organization comprised "in-house departments" responsible for key lines of work. The central office established the project's comprehensive time schedule and, through the schedule, aimed to impose a rational and systematic order from start to finish over all lines of work. 49 The in-house departments estimated project costs, awarded contracts for labor and materials, purchased materials in bulk, expedited the delivery of materials, and coordinated shop drawings. After construction began, the central office enforced the comprehensive time schedule by tracking weekly progress and costs and through the authority of the construction superintendent and the superintendent's daily reports. Horowitz acknowledged that the uniqueness among the thirty to fifty trades typically employed on a given construction site—"too diverse to be welded into a whole"—presented a challenge, but he still anticipated that his organization would facilitate a systematic, orderly, and harmonious relationship among all lines of work. 50 Horowitz's organizational methods resembled those recently proposed by his New York contemporary, the mechanical engineer and building contractor Frank Bunker Gilbreth. Gilbreth's "System in Contracting" (1905) and "Field System" (1906) similarly defined the departmental functions housed within the contractor's central managerial office and similarly called for clear lines of communication with the building site. 51 Gilbreth's effort to rationalize the work process and the work site traced its origins in turn to the principles of Frederick Winslow Taylor, whose "Piece Rate System" of 1895 pioneered "scientific management." Taylor based his time and motion studies on observations from the shop floor of the steel industry; he aimed to improve the speed and the efficiency of the individual worker. 52 While less focused
on the worker, Horowitz’s “modern building organization,” like Gilbert’s “system in contract work,” emphasized the rationalization of both the work process and the work site. Horowitz’s self-described mission as a builder was “get the order, and then put up the building, so that it is done in the shortest possible time.” Paul Starrett likewise stressed the centrality of speed to the financial success of any big construction project: “Time is important in building. Equipment is tied up, other jobs wait, tenants are ready to move in, the owner stands on the sidelines counting the days. Speed pleases everybody and is money in the pocket. Speed gets jobs.” When campaigning for the Woolworth Building’s contract, Starrett told Woolworth, “You watch that building across the street; see it shoot up! You’ll see what speed we get,” pointing to the East River Savings Bank, at the time starting construction cattercorner across the Broadway from Woolworth’s Stewart Building headquarters. In the railroad construction industry, Benjamin Franklin’s notion that “time is money” had already become a truism on rationalized work sites by the mid-nineteenth century, but for Starrett and Horowitz speed in its own right had risen to precedence as the industrialization of both the work process and the office space.

Equally important, Horowitz, Gilbert, and Woolworth knew that achieving speed during construction required that potential labor conflicts be resolved or, still better, altogether avoided. Strikes had crippled Fuller Company building sites between 1900 and 1905, and across the New York building industry, strikes and lockouts had come to a head in 1902–3, with 2,268 industrial actions involving 2,268 building projects.58 “The labor question constantly arose,” Gilbert wrote in 1900, during the construction of the Broadway Chambers Building. Within the next five years, however, the industry had achieved an unusual level of stability. The city’s General Arbitration Board, established in 1904, settled labor disputes. For a brief period, it also gave workers a closed shop, or the right to stipulate that the whole of a particular organization be protected by a union. Although Fuller and employer’s associations challenged the right in 1906, they settled for employing union alongside nonunion labor. In addition, the Fuller Company adopted a position of conciliation among the unions. After Black took control, it devised methods for defusing labor actions in advance. It paid workers reliably and well, but it also bribed union leaders to ensure peaceful labor conditions.60

Regardless of the New York building industry’s having reached a new level of stability and order, Gilbert continued to worry about a major disabling strike at the Woolworth project site; work on his United States Custom House had been halted repeatedly by strikes. When sending the Woolworth Building’s specifications out for bid, Gilbert advised “the use of such a class of labor that will not occasion strikes.” With the exceptions of a painters’ strike in March 1911, a five-day strike in the shops of the Atlantic Terra Cotta Company in June, and last-minute negotiations with the Reliance Labor Club over the carving of the interior marble in September 1911, the Woolworth project remained remarkably free of labor conflict throughout the course of construction, to the relief of Horowitz, Gilbert, and Woolworth. After completion, Gilbert applauded the site’s “peaceful” labor conditions, which he thought offered a broader social lesson: “It is only by the combination of the interests of capital and labor that organized society can successfully exist.” Both sets of interests, Gilbert had come to believe, contributed to the timely realization of his costly, opulent, and skillfully crafted Beaux-Arts design.

Besides the threat of strikes, Horowitz and the Thompson-Starrett Company faced another complication in their goal of thoroughly rationalizing and speeding up the construction process—New York’s increasingly diversifying labor community. Between 1890 and 1910, immigrants from Southern Italy and Eastern Europe flooded the city, along with Chinese and African-Americans from the southern United States. By 1900, three-quarters of the city’s population consisted of foreign-born immigrants. The Metropolitan Life Tower’s steel creators, one writer reported in 1908, comprised “Americans, English, Irish, French-Canadians, Swedes, now and then an Italian,” and “two full-blooded Indians.” That year, Bricklayer and Mason compared building a skyscraper to building the Tower of Babel, given the confusion of languages arising from the integration of native-born workers with the new immigrant groups. Gilbert argued that the problem of confusion could be obviated altogether, and speed thereby increased, through the segregation of construction crews into groups by nationality. But regardless of such racial and ethnic differences among the workers, by the mid-1890s many of the New York building trades had achieved a new solidarity; they had isolated themselves from party politics and had begun adhering to Samuel Gompers’s “pure and simple unionism.”

New York’s building trades unions, the membership of which increased twofold between 1890 and 1910, enforced standards of safety while promoting equality among all members. By 1910, moreover, the city’s structural ironworkers had achieved still greater solidarity through their swelling numbers in the Housesmiths’ and Bridge-men’s Union of New York and Vicinity and, as a consequence, the status of a “labor aristocracy,” or a well-paid working-class elite. Still, control over the workers’ livelihoods remained vested in the hands of their giant corporate employers, the founders of an industry that viewed them no longer as skilled, independent artisans, but instead as employees, and in doing so, enforced above all else the criterion of speed.

ARCHITECT, BUILDER, AND CLIENT

As construction of the Woolworth Building began, Gilbert’s office, organized hierarchically but still functioning as something
of a Beaux-Arts atelier, faced coordinating one of the most complex, daunting, and rigorously scheduled architectural projects of the day (see fig. 4.1). To that end, Gilbert tailored his office methods to synchronize with the expectations of Thompson-Starrett's “modern building organization.”32 Gilbert's relatively small staff of twenty to twenty-five assistants produced the project's hundreds of working drawings to accord with Thompson-Starrett's construction schedule and, afterward, supervised assembly and craftsmanship on the site with efficiency.

Gilbert organized the lines of command between his office and those of his engineering consultants and manufacturers to resemble those existing between the general contractor's central office, related departments, and subcontractors. Guynvald Ais and Company, with thirty engineers and draftsmen, produced the Woolworth Building's structural steel and all other steel, terra cotta, and stone masonry.33 The Atlantic Terra Cotta Company, with twenty-five assistants, produced virtually the building's entire terra cotta and stone.34 Gilbert had not departmentalized his office like that of the Thompson-Starrett Company, but the current obsession with system and organization permeated his thinking as much as it did theirs. Of this Gilbert was deeply aware: “The architect of today conducting great building enterprises must of necessity maintain a large organization. It is physically impossible for any one man to do all of the things that the architect is required and expected to do. It is his function to design the building in every sense of the word, but necessarily he must use many assistants in accomplishing this. Skilled designers and draftsmen, structural experts, mechanical, electrical, heating, ventilating and sanitary experts ... must take their part in the organization of a great building... It naturally follows, then, that the architect, being the designer and master builder, must be the one to coordinate the work of all those engaged in the enterprise.”35 Contemporaries admired the Gilbert office's “able and systematizing deputizing effort, without which works of the magnitude of Mr. Gilbert's could not be achieved.”36 Like the Woolworth project, each of the office's earlier projects had presented a wide array of unique and unprecedented construction-related problems. The time pressures imposed by Thompson-Starrett's “modern building organization” only exacerbated the challenges.

Gilbert told Woolworth in August 1912, “This high speed business and the extraordinary character of the propositions we have had to solve sometimes forces us all to nearly a killing pace.”37 By 1917, Gilbert had attempted to combat such pressures by establishing within his office a second- ary tier of key associates. John Rockart and George Wells had joined Johnson in becoming the office's highest-paid employees.38 In 1909, all received three hundred dollars a month, about three times the average draftsman's salary.39 Still, Gilbert refused to let Johnson's, Rockart's, or Wells's names grace the office's letterhead, reinforcing the impression to clients and to the public alike that his creative works were his alone.40 The preparedness and efficiency with which Gilbert's office was able to tackle projects as large and complex as Woolworth's skyscraper can be ascribed largely to Gilbert's careful selection and promotion of Johnson, Rockart, and Wells.

Johnson, having already fulfilled a pivotal role in the project's conceptual design process, now oversaw the office staff's production of all craft details, including the full-scale drawings for ornamentation; he “directed the overall design of the Woolworth Building,” recalled Antonin Raymond, who drew some of those details.41 Johnson also approved the full-scale shop drawings produced by the Atlantic Terra Cotta Company's in-house draftsmen and, later, Donnelly and Ricci's models for the project's ornamental terra cotta, stone, and copper.42 As Gilbert's project manager for the Woolworth Building, Rockart supervised the office staff's production of drawings for construction and coordinated all project meetings.43 After construction began, Wells oversaw the project's progress in the office and on the job site. He collaborated with Horowicz to supervise the signing of all contracts between the building's subcontractors and the Broadway-Park Place Company. He also wrote and updated construction specifications, inspected the quality of the structural steel and all other materials and their fabrication, approved on-site assembly and craftsmanship, and with Thompson-Starrett synchronized the timing of steel, terra cotta, and stone deliveries. Later, he coordinated the subcontractors' installation of the building's mechanical and electrical equipment.44 At the construction site, Gilbert instructed Wells to rigorously enforce his own high standards of craftsmanship while also cultivating a climate of goodwill: “As long as you maintain your good temper, keep free from personalities, and do your duty, as I believe you have done in the past, I will sustain you. Do not under any circumstances lose temper or enter into any personal feeling. ... Your position is a difficult one and it would not be an unnatural trick for them [the foremen] to quarrel with you if possible, and to claim that your decisions were influenced by spite... Hold them strictly to the contract, and no matter how many times you have a thing done over, insist upon it until it is right. Do no matter how much they protest.”45 Gilbert valued solid craftsmanship, and Wells's supervision of construction distanced him from some of the project's most important craft details.46 But it also allowed him to focus on developing the identity of his firm as a Beaux-Arts atelier—through effective administration, skillful salesmanship, and the production of the vivid conceptual sketches and seductive perspectives that won support for his designs.

Gilbert's office, with its two associated corps of “structural” and “ornamental” draftsmen—totaling about eighty in his own employ and that of Guynvald Ais and Company and the Atlantic Terra Cotta Company combined—produced virtually all the Woolworth Building's construction drawings within about three months, between January 13, 1911, and April 29, 1911 (Figs. 5.3, 5.4, 5.5). Sometimes after April, however, Gilbert increased the height of the tower to 792 feet, causing revisions to continue until the end of July.47 The drawings produced by Gilbert's draftsmen,
when added together with the drawings produced by the project's consulting engineers, brought the total to 1,550. Given the skycraper's gigantic size and the urgency of completing the drawings, Gilbert, who treasured the ideal of the architect as an artist, nonetheless found himself at the mercy of the countless impersonal hands that methodically translated his original conceptual sketches and Johnson's perspectives into documents for construction. "The principal of a large practice has many difficulties. If I had the physical and mental ability to make the drawings for the Woolworth Building, it would have taken me ten years." Still, at Gilbert's behest, Thomas R. Johnson led the office's junior designers and draftsmen in the production of the skyscraper's many plans and elevations, choosing Stickel for the important Broadway elevation, and guided their refinement of intricate ornamental details in limestone, terra cotta, copper, and marble: spandrels, canopies, tourelles, buttresses, pinnacles, and gables. Some of the ornamental details they studied at full scale, among them the interior's metal screens, woodwork, and plaster cornices. These Johnson treated as designs from which a fabricator could produce shop drawings directly.

Hierarchy, delegation, and specialization had already characterized the organization of large-scale architectural practices in New York and Chicago by the turn of the century, notable among them D. H. Burnham and Company's office with 180 employees and McKim, Mead, and White's with approximately 100. Gilbert distinguished his practice from such practices, however, by keeping his staff of assisting designers and draftsmen comparatively small, rarely exceeding the Woolworth Building project's total of 25. In doing so, he resisted creating D. H. Burnham and Company's so-called large manufacturing plant, which in the view of H. Van Buren Magonigle produced "cold and lifeless syndicated
at the time of the Singer Tower (1906–8). Both offices, however, also incorporated departments of engineering, with Post serving as his own chief engineer and Flagg employing Otto Francis Semsch. Flagg, furthermore, had added a department of construction in 1907.10 Gilbert, by contrast, utilized the combined capacities of outside consultants, draftsmen, and construction contractors. In doing so, he aspired to keep intact the identity of his practice as a small, independently functioning Beaux-Arts atelier.

Despite Gilbert’s “able and systematizing deputizing effort,” the Woolworth Building was nonetheless “carried through under the personal direction of Woolworth,” as Gilbert put it. “There was no detail that did not have Frank Woolworth’s personal supervision . . . somewhat to my temporary distress.”101 Horowitz recalled Woolworth’s “close watch of the operations.”102 Woolworth, in fact, competed with both Horowitz and Gilbert for control of the project, at times commandeering Horowitz’s position, tracking and recording the project’s labor costs week by week, and at times pestering Gilbert about whether the project’s consulting engineers had indeed met the highest standards of design.103 Woolworth kept especially careful watch over Flagg, whom Gilbert had appointed during construction as the steel inspection engineer, fearing that he might start “boasting the job” and giving steel contracts to his friends.104

Woolworth, furthermore, imposed cost-saving methods of his own accord, frequently requested changes, and vacillated over minute materials- and equipment-related decisions, all of which delayed construction.105 Horowitz characterized Woolworth’s methods as his “customary way of buying goods for his five-and-ten-cent stores.”106 In January 1911, for example, Woolworth accused Thompson-Starrett of charging the Broadway–Park Place Company three-quarters of a cent more than the typical price of new rope for “second-hand rope” from other jobs, and in February, he haggled with Gilbert over “details of a more or less immaterial character”: pneumatic pivot door checks, metal trim, elevator signal service, locks on elevators, bulletin boards, and mail chutes.107 Earlier, Woolworth had solicited an “astonishingly low” bid from Elbert Gary of United States Steel for the project’s total of more than twenty-four thousand tons of structural steel—its highest-priced contract—even on the grounds that supplying steel for the Woolworth Building had advertising value.108 After Horowitz locked in the price of the steel’s fabrication at almost two hundred thousand dollars less than the American Bridge Company had originally proposed, however, Woolworth reportedly changed his stance and became “more cooperative.”109

In his severest effort at cost cutting, Woolworth attempted to slash both Horowitz’s fee for managing the project’s construction and Gilbert’s professional fee, arguing that the publicity associated with the world’s tallest skyscraper would bring “a fortune in the shape of fame.” Horowitz wrote: “arguing to Woolworth that he would not handle all aspects of the building’s construction “for nothing”; he could not “afford to put up [Woolworth’s] building for the sake of prestige, because we already have earned an abundance of prestige.”110 As for Gilbert, he reportedly told Woolworth that he was “just another millionaire” until his own architectural design for the Woolworth Building had made him famous.111 Gilbert, in fact, sent Woolworth the bill for his professional services, $66,000 for the project’s three earliest designs, on April 20, 1911.112 The project’s design phase had ended four months earlier, the office had virtually completed detailed working drawings, construction of the foundation also neared completion, and within two weeks, Woolworth would release Johnson and Hawley’s colorful perspective for simultaneous publication in the Sunday editions of New York’s newspapers. Still, Woolworth disputed Gilbert’s fee.113 In response, Gilbert argued that his office had totally redesigned the skyscraper between January 23, 1911, and April 25, 1911, producing a complete set of construction documents within ninety calendar days. More critically, after working “night and day” it had filed those documents at the Manhattan Bureau of Buildings.114 In the end, Woolworth paid Gilbert the expected 5 percent professional fee on a project cost of approximately $8.5 million, or $426,000.115 Gilbert’s refusal to give in to Woolworth during the arguments over fees, the secretary and treasurer of the American Institute of Architects, Glenn Brown, later proudly asserted, “won a victory for the Institute Schedule and a handsome remuneration for himself.”116

Despite the obvious stresses in their architect–builder–client relationship, Gilbert, Horowitz, and Woolworth remained effective collaborators throughout the course of the project. In October 1911, Gilbert wrote to his children while sailing for Europe aboard the Norddeutscher Lloyd steamship Bremen, describing gifts from Woolworth, a “handsome clock which folds flat in a travelling case; my name is engraved on it; it looks expensive,” and from Horowitz, “boxes of rare cigars.”117 Horowitz later recalled that he became “devoted” to Woolworth during the years of the Woolworth Building’s construction. After meeting at Gilbert’s office several times a week and at other times informally, “the three of us began to find companion-
CHAPTER FIVE

Building the Woolworth Building

The construction techniques and methods Thompson-Starrett employed to build the Woolworth Building represented the culmination of two and a half decades in the development of the skyscraper's foundation, steel framing, wind bracing, and cladding technologies. They also tested the limits of those technologies. Workers excavated the concrete piers of the Woolworth's foundation to some of the deepest bedrock in the city. The skyscraper's steel frame, the highest in the world, reached the greatest level of intricacy in its individual bracing members, and its exterior, sheathed throughout in terra cotta, represented the day's most extensive system of ornamental cladding. From a purely technological standpoint, however, the Woolworth Building was a conservative design, reflecting the restrictive stipulations of New York's 1899 building code. The skyscraper had "few if any absolutely new features of importance," reported Engineering Record in 1912. But on account of its unusually large scale, rationalized process of construction, sophistication as a work of engineering, and inclusion as well as multiplication to an unprecedented degree of the many new technological developments preceding it, the Woolworth Building epitomized the skyscraper as a building type. For this reason, it anticipated the great, iconic New York setback skyscrapers of the 1920s, the Chrysler Building and the Empire State Building among them, leading the structural engineer Mario Salvadori to call it a "first" in reference to the later skyscrapers.

THE CONSTRUCTION SITE

The Thompson-Starrett Company had considerable experience with building tall, steel-framed skyscrapers, but the unusual size of Woolworth's project presented a host of new challenges (fig. 5.6). Engineering Record and Scientific American emphasized how Thompson-Starrett organized the site for efficiency and how by ingenious methods they raised the project's steel, brick, and terra cotta to previously unconquered heights. New derricks and steam-powered cranes lifted "loads which never before had been lifted," among them twelve-ton members of steel. Hod hoists delivered tile, brick, and terra cotta to the skyscraper's upper stories at a speed of one thousand feet per minute. To increase speed, Thompson-Starrett developed a special two-stage vertical hoisting process, along with a method for shifting sets of guy derricks upward two stories at a time. It invented new electrically powered hoisting engines and new safety devices for special types of electrically powered scaffolding, or the temporary, open platforms that supported workmen and materials as construction progressed. To produce steam of the high pressure required for rapid hoisting, it employed a battery of three boilers that consumed twenty tons of anthracite coal in twenty-four hours.

According to Engineering Record, the Woolworth project stood out as remarkable for "the organization, administration, and execution of the complicated and difficult construction work with numerous diverse operations, simultaneously prosecuted by an army of workmen in a very restricted space." The site's confined area for storage, contained by sidewalk boundaries, imposed severe limitations on the delivery and removal of the project's nearly two hundred thousand tons of materials, some of which trucks hauled in gigantic, fifty-ton masses. As the skyscraper's steel skeleton mounted higher, and as successive batches of new materials and new subcontractors arrived at the site, the human and mechanical energy intensified; "a large number of freight and passenger elevators [moved] materials and men."

The superintendent for the Woolworth project, William Sunter—whom Gilbert called "the most efficient man on the job"—had requisitioned materials two or three days in advance, so that they flowed to the site systematically, and precisely at the moment specified by the schedule. Thompson-Starrett had not planned the skyscraper as a "fast-track project" in the present-day sense of the term, but the frame's more than twenty-thousand tons of structural steel—three times the amount used to construct the Metropolitan Life Tower—it had fabricated in the American Bridge Company's plants in Philadelphia and Pittsburgh as rapidly as Gunvald Aus and Company could supply the shop drawings. American Bridge then shipped the fabricated steel by rail to the Pennsylvania Railroad Company's yards in Greenville, New Jersey. Sunter ordered the steel from the yards in three-hundred- to five-hundred-ton lots; after being shipped by lighter to New York, the lots were carted to the site by the comparatively simple method of horse-drawn truck (fig. 57). The Atlantic Terra Cotta's shops in Perth Amboy, New Jersey, shipped the skyscraper's terra cotta cladding directly to lower Manhattan around Staten Island via the upper bay and the Hudson River. Once workers began attaching terra cotta, Sunter had batches sent from the factory at the rate of one truckload every fifteen minutes. When the batches arrived on the site, workers hoisted the terra cotta to ever higher stories as construction progressed. At the project site, there existed a "spirit of cooperation which pervaded the work from the beginning," according to Gilbert's later description of the peaceful labor conditions. Woolworth likewise applauded the ease with which "each contractor worked as a unit in cooperation with the other contractors," comparing the unity with the "deep and rich communal spirit" of the cathedral builders. Both men, however, refused to recognize the contradictions between such a "communal spirit" and the early twentieth-century reality of a labor force totally at the mercy of speed, or a "well systematized organization" working in "record time." The average size of the project's labor force was approximately two thousand, with about one thousand employed directly by Thompson-Starrett and about one thousand by the project's ninety subcontractors, most of whom worked in single eight-hour shifts. A total of twenty-six subcontractors fabricated, assembled, and installed the building's electrical, heating, and ventilating systems alone. That such a vast array of trades and individuals should fall into place systematically and on time can be attributed above all else to Thompson-Starrett's rationalized control over the project's seventy classified items or "principal operations" through its comprehensive time schedule. As inter-
Altogether, the Foundation Company and the Thompson-Starrett Company constructed the Woolworth Building within a period totaling twenty-nine months. Preparation of the site began in April 1910, when Gilbert engaged Phillips and Worthington to investigate the area's surface geology with test borings. That July, the E. H. Southard Wrecking and Trucking Company, followed by the Yolk House Wrecking Company, razed the five existing commercial buildings that bordered Broadway and Park Place. On November 1, the Foundation Company demolished and removed the buildings' remaining walls, footings, and floors below grade and then three days later began excavation with pneumatic caissons (see fig. 5.6). In May 1911, four months after Woolworth acquired the Barclay corner, Yolk House demolished the existing structures bordering Barclay Street, which opened up the entire 152-foot Broadway frontage. Although the Foundation Company had begun excavation in November, it took another ten months before its labor force sank the last of the foundation's caissons. It completed the skyscraper's foundation on August 26, 1911.

Thompson-Starrett's structural ironworkers set the Woolworth Building's first steel grillage on August 15, and by October 11, the skyscraper's skeletal steel superstructure began to rise in the city. In late November, the superstructure reached the sidewalk level, and then it climbed incrementally upward through the following winter and spring at a rate of nearly a story and a half per week (fig. 5.8). Bricklayers attaching terra cotta cladding followed closely behind. By April 6, 1912, steel erectors had carried the frame up to the thirtieth story, the top of the main block, and by May 30, to the forty-seventh story of the tower (fig. 5.9). On July 1, 1912, less than nine months later, they drove the frame's final rivet in place, topping off the tower's 792-foot pinnacle (fig. 5.10). "The highest piece of steel was erected on schedule time," Gilbert wrote to Woolworth, adding that "the other work has been following along with extraordinary speed and system, and it is a matter of constant remark all over the city and in fact all over the country that it has been wonderfully well handled." Thompson-Starrett's original schedule had specified a completion date of December 31, 1911. That July, Sunter pointed out that certain trades had completed work in advance of the schedule but others, unfortunately, had lagged significantly behind. Horowitz revised the schedule and designated April 1, 1913, as the project's new completion date. By comparison to the length of time it took to build a major public building—Gilbert's United States Custom House, for instance, took more than six years to construct—the Woolworth Building's three-month delay was minor; thousands of workers had fabricated and assembled its structural steel and terra cotta with speed and efficiency.

CAISSONS

Next to the Municipal Building, the Woolworth Building represented the largest architectural caisson job ever undertaken anywhere (figs. 5.11, 5.12). As such, it challenged the conventional practices of caisson construction and put to the test the newest caisson technologies. These had significantly matured since Charles-Jean Triger's fabrication of the earliest caisson for a coal mine, in 1839, a pressurized cast-iron enclosure with a sharp cutting edge for excavation underwater, featuring an air lock that permitted communication with the outside. Still, the Woolworth job imposed new demands; it pressed caisson

workers into shafts of unusual vertical depths, where they charted unknown subterranean territory and, despite the latest technologies, grappled with all the attendant risks.

After the Foundation Company arrived on the Woolworth Building site on November 1, 1910, caisson workers drove wood and interlocking steel sheet piling with steam hammers along the site's street edges and underpinned the walls of adjacent buildings with new concrete footings. On November 4, they began excavating shafts for the skyscraper's thirty-eight reinforced concrete piers, and when Woolworth enlarged the site on February 3, they excavated the thirty-one new shafts required for the project's total of sixty-nine piers. The site's bedrock, lying deep beneath waterlogged quicksand, gravel, and hardpan, varied in profile from no to 120 feet below surface grade. Where the bedrock inclined steeply, workers carved out horizontal offsets to provide suitable bearing strata. Inside the caissons, the workers labored around the clock in three eight-hour shifts of two hundred men, digging the shafts completely by hand. A half-dozen men crowded into confined chambers with at best six feet of headroom and faced poor ventilation and stifling heat. At night, the excavation continued under electric lamps, the poet John Reed's "thousand candle flares." As many as nine caissons worked at once sealed and placed under air pressure equal to the surrounding water pressure.

Each shaft took an average of two weeks to construct, with wagons carting away the excavation spoil throughout the day and night. As excavation by caisson proceeded, other teams of workers poured and sank concrete piers in sections while at times reducing the air pressure in the caissons' steel working chambers. They loaded the piers with "ballast," or huge quantities of one- and two-ton cast-iron blocks, frequently totaling up to eight hundred tons. One of the piers, caisson number 61 (six feet, six inches in diameter), they sank eighty feet in twenty consecutive hours. The larger caisson number 34 (nine feet, nine inches in diameter) took twelve days to excavate, pour, and sink.

The Foundation Company provided the Woolworth site with its own steel air lock for "hospital purposes" and kept a physician and nurse constantly in attendance. Although experts in Germany and France had determined the cause of "caisson disease," or "the bends," around 1861, it had yet to be fully understood; workers continued to suffer from the sudden decompression caused by the changes in atmospheric pressure, or "the effects of dissolved gases 'boiling' in the bloodstream," with no cases of the sickness and four of the Brooklyn Bridge's estimated twenty deaths during construction attributed to the disease. Reported, fewer than 80 percent of the applicants for the Woolworth's caisson construction qualified after on-site medical examinations for the rigors of the work. During the Municipal Building project of only a few months earlier, which required excavations as deep as 178 feet below grade, experts judged an atmospheric pressure of forty-five pounds per square inch the limit of human tolerance. At the Woolworth's site, the men excavated the shafts in forty-minute shifts, spent an equivalent amount of time decompressing in the caisson's air lock, and repeated the process just one more time before finishing for the day.

Gilbert and his contemporaries described the rigors of caisson work as an important rite of masculinity: "The courage of a soldier
CHAPTER FIVE

under fire is not more heroic," Gilbert explained. In "the excavation or the caissons" there lurked "innumerable and terrible physical dangers every hour of the day"; such work "is quoted as 'extra hazardous,'" for it is so in every sense of the word.148 William Aiken Starrett similarly compared the building of a skyscraper to the waging of a war, with workers deployed like an army in a risk-filled field operation.149 Rather than banding together as Gilbert ever, the Woolworth's caisson workers achieved solidarity through their fight to secure safe and survivable conditions of work. Their union, the International Compressed Air Workers of America, defended and protected that solidarity.

The Foundation Company, headquartered adjacent to the Woolworth's construction site at 79 Broadway, boasted garrisons on caisson technology, among them the sturdy and efficient air lock developed by its vice president, the civil engineer Daniel E. Moran. The company's reputation rested largely on the achievements of its professional engineering staff, which continued to refine excavation equipment and procedures. For the Woolworth project, it specially prefabricated the caissons' steel forms, air locks, and cofferdams in its own yards near Newark, New Jersey, and in other shops in the vicinity. On the construction site, it installed batteries of steam boilers and air compressors and set up movable derricks with long booms that steered with tens to twelve-ton caisson sections, United States Steel's American Bridge Company had continued to employ the steel fabrication technique known as "heavy bridge construction" for its structural members, which reportedly increased the total weight of the Woolworth project's steel by at least one-third. The massiveness and structural conservatism of the Woolworth Building's steel frame, then, can be explained in part by a corporation that in becoming so large, and indeed, so inflexible as an industrial system, could no longer maintain its position at the forefront of technological innovation.

The rapidity and efficiency with which the steel erectors assembled the Woolworth Building's steel frame, by contrast, pointed to an antithetical phenomenon—Thompson-Starrett's modern, rationalized system of construction, in which speed reigned paramount. In addition to fabricating the project's steel, the American Bridge Company also served as the structural steel subcontractor, employing a total of 180 structural ironworkers in single eight-hour shifts (fig. 5.14). Antonin Raymond later recalled, "Workers of that time on the whole were excellent, and I learned more from them than I had ever learned in the office." Organized in teams of erectors and riveting gangs, the ironworkers averaged a pace of two stories per week while constructing the skyscraper's twenty-eighth to twenty-story main structure, setting in a record for the largest amount of structural steel ever assembled—1,153 tons—within six consecutive eight-hour days.

The Woolworth Building's sixty-nine reinforced concrete piers functioned like giant tubular roots extending downward through water-saturated soil to bedrock. Their odd arrangement and two-staged process of construction—hardly a "pure" solution for the design of a concrete pier foundation—reflected instead Woolworth's disjointed process of acquiring parcels to create the project's final site. Axi designed most of the piers as circular, ranging in diameter from six feet, six inches to eighteen feet, nine inches. Along the skyscraper's Barclay Street edge, however, he shaped the piers instead as long and narrow rectangles, permitting a tight adjacency against the property line, and to utilizing the site to very fullest.150 After Woolworth enlarged the site, Axi joined eight of the project's original thirty-eight piers to the project's new piers with enormous transfer girders. The girders carried at their midspan enormous concentrated point loads, which shot straight downward from the main columns of the tower.

The largest of the Woolworth's transfer girders, G41, spanned two piers under the tower column 44. Probably the heaviest ever used in building construction, G41 was eight feet deep, six feet, nine inches wide, and twenty-three feet long. Built up from three separate girders, and finished with solid web and side plates, it weighed sixty-five tons. At its center, it carried a concentrated point load of four thousand seven hundred tons. On account of its size, G41 required a forty-two-horse team and a one-hundred-ton truck to haul its bulky mass to the building site. After grappling with girder G41, the Foundation Company chose to cut apart the project's remaining seven transfer girders while still in transport aboard a lighter; at the construction site, it had workers rivet the pieces back together again.151 Along the project's western property line, a special type of transfer girder, the cantilever girder, carried the column loads eccentric with the building's main foundation piers, supporting those loads as closely as possible to the existing adjacent construction.152 Unusually elaborate steel grillages distributed the tower columns' concentrated point loads over the top of each concrete pier, utilizing four separate tiers of steel I beams, each laid crosswise—contrasting with the simpler two-way grillages typically found in New York's skyscrapers.153 Altogether, Axi's design for the Woolworth Building's cumbersome system of oddly shaped concrete piers, huge transfer girders, cantilever girders, and complex grillages illegitimately transferred down to bedrock the skyscraper's combined column loads of 95,000 tons. Still, it effectively exploited every square inch of Woolworth's property.154

STEEL

The extreme depth of the Woolworth Building's concrete pier foundation was exceeded only by the extreme height of the tower's structural steel. The project's huge quantity of steel pointed to the high volume of production made possible by the size of United States Steel, the recently consolidated, vertically integrated, and world's largest steel producer. As the parent company of the Carnegie Company and the American Bridge Company, United States Steel produced as well as fabricated all the structural steel for the Woolworth Building.5 United States Steel's great size, however, also engendered a particular type of product, its Carnegie Company's massive and overdesigned steel I beam. The Carnegie Company, furthermore, had continued to build up I-beam sections using plates and angles at the very moment that its competitors, Bethlehem Steel, began producing the innovative, labor-saving wide-flanged H-beam, a product of the new "universal" rolling method devised by Henry Grey.156 Corresponding to the Carnegie Company's conservative method of creating built-up sections, United States Steel's American Bridge Company had continued to employ the steel fabrication technique known as "heavy bridge construction" for its structural members, which reportedly increased the total weight of the Woolworth project's steel by at least one-third. The massiveness and structural conservatism of the Woolworth Building's steel frame, then, can be explained in part by a corporation that in becoming so large, and indeed, so inflexible as an industrial system, could no longer maintain its position at the forefront of technological innovation.

The rapidity and efficiency with which the steel erectors assembled the Woolworth Building's steel frame, by contrast, pointed to an antithetical phenomenon—Thompson-Starrett's modern, rationalized system of construction, in which speed reigned paramount. In addition to fabricating the project's steel, the American Bridge Company also served as the structural steel subcontractor, employing a total of 180 structural ironworkers in single eight-hour shifts (fig. 5.14). Antonin Raymond later recalled, "The workers of that time on the whole were excellent, and I learned more from them than I had ever learned in the office." Organized in teams of erectors and riveting gangs, the ironworkers averaged a pace of two stories per week while constructing the skyscraper's twenty-eighth to twenty-story main structure, setting in a record for the largest amount of structural steel ever assembled—1,153 tons—within six consecutive eight-hour days.
CHAPTER FIVE

As the steel arrived at the site, between thirty and forty structural ironworkers unloaded, sorted, and began erecting the frame's individual steel components, assisted by large stiff-legged derricks. A team of ten erectors followed two stories behind, "fitting up" and plumbing the steel columns, girders, beams, and portal arch wind bracing to a tolerance of three-eighths of an inch (fig. 5.14). Four-man gangs of riveters, twenty-two in all, accompanied the erectors. Concentrated in groups around the frame's column splices, portal and knee braces, and girder intersections, the gangs drove an average of three hundred rivets per eight-hour day using pneumatic hammers operated from the basement by two electrically powered air compressors. A force of thirty-five steel painters followed one story behind the riveters, applying the code-required field coat of red lead paint. The floor-arch builders followed still another story behind.161

Gilbert spoke of "the hazardous height to be scaled by the workmen erecting the structural steel," and Horowitz of the chilling experience of working high on a steel skeleton "so high from the ground [that] on wet mornings, its upper half was lost to view in clouds."164 The steel erectors, Horowitz added, "seem not to know the meaning of fear" (fig. 5.15). They stood on the edges of beams, leaning their bodies outward against the wind, and swarmed "like flies onto the chain of the hoisting mechanism," by which they were lowered, "almost as swiftly as falling, to the street," finding the elevators too slow.169 Journalists hailed the steel erectors' risk taking, while knowing full well that the risks were all too real. At the project's outset, a derrick's steel cable broke, crashing down over the sidewalk and, in Gilbert's words, "killing a man and badly wounding, probably mortally, a boy while passing."165 As the frame approached the twenty-eighth story, the riveter Peter Gushue of Brooklyn fell down an elevator shaft, and several hundred fellow workers mourned his death, refusing to work for twenty-four hours afterward.166 Liability insurance inspectors reported the accidents and injuries, which ranged from minor to severe, at least once a week.167 New York's unions continued to demand safer building methods and equipment, given the industry's national average of 12 fatalities and more than 350 serious injuries per 1,000 workers a year—among them the stabilizing of scaffolding and ladders, the placement of guardrails around openings, and the covering of floors as a skyscraper's skeleton rose—and backed those demands with strikes. Still, they found their demands at best infrequently acknowledged.168 Paul Starrett frankly admitted that a worker should join a union to protect himself, but also applauded the site's foremen who "made a game of it, a race against time."169

A RECORD-BREAKING FEAT OF MODERN CONSTRUCTION

Figure 5.13: Woolworth Building, structural ironworkers hoisting a beam in place, 1912. Photograph by Brown Brothers.

Figure 5.14: Woolworth Building, structural ironworkers, 1912. Unidentified photographer. Cantor Gilbert Collection, Archives Center, National Museum of American History, Behring Center, Smithsonian Institution.
In 1903, the editors of *American Architect and Building News* called attention to the rapidity of the day's steel-frame construction, arguing that it demonstrated the virtues of a modern method of assembly:

"The advantage of the modern steel-frame construction over the older style in point of rapidity has been strikingly shown of late. It is obvious that, while every portion of a steel-frame structure takes as long to make as the corresponding part of a building of masonry, it is possible, in the former, to prepare parts outside, and when they are ready, to 'assemble' them... with a rapidity which is out of the question in masonry structures." In assuming such a preconceived relationship among the steel frame's component parts, the method of assembly suited Thompson-Starrett's objective of rationalizing the process of construction. As early as the 1840s, James Bogardus had pioneered a modular system of cast-iron construction, but not until 1887 did the method of assembly triumph—in London's Crystal Palace. Its builders, Fox and Henderson, had the design's individual cast- and wrought-iron members prefabricated as modular, interchangeable parts and in turn erected by a rationalized, linear method that portended later industrial assembly lines. Horowitz would go on to declare that "our mighty skyscrapers all have been assembled out of factories." Steel, in use for skyscrapers in New York since the mid-1890s, comprised modular components not unlike the earlier cast- and wrought-iron systems—albeit with the added advantage of increased strength in both tension and compression. Horowitz found steel ideally suited to a comparable type of prefabrication off site, where the final location of each member could be predetermined by the fabricator's setting plan. The Woolworth's steel members could not "have either been fabricated, properly finished, shipped, handled, or erected in the ordinary course of events," *Engineering Record* reported in 1912, suggesting Thompson-Starrett's recent advances in the scale of assembly. The process of assembly, moreover, ensured predictability and accuracy in the scheduling of construction and so made the company's goals of rationalized construction and rapid completion achievable.

As constructed, the Woolworth Building's steel frame possessed not only a visual massiveness that betrayed its conservative design, but also a complexity among its component parts unprecedented in earlier skyscrapers. Column, girder, and bracing members the American Bridge Company built up in accordance with Aus's design had a level of elaboration never reached before or since in steel-framed construction. Column, girder, and bracing members the American Bridge Company built up in accordance with Aus's design had a level of elaboration never reached before or since in steel-framed construction. The Woolworth's steel frame possessed not only a visual massiveness that betrayed its conservative design, but also a complexity among its component parts unprecedented in earlier skyscrapers. Column, girder, and bracing members the American Bridge Company built up in accordance with Aus's design. Horowitz's effort to streamline, rationalize, and speed up the entire process of construction and wind bracing, the final design of which Aus assigned to his associate S. F. Holtzman, had a level of elaboration never reached before or since in steel-framed construction. The Woolworth Building's system of wind bracing, the final design of which Aus assigned to his associate S. F. Holtzman, had a level of elaboration never reached before or since in steel-framed construction.
system integrated a wide catalog of bracing types: portal arch and double portal arch bracing, full-story diagonal bracing, and knee bracing, or the low diagonals joining corner girders and columns. It also incorporated the more common stiff, moment-resisting connections made by joining triangular gusset plates to girders and columns. Second, the tower's lower twenty-eight stories featured the most extensive use of portal arches ever to appear in tall building construction. In the tower's frontal elevation, the portal arches made possible an unusual degree of openness between the main structural columns, precisely in the places the eye would have expected to find either full-bay diagonals or, in masonry construction, the greatest massiveness and weight. The portal arch system, in essence, made possible the architectural impression desired by Gilbert, that of a screenlike ethereality.

The Woolworth's tall and thin central tower functioned structurally as a highly rigid vertical cantilever: Totally self-supporting, it stabilized the entire building. From the tower's fifty-fifth-story pinnacle down to its fiftieth floor, inclined roof members counteracted the lateral forces of the wind. Then, from the fiftieth floor down to the forty-seventh floor, four interior columns joined to floor girders resisted the forces, and from the forty-seventh floor downward, outer columns connected to wall girders. From the forty-second floor down to the twenty-eighth floor, Aus reinforced the tower's system of columns and wall girders with diagonal knee bracing. Finally, from the tower's intersection with the building's flanking wings at the twenty-eighth story, and all of the way down to the building's base, Aus's portal arches spanned each structural bay and every story in the tower's front and back elevations. In addition, Aus set portal arches in bracing planes, which extended perpendicularly back from the Broadway elevation through the tower's full depth of three bays. On the Woolworth's lowest four floors, he doubled the portal arches, and for its basement as well as its first floor, he designed each reinforced concrete floor as a horizontal diaphragm, or what he called “a continuous sheet of great strength,” to provide additional rigidity in resisting the lateral forces of the wind. Aus designed the Woolworth Building's lower flanking wings to be structurally self-supporting—their massive vertical loads exceeded the potential lateral loads—but he also combined them with the central tower to ensure the building's lateral stability. He secured the wings' rigidity by joining them in tandem with gracefully arched portal struts spanning the skyscraper's light court. Due to the intricacy of the skyscraper's full catalog of bracing components, and to their integration with the steel skeleton as a system, Aus could assert with complete confidence that “not the slightest tremor can be observed on top of the tower, even in a very heavy wind.”

The scale and complexity of the Woolworth Building's wind-braced steel frame required that Gilbert rely heavily on the
engineering expertise of Aus. Still, Gilbert instructed Aus to be "extremely careful and conservative" with his structural calculations. Gilbert also advised Woolworth that Aus's design be checked by "an outside engineer" as an "additional precaution" and recommended Boller and Hodge, the structural engineers who had checked Otto Francis Semsch's design for the Singer Tower and more recently Purdy and Henderson's design for the Metropolitan Life Tower. Woolworth, eager to trim expenses, countered that checking by United States Steel or the Manhattan Bureau of Buildings would be adequate. Gilbert continued to advocate caution, nevertheless, choosing Thompson-Starrett's chief engineer, George Simpson, for the checking. He then emphasized to Simpson that while he had confidence in the engineering judgments of Aus, he also wanted to ascertain the Woolworth Building's absolute stability, given its "extraordinary height." In 1911, Gilbert wrote proudly of the Woolworth Building's superior rigidity against the forces of the wind: "It has been the intention to provide the soundest, strongest, and most efficient construction." Tests made by Aus during a "violent gale" on January 6, 1913, Gilbert felt comforted to know, revealed not the slightest tremor. In 1915, Gilbert asserted that the tower "does not sway at all so far as we can detect by the most careful measurements" and that "the structure is of the most substantial character; we did not dare take any risks that could be foreseen or avoided." Although the tower did in all likelihood sway at least a fraction of an inch, Gilbert had it tested yet again the following year, to put to rest once and for all recurring myths about its swaying.

Aus, in marked contrast to Gilbert, strongly criticized the Woolworth Building's structural redundancies and wasteful conservatism, publicly calling attention to its absence of structural engineering economy. This he blamed on the 1899 New York City building code's excessively high figures for wind loads and live loads. Skyscrapers, he insisted, could beyond any question be built to a height of one thousand two hundred feet—but only if engineers and officials reevaluated the code's requirement for wind loads and live loads. Under the current code, it would be impossible to ever build much higher than the Woolworth Building, at least without the closer spacing of major columns and the consequent loss of valuable floor area. Other engineers called New York's building code archaic and urged that it be amended. They cited Chicago's building code as the desired model.

The Woolworth Building's rapid, rationalized process of construction and record-setting height may have exemplified Thompson-Starrett's ambition to modernize the city, but the massiveness and conservatism of its structural design pointed instead to the outmoded stipulations of the firmly entrenched 1899 New York City building code. Even the gianthood of United States Steel, with its stagnant methods of design and reliance upon heavy bridge fabrication techniques in the end served the dictates of the code. Those who attempted to revise the code, in particular the New York Building Code Revision Commission in 1909, confronted the vicissitudes of city politics in addition to the competition between local building trades and professional interests. The code's stipulations remained in force until 1916, when the city finally adopted a new code. Only in later skyscrapers such as the Empire State Building would engineers use fewer structural pieces and connections of increased rigidity to serve the same ends with greater economy. Consequently, the most innovative aspect of the Woolworth's construction would be identified instead with Horowitz and the Thompson-Starrett Company's "modern building organization" and, in particular, with the organization's rationalized method for assembling the skyscraper's intricate skeleton of steel in record time.

**Terra Cotta**

The Woolworth Building's steel frame asserted itself audaciously during construction as a bold feat of modern technology, but the application of its handcrafted terra cotta cladding suggested by contrast a kinship with the great stone monuments of the Middle Ages (see figs. 5, 9, 5.10). Terra cotta invested Aus's steel-framed engineering with a human scale, delicacy, and soaring, aerial lightness; without such an intricacy of ornamental detail,
CHAPTER FIVE

A RECORD-BREAKING FEAT OF MODERN CONSTRUCTION

try had developed fully by 1910 (figs. 5.10, 5.13). Although working within the oldest tradition of their craft, the bricklayers found themselves subject to the dictates of Thompson-Starrett's comprehensive time schedule and to the concomitant rigging of the building site for efficiency and speed. Thompson-Starrett kept the Woolworth project's 110 scaffolds, suspended completely around the building by seven-story ropes, under the constant supervision of five men, who raised them on schedule methodically, abruptly, and all at once, to keep the top of the terra cotta cladding continually at waist height for the workmen. On the skyscraper's lower floors, work advanced at the rate of one and a half stories per week. Still, the speed of the terra cotta's application wholly depended on the rates of its production and shipment by the Atlantic Terra Cotta Company.

On April 10, 1912, after the bricklayers had finished attaching fourteen stories of the Woolworth Building's terra cotta cladding, thirty stonemasons began dressing, setting, and anchoring carved Bedford limestone to its three-story base (fig. 5.12). The skyscraper's steel-framed construction facilitated speed by allowing workers to proceed with such typically discrete cladding operations simultaneously. It also allowed the building to remain open.

FIGURE 5.20 Woolworth Building Tower, showing installation of terra cotta cladding on the first two floors of the tower as it rises above the main building, 1912. From Atlantic Terra Cotta, vol. 2 (April 1915). Unidentified photographer. Collection of the New-York Historical Society, negative 78898d.

The main challenge he faced, Gilbert told a reporter in 1912, was "how to combine height with architectural distinction." In the large-scale industrial manufacture of terra cotta—the largest single use of architectural terra cotta to date—Gilbert had identified a modern method for recreating the character of a Ruskin-inspired handcrafted and polychromatic design and, with it, a modern method of hierarchically integrating types of ornamentation that rivaled his medieval models.

Bricklayers began attaching the Woolworth Building's terra cotta cladding on February 1, 1912, after the structural ironworkers had completed the riveting of its skeleton up to the eighteenth story. That day, about one hundred men positioned on scaffolds encircling the building's entire sixth story began tying the pieces of terra cotta to steel members with steel anchors, fastening each numbered piece to reflect its numbered location on the drawings. Subsequently, they backfilled the cladding with common red brick and mortar, employing a craft technique that industrial plant.

FIGURE 5.21 Woolworth Building, detail showing the installation of terra cotta cladding, May 18, 1912. Photograph by Wurts Brothers. Collection of the New-York Historical Society, negative 78854.
below the sixth story until it received the approximately 150 loads of terra cotta, 50 loads of stone, and 80 loads of brick delivered to the site, deposited on the sidewalk bridges, and then handed over to the workmen or stored in designated areas elsewhere within the structure. 199 After the first batch of terra cotta arrived, construction suddenly came to a standstill. The intricate Gothic ornamentation of the crown's projecting canopies and the setting and anchoring of limestone at the three-story base, June 10, 1912 • photograph by Wurts Brothers. Collection of the New-York Historical Society, negative S+7SI. 

FIGURES 22 Woolworth Building, lower stories under construction, showing the tower's three setback stages required further labor and time to craft in the factory by hand. Almost two months later, on October 31, Atlantic Terra Cotta shipped its last cargo of ornamental cladding to the site.200 The manufacture of the Woolworth Building's seven thousand five hundred tons of architectural terra cotta by the Atlantic Terra Cotta Company's Perth Amboy, New Jersey, industrial works had begun in December 1911.201 Only four years earlier, Atlantic Terra Cotta had merged with three other large terra cotta companies, among them the Perth Amboy Terra Company, to become the largest terra cotta manufacturer in the world.202 Given the volume of production required for the accelerating pace of office building construction, Atlantic Terra Cotta employed "efficiency experts" at its Perth Amboy plant to oversee a newly standardized and mechanized system of production.203 As a result of such practices, terra cotta's production, which had already doubled on a national scale between 1890 and 1900, had almost quadrupled by 1910.204 In 1911, Atlantic Terra Cotta publicized the product it supplied for the Woolworth Building as "one of the largest contracts in terra cotta ever given for a single structure in the world."205 The Atlantic Terra Cotta Company's production of individual terra cotta units for the Woolworth's cladding followed the industry's conventional practices, with two key exceptions. First, Gilbert required that the company's draftsmen produce the project's hundreds of full-size detailed drawings in an office adjacent to his own under the supervision of Johnson. Its construction department then produced a pair of detailed drawings, or shop drawings, at "shrinkage scale."206 Second, Wells's specifications stipulated that the full-size models of the Woolworth's handcrafted and costly "foliate or intricate ornamental parts"—its terra cotta tracery, crockets, pinnacles, and gargoyles—be modeled by an outside firm of Gilbert's choice, which he later identified as Donnelly and Ricci.207 Donnelly and Ricci, Gilbert further stipulated, were to sculpt the models at Atlantic Terra Cotta's Perth Amboy factory rather than in their own shops.208

Many of Donnelly and Ricci's modelers had trained as architectural sculptors in European art schools before departing to the United States. Elissio Ricci, the firm's partner in charge of the Woolworth project, studied sculpture in Florence before emigrating to America in the 1890s.209 Ricci either modeled himself or supervised the modeling of all terra cotta ornamentation for the Woolworth Building.210 After Ricci and the modelers sculpted the project's full-scale "foliate or intricate ornamental parts," they presented their work to Johnson for approval.211 Johnson authorized the models, and then factory workers cut them up to make plaster molds. Shortly thereafter, the manufacture of the terra cotta began.212 Gilbert had few reservations about assigning the design of the Woolworth Building's structural steel to A. H. Jealously guarded the ornamental character of its terra cotta cladding, however, as his own métier. For Gilbert, terra cotta offered new possibilities for surface textures, for colors, for "authentic" craftsmanship, and for rivaling the colorful stone facings and venetian architecture of the Middle Ages.213 Even more important, terra cotta had the capacity to compensate architecturally for what Gilbert continued to view as the structural steel frame's problematically thin and repetitive construction. Woolworth intended, Gilbert emphasized, to build the Woolworth Building not as "a purely commercial structure," but rather "to clothe it with beauty," and "to make it a worthy ornament to the great city of New York." (fig. 5.23). Woolworth, he added, was willing to pay for such a structure "enriched and beautified" with ornamentation and color, and terra cotta cladding provided the means.214 Gilbert gave all elevations of the Woolworth Building an equally elaborate ornamental treatment, even the lustrous, fully glazed, and highly reflective light court.215 For the
Woolworth Building's general color, Gilbert chose a combination of warm cream and ivory shades, which he combined in a matte-glazed surface that suggested the patina of age. Against this background, he tinted the building's transoms with a darker tone of buff, to deepen the illusion of recession between the verticals; he intended to attract and to lead the eye upward with "the light lines and planes of the piers."

Gilbert used a far bolder, varied palette of color to "accent both the highlights and shadows" in the Woolworth's Flamboyant Gothic ornamentation (fig. 5.24; see fig. 5.23). Against the dark blue undersides of crowning canopies, he applied touches of bright gold glaze as highlights in ornamental shields, setting these off against "darker shades." When caught by sunlight, their sparkle emphasized "by contrast the depth of shadow." Just below the projecting canopies at the twenty-sixth and the forty-second stories, Gilbert set the terra cotta transoms more deeply and colored them more darkly in bronze green. In their juxtaposition with the dark blue tones lining the canopies' undersides, they intensified the illusion of shadowy depth and cavernous recess beneath a crown. In the backgrounds of the transoms'
Flamboyant Gothic tracery patterns, Gilbert applied golden yellow, sienna, bronze green, and light and dark blues as poly-chromatic accents to throw the tracery's delicate outlines into sharper detachment and relief. Although the eye of the street spectator could barely distinguish such background colors on the building's higher floors, they grew stronger in depth, and appeared across larger areas of surface as their distance from the ground increased. In his choice of colors, Gilbert gave special consideration to how the Woolworth's picturesque tower would look against the sky's atmospheric background of sky and clouds. As if he were recreating through his choice of colors one of his many sun-filled watercolors of European towers and campaniles, he wanted, he said, to "apparently increase the height of the tower" and to "relate it to the color of the sky, whether blue or grey." In the transoms of the tower's higher setback stories, he colored panels light green, and for the highest stories, he used white against blue. As for the spire, Gilbert later recalled that he "studied for many months" the "color of the roofs and especially of the apex of the tower, with its delicate gilding... before it was finally determined." Gilbert eventually decided to gild the ribs of the roof and observation story. He highlighted the copper panel of the main building with their Gothic pinnacles, cresting, and tracery patterns in a pale blue green (fig. 5.25). Little in the Woolworth's bright and sunny color scheme could be traced to Gilbert's original, and darker, medieval sources, whether those of the sacred or secular Low Countries Gothic, or the English Perpendicular and French Flamboyant Gothic traditions. Gilbert, rather, continued to view colored terra cotta through a fifteenth-century Ruskinian Gothic lens. In place of the Ruskinians' authenticity of "constructional polychromy," however, he exploited instead the illusory capacities of terra cotta's colorful surface glazes. In doing so, he strengthened the vividness of the Woolworth tower in the eye of the street spectator while also highlighting its shape as an eye-catching ornamental feature in distant street and skyline views. Besides terra cotta's suitability for color, Gilbert exploited its technical capacities to the fullest: its potential for the clarification of form through sculptural detachment, tolerance for deep undercutting, facility in attenuation, and susceptibility to modeling in high relief. Linear Flamboyant Gothic ornamentation in terra cotta enlivened the surfaces of the Woolworth's gables, culminating toulrelles, spandrels beneath ogee arches, and horizontal belt courses. It vigorously projected in Gothic canopies—Schuyler's "efflorescence" of "buds and blossoms"—in the gargoyles of the toul­ relles, and in the finials and crockets of the crown. Large flying buttresses of terra cotta effected skillful transitions at the tower's setbacks (fig. 5.26). Freestanding verticals projected from outriggers in the tower's upper stages, attenuated to the point of weightlessness. As if inspired by the writings of Ruskin, Gilbert found in terra cotta the ideal medium by which to calibrate the proportions of the tower's Flamboyant Gothic ornamentation, thereby reducing the skyscraper's colossal size in the eye of the street spectator. "As the parts were reduced in size and increased in number," wrote Gilbert, "they were also increased in relative size, so as to make some allowance for the optical reduction due to their distance from the eye." The large-scale ornamentation Gilbert designed for the tower's highest stages, particularly—"by no means... a process of mere 'monstrification,'" as Schuyler put it—augmented its legibility.
from a distance while retaining the material's characteristic clarity of outline for all beholders to appreciate, whether stationed near or far.225

Along with its lightness, grace, and subtleties of color, the Woolworth Building's terra cotta cladding had a peculiarly delicate, lean, and brittle character that made it stand out as a specifically modern material among Gilbert's earlier Beaux-Arts monuments in stone, notably the United States Custom House. The Woolworth's terra cotta pieces, moreover—already stylized and factory made—Gilbert designed in repetitive patterns, as groupings of four stories about the central axis of the tower. Gilbert, it appears, had little immunity to the modern, industrial tendency that an 1890s critic had already identified in the terra cotta ornamentation of Chicago skyscrapers, which he called the "machine-lace of the present day."226 Still, few contemporary critics could find any artistic shortcoming in the Woolworth Building's modern version of the Gothic ornamental tradition—they called attention, rather, to its remarkable authenticity. Schuyler compared the Woolworth's ornamentation favorably with that of a medieval cathedral's. "One has seen photographic 'bits' of famous minsters in comparison with which this brand new American Gothic loses nothing.227 And if Engineering Record and Scientific American hailed the Woolworth Building as a feat of structural engineering, art critics such as Clarence Ward attributed its success as a skyscraper to the beauty embodied in the scale, poetry—indeed, in the "Gothicness" of its "lacelike and beautifully proportioned" terra cotta detail.228 In architectural terra cotta, consequently, Gilbert and Woolworth had discerned the ideal material for reconciling their desire for a European, handcrafted exterior with the city's forces of modernization.

The Highest Building in the World

Well before the Woolworth Building's steel frame began to rise visibly in the city, Woolworth hired the commercial photographer Irving Underhill—whose studio directly fronted the building site—to document its construction at regularly timed intervals. He then mailed Underhill's photographs to his store managers and agents throughout the country and abroad, with the recommendation that they be distributed and published as "widely as possible" (see figs. 5.6, 5.8, 5.9, 5.10).229 The construction of the Woolworth Building, like that of other major skyscrapers and noted works of engineering of the day, inspired a widespread enthusiasm for what David Nye has called the "technological sublime."230 This enthusiasm Woolworth appreciated. He would both exploit it and celebrate it through Underhill's photographs and other forms of publicity, continuing his program of strategically promoting his project, thereby calling still greater attention to his "world's greatest skyscraper.

As the Woolworth Building rose skyward, New York's newspaper reporters recorded its progress and in the process transformed its construction into a form of urban theater. In their well-timed sequence of stories they interwove the epic of the skyscraper's ascent with human drama. The reporters' accounts reached the expected climax on July 1, 1912, with the tower's topping off as a noon whistle blew; Charley Campbell, Thompson-Starrett's steel superintendent, hoisted a twelve-by-twenty-four-foot flag to the top of a thirty-foot flagpole (fig. 5.28). Thousands of people in the streets, the reporters noted, "paused to pay tribute to the highest building in the world."231 "The upper stories were crowded with ironworkers, steamfitters, plumbers, reporters, photographers,
and other curiosity seekers," the Gilbert office's G. F. Shaffer more accurately explained, "while far below could be seen the upward gazing throng of Broadway's noon thousands." The denouement of the newspaper drama took place on December 12, 1913, with the exceedingly spectacular and some thought "wholly unnecessary and daredevil performance," of the craftsman Niels Nelson, who inched his way to the top of the tower's flagpole to gild its summit with a glint of gold.21

In June 1911, Hugh McAtamney reported to Gilbert that he had succeeded in getting news items about the as-yet-unbuilt Woolworth Building printed in two hundred newspapers around the world, and that "dippings are now coming in from France and Germany."22 In all likelihood, it was McAtamney who broached to reporters in May that the roof of the Woolworth's twenty-eighth story might serve as an "aerial wharf" for airships, and its tower sport an electric beacon at its peak, transforming it into an "aerial lighthouse."23

And as the tower's frame neared climax and completion in June 1912, it was probably McAtamney who apprised the city's reporters of the exploits of the aviator Frank Goodale. Goodale piloted a balloon contraption out of the haze over the Hudson River, encircled the pinnacle of the tower, and waved at the structural ironworkers. He then headed south to Battery Park, "to the wonder of gaping thousands from the streets, roofs, and windows of skyscrapers."24

The capstone of McAtamney's publicity program for the Woolworth's construction, his commemorative The Master Builders: A Record of the Construction of the World's Highest Commercial Structure (1913), exalted the skyscraper as well as its builders (fig. 5.2): "The United States of America has set the pace for building construction of the entire civilized world," the book triumphantly pronounced in its opening line, linking the project with the day's popular and widely trumpeted themes of western expansion and dominance. "There may never be a building in New York City which will tower away so high skyward."25 Woolworth and Gilbert wrote introductions, with Woolworth proclaiming his skyscraper "the greatest structure in the world" and Gilbert calling his own design a "worthy ornament to the great city of New York."26 The embossed blue cover of The Master Builders, with its gilded lettering and tinted photographs showing the completed Woolworth Building and the new New York skyline, functioned as a superb piece of visual boosterism for the Thompson-Starrett Company, Woolworth, and for the city. It also functioned as eye-catching advertising for the project's subcontractors, craftsmen, and manufacturers, who in giving to prospective customers such an account of "the greatest structure in the world" furthered Woolworth and McAtamney's objectives for publicity.

Burrelle's Press Clipping Bureau culled accounts of the project's construction from newspapers around the world and mounted them in scrapbooks designed for Gilbert and Woolworth.27 McAtamney, in the end, spent approximately one hundred thousand dollars publicizing the construction of the Woolworth Building—perhaps the first public relations campaign on such a scale for a single building.28

In the process, he further sensationalized an already sensational skyscraper. Yet after a certain point, McAtamney's program of publicity threatened to destroy the air of high seriousness that Gilbert, Horowitz, and Woolworth brought to the construction of the project. In late July 1912, Gilbert cautioned that "spectacular advertising of the building must not be permitted."
and later, Edward Hogan asserted as the skyscraper’s rental agent that “if you get too spectacular, you don’t get the tenants you want.”

By 1910, skyscrapers, along with long-spanning bridges, subway tunnels, and great railway stations, had become powerful and awe-inspiring emblems of the modernizing city. As the Thompson-Starrett Company’s William Aiken Starrett later put it, “when a great building starts, all the world is a builder,” and “the whole citizenry of a metropolis takes to its heart the swift and skillful accomplishment.”

Horowitz, not surprisingly, viewed the Woolworth Building as a superior work of construction in its own right, as the defining project in his career as a builder, and the lower Manhattan skyline as a “three-dimensional memoir.”

As innovators in the construction industry, Horowitz and his Thompson-Starrett Company took pride in participating as builders in the nation’s larger ethos of technological experimentation, innovation, and achievement.

Hughes has written that in the United States the “character-forming achievement for almost three centuries has been to transform a wilderness into a building site.” The New York skyline, which Paul Starrett later described as “more skyscrapers per acre and taller skyscrapers than any spot on earth,” signified the early twentieth century’s most pronounced architectural manifestation of such an achievement. Equating those skyscrapers with recent advances in the construction industry, William Aiken Starrett proclaimed that historians of the future “will of surety say that we were a nation of builders, great builders, the greatest the world has ever seen.” For Gilbert’s contemporaries in construction, then, the Woolworth Building—at its completion New York and the world’s tallest, its height the product of a newly systematized building organization and a rationalized process of assembly in record time—marked a turning point in the history of construction. Such height and speed of assembly they chose to celebrate, despite the building code’s conservatism, the historicizing features of Gilbert’s skyscraper Gothic design, the realities of the construction industry, or even Woolworth’s exploitation of the project toward the ends of spectacular urban theatrics and printed media publicity. For this reason, skyscrapers such as the Woolworth galvanized for those who watched or read about its rise in the city a still newer belief in the nation’s seemingly predestined technological greatness.