No Exit

The Rise and Demise of the Outside Fire Escape

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The now commonplace expression "socially constructed," when used in reference to technology, ordinarily refers to a process of indirect influence, whereby the tastes, values, or institutions of a society shape a physical artifact or system. Yet in democratic societies with representative governments technologies and artifacts can be literally socially constructed, in the sense that a government may on behalf of its citizens call objects into being. Examples of such artifacts—which might for the sake of clarity be called "publicly constructed"—include military ordnance and deadly devices such as tanks and fighter jets, for which there are no legal civilian uses. Interestingly, another category of publicly constructed artifact includes devices intended to have the opposite effect—that is, to safeguard human life and limb. Workplace safety laws, along with changing judicial views of employer liability, have brought into existence a range of protective devices—from machine guards to protective suits with respirators—for which there was little or no market demand.

The American "skeleton" fire escape is an example of the latter sort of publicly constructed artifact. In the nineteenth century, city and state governments called these iron balconies with ladders or stairs into being. Their form and details evolved over time as localities revised standards for their design and construction. But outside fire escapes had inherent drawbacks, and although they were placed on the walls of early skyscrapers they were

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unsuitable as exits from very tall buildings. Thus, just as they had required the development of these devices to begin with, cities and states brought that development to an end during the twentieth century when they excluded fire escapes from the permissible options for providing egress from new large buildings. For this reason, fire escapes no longer appear on the walls of modern commercial and civic buildings or big residential structures.

Like all publicly constructed artifacts, the fire escape and its evolution reflect changes in both the external environment in which the device functioned—increasing building heights, population densities, and fire hazards—and in Americans' attitudes about the responsibility building owners have for the well-being of the public. This article traces the history of the outside fire escape in the United States from its introduction in 1860 to the early twentieth century, when expert opinion turned against fire escapes as a means of emergency egress.

Early State and City Laws

When a building is on fire, smoke and flames will spread through undivided floor areas and seek to rise through open shafts, such as those containing stairways and elevators. It is desirable to have multiple ways out of a building in case the regular stairs and corridors become blocked by fire and smoke or jammed with people all trying to get out at the same time. A fire escape is a supplemental means of egress, commonly called an "alternative" means of egress. In an emergency these extra exits are vital, but for daily comings and goings they are redundant.

Until the mid-nineteenth century, no one saw the need to build supplemental exits. Given the relatively small buildings of the day, a rescue ladder at a window sufficed in an emergency. Indeed, in this period the term "fire escape" meant a ladder on a cart wheeled to a burning building. The ancestor of the skeleton fire escape was not this wheeled ladder but rather a device mandated by law: the roof exit, or scuttle. Introduced as early as the eighteenth century, the roof scuttle began as a voluntary measure, installed to allow firemen to reach roof or chimney fires. However, scuttles could also serve as emergency escape routes that let occupants scramble out in case fire blocked their way down the stairs. In 1852, the city of Brooklyn required all buildings within the fire limits to have "a scuttle or place of egress in the roof." New York City and later Boston adopted similar rules, and eventually many cities required roof scuttles for emergency egress.[1]

1. 1852 New York Acts, chap. 355, section 7; 1862 New York Acts, chap. 356, section 27; 1872 Massachusetts Acts, chap. 371, sec. 15; H. A. Phillips, "Comparative Municipal Building Laws," pt. 14, *American Architect and Building News*, 24 September 1892, 195.

APRIL
2003
VOL. 44

What brought the iron balcony fire escape into existence was the proliferation of large, multifamily "tenant houses," or tenements, in New York City. While the earliest tenements were simply old homes and stores converted to apartments, by the 1850s landlords had begun to put up new tenement houses that, at four, five, and six stories, might tower over their neighbors. A committee of New York lawmakers surveyed the sanitary condition of tenements in 1856 and found that, among their other failings, the buildings were firetraps, with flimsy, combustible interior partitions and steep, dark, crooked stairways that could not be descended quickly. Moreover, regardless of the number of occupants the tenements typically had only a single stairway. The committee recommended that stairs and halls of larger tenement houses be regulated "to ensure easy egress in case of fire," but nothing came of its report.[2]

New York had regulated buildings since colonial times under the community's police power, and the regulation of tenements in the interest of public health and safety simply continued this tradition. Usually tragedies—a deadly building fire or collapse—and the ensuing public outcry drove lawmakers to revise the building laws, and it was a tragedy that brought New York City's first comprehensive building code into being. In February 1860 a fire in one of the tall tenement houses trapped people on the upper floors, beyond the reach of the fire department's ladders; ten women and children died. New York City architects drafted a building law that brought together disparate existing rules concerned with buildings and added some new ones, and this became the basis for a bill the state legislature enacted. The law contained the city's first exit regulations, which applied only to tenements. Every large tenement house was to have either a noncombustible tower stairway or "fireproof balconies on each story on the outside of the building, connected by fireproof stairs."[3] The word "fireproof" in this case meant that the balconies and stairs were to be made of something other than wood, which, as a practical matter, meant iron.

No other American city at the time faced a tenement house problem on this scale, and thus, through the 1860s, New York City was on its own when it came to devising rules for egress. The Old World offered little guidance. London's building law required that the main corridors and stairs in public buildings be made of noncombustible material, but this was mainly for the safety of firefighters entering a burning building.[4] New York's 1860 law represented an advance in that it required either one protected stairway, as

2. New York Assembly, *Report of the Select Committee Appointed to Examine into the Condition of Tenant Houses in New-York and Brooklyn, 1857*, report no. 205, vol. 3 (Albany, 1857), 3.

3. 1860 New York Acts, chap. 470, sec. 25; "Burnings—Fire Escapes," *Scientific American*, 18 February 1860, 121.

4. C. C. Knowles and P. H. Pitt, *The History of Building Regulation in London, 1189–1972* (London, 1972).

in London, or else two ways out. The city also took the novel step of applying the new rules retroactively to existing as well as future tenements. This retroactive feature distinguished the new exit rules from practically all other provisions in this and subsequent building codes, which applied only to new construction.

Although the fireproof balconies connected by stairs described in the 1860 law sound like what we today would call a fire escape, those words did not appear in the text of the law. Indeed, at this time the term "fire escape" still did not mean a fixed device, much less a balcony and stairs. So when New York's lawmakers revised the law two years later and simply required large tenements to "have placed thereon a practical fire-proof fire escape," they were relaxing the rules and opening the way for all sorts of makeshift devices.[5]

The retroactive aspect of the law shaped the future form of emergency exits toward external devices and away from more substantial solutions, such as protected interior stairways. Contemporaries believed that government could not require owners to alter the interiors of existing buildings, which meant owners could not be asked to put in additional interior stairways. New York's lawmakers might have distinguished between existing buildings and new construction and imposed higher standards (such as two interior stairways) on the latter, but they did not. Landlords would have opposed a two-stairway rule, because interior stairways reduce the amount of rentable space. More importantly, it seems no one at the time considered multiple stairs necessary. Following deadly fires, the press usually called for fire escapes. For example, reporting on an 1851 factory fire, the editors of *Scientific American* blamed the deaths in this and other factory fires on "reprehensible arrangements" such as unprotected wooden stairways and a lack of *outside* stairs.[6] Lawmakers favored a general solution adapted to both old and new buildings, and thus fire escapes became the universal sort of emergency exit in New York City for many years. Revisions to the building code in 1867 and 1871 extended the scope of fire escape rules to cover buildings besides large tenements: first large factories, and then every hotel, boarding house, office building, and factory in which people worked above the first floor.[7]

But New York's lawmakers did not specify what sort of devices would count as fire escapes, and this lack of specificity, combined with the recognition that the new requirements created demand, inspired inventors to turn out a range of mainly impractical things they dubbed "fire escapes." Patents for fire escapes increased from just a handful before 1860 to dozens each year in the 1860s. Most were for portable or personal kinds of apparatus,

5. 1862 New York Acts, chap. 356, secs. 23 and 27.
6. "Danger of Factories by Fire," *Scientific American*, 22 November 1851, 77.
7. 1867 New York Acts, chap. 939; 1871 New York Acts, chap. 625.

APRIL
2003
VOL. 44

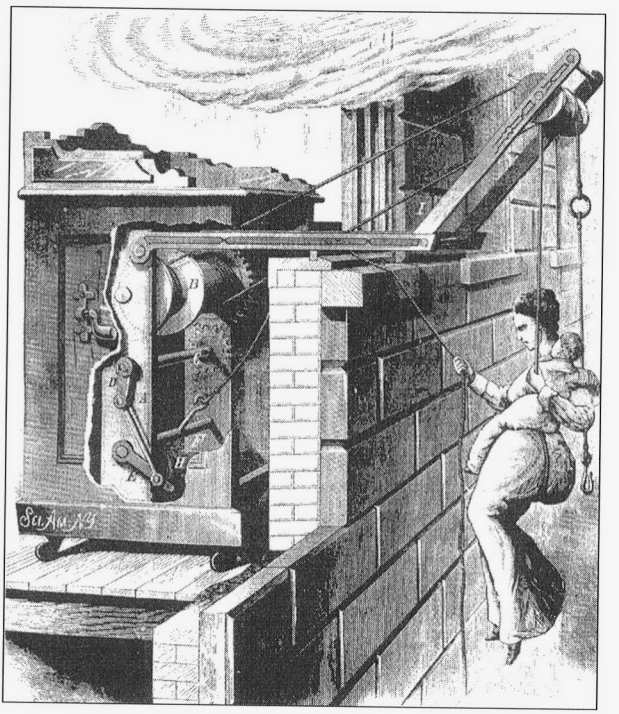

FIG. 1 A rope-type fire escape. This one, patented in 1878, is disguised as a washstand. ("Lescale's Fire Escape," *Scientific American* 9 [1878], 14.)

variations on ropes, chutes, or ladders-on-wheels. A rope-type fire escape typically consisted of a rope, a pulley, a sling or basket, and a friction brake, and could be set up when needed or fixed permanently to a building; a person used the contraption to lower him- or herself from a window (fig. 1). The chute type of fire escape usually consisted of a cloth slide or tube that descended from a window to the ground. In 1860, New Yorkers were treated to an "amusing demonstration" of adventurous men and boys sliding from the top of City Hall down an English-made cloth-tube fire escape.[8] From 1862 until the end of this decade, New York City's building officials accepted portable devices for the purposes of the law, although the superintendent of buildings, James Macgregor, acknowledged his difficulty in determining their usefulness. While he considered some to be "frail and badly-con-

8. *Subject Matter Index of Patents for Inventions Issued by the United States Patent Office from 1790 to 1873, Inclusive* (1874; reprint, New York, 1976); annual volumes, *General Index of the Official Gazette and Monthly Volumes of Patents of the United States Patent Office* and *Annual Report of the Commissioner of Patents*, for the years 1872–79. "Fire-escape—Sliding from the Top of the City Hall," *Scientific American*, 10 March 1860, 168.

structed appliances," he praised two portable fire escapes, one a rope-and-pulley type, the other a chain ladder. That he judged these two devices acceptable indicates the latitude landlords had in complying with the law. Perhaps for this reason, or perhaps because landlords simply shirked their responsibility, balcony fire escapes were not fixtures of the street walls in tenement house districts in the 1860s and 1870s.[9] When they did put up fixed fire escapes, landlords usually opted for the most rudimentary affairs: iron ladders clamped to the wall or balconies connected by straight ladders.

When tall tenement houses began to appear in other cities, lawmakers there followed New York City's lead and called for fire escapes on them. Boston's first modern building law, drafted by Boston architects who had studied London's and New York City's rules, introduced the fire escape to Boston. Enacted in 1871, this law called for every tenement and lodging house in the city, new or existing, regardless of size, to have "a proper fire-escape, or means of escape in case of fire." The following year, after central Boston burned to the ground in one of the nation's biggest conflagrations, lawmakers amended the building code: in addition to tenements, buildings in which "operatives" worked on the third floor or above also were required to have fire escapes.[10]

Even cities without tenement houses introduced fire escapes when they enacted building laws, which were modeled on those of Boston and New York. Architects or building officials would propose a building code, often following a disaster such as a large fire. Rarely were these laws as detailed as those of Boston and New York City, but they usually included requirements for fire escapes. By the early 1890s, practically every large American city required fire escapes on certain kinds of buildings.[11]

Legislation to protect factory workers became another means for spreading fire escapes through industrializing cities and factory yards. Manufacturing employment increased dramatically after the Civil War, rising nearly 60 percent between 1860 and 1870. At the end of that decade, half of all manufacturing employment was in just three states: Massachusetts, New York, and Pennsylvania.[12] Around this time, the Massachusetts

9. *Documents of the Board of Aldermen of the City of New York*, pt. 1, vol. 30 (New York, 1862), doc. no. 7, 16–18, quote on 18. On the absence of fire escapes despite the law, see "Wholesale Murder—the Owners of Tenement Houses," *New York Times*, 25 September 1866, and *American Architect and Building News*, 4 October 1879, editorial. Some sources spell Macgregor's name McGregor.

10. 1871 Massachusetts Acts, chap. 280, sec. 35; 1872 Massachusetts Acts, chap. 371, sec. 14.

11. H. A. Phillips, "Comparative Municipal Building Laws," pt. 24, *American Architect and Building News*, 25 March 1893, 187.

12. Inter-University Consortium for Political and Social Research, *Historical Demographic, Economic, and Social Data: The United States, 1790–1970* (Ann Arbor, Mich., n.d.; www.icpsr.umich.edu:8080/ICPSR-STUDY/00003.xml). The 1860–70 comparison includes only states enumerated in the 1860 U.S. census.

APRIL
2003
VOL. 44

legislature, after decades of ignoring labor issues, began to consider worker protection legislation. In 1869 the legislature established the Bureau of Statistics of Labor, the first such office in the nation. This action was followed by attempts to limit hours of labor and then to pass a factory worker protection act. The latter, enacted in 1877, was the first in the nation and became a model for such legislation in other states.[13]

Like the first comprehensive building codes, Massachusetts's pioneering legislation also had its origin in a deadly building fire—in this case, an 1874 blaze in a Fall River textile mill. The fire killed twenty-three workers and injured many more, mainly women and children, most of whom worked in the attic, the mill's sixth floor. The workers on this floor did not know the building was on fire until its sole stairway filled with smoke, blocking their way out. While the mill had some sort of outside ladders, these did not reach the attic, and no ladders inside reached the windows in the roof. In a scene that anticipated the more infamous Triangle fire of 1911, many workers jumped from the windows at the gable end of the mill, falling to their deaths. Soon after this fire, Carroll D. Wright, head of the Massachusetts Bureau of Statistics of Labor, drafted what he called a "factory act," a bill for state regulation of work conditions in factories, including exits in case of fire. Manufacturers opposed it, and lawmakers sought more information about the problems it addressed. In 1876 the state legislature called for inspection of, and a report on, means of escape in public buildings (churches, schools, halls) as well as in factories.[14]

What the state inspectors found confirmed the need for regulation of exits. Many factories, and especially small ones (which were often built of wood), had only one stairway to the upper floors. Most buildings had doors that opened inward, against the flow of traffic leaving a building. Theaters were particularly deficient: Boston's Howard Athenaeum, for example, had only one narrow stairway to the upper gallery, and two other stairways ended in locked doors. The inspectors also reported on hazardous working conditions; they found few machine guards and "many cases of almost criminal neglect of the protection of belting." In his report on the findings, Chief Detective Luther Stephenson Jr. mentioned the recent devastating fire in a Brooklyn, New York, theater, which killed nearly three hundred people. This tragedy provided "an argument stronger than pen can write or lips can tell, why stringent laws should be made and enforced." In the "best interests of the working classes and for the public safety," he concluded, the state should inspect buildings and compel owners to make changes needed to safeguard life in case of fire.[15]

13. Carroll D. Wright, *Industrial Evolution of the United States* (Meadville, Pa., 1895), chaps. 21–22.

14. *Labor Journal*, 26 September 1874. 1876 Massachusetts Acts, chap. 216.

15. Massachusetts Senate, *Report of the Chief Detective of the Commonwealth of Massachusetts for the year ending Dec. 31, 1876*, 1877, Sen. Rept. 11, quotes on 15, 23.

Wright referred to the law finally passed in 1877 by the Massachusetts legislature as the "factory act," but it dealt with safe egress in nonindustrial buildings as well as factories; indeed, it was more of a building exits law than a worker protection law. The law allowed state inspectors—a special group of state police officers, called district police—to enter any church, hotel, school, or theater and order improvements to egress facilities at their discretion. Such improvements could include fire escapes. In addition, the law required fire escapes on all large factories that lacked a sufficient number of protected stairways. As with building laws, other states patterned their factory worker safety laws in part on this one, and by the turn of the century practically every major industrial state had a factory act. Most of the laws mandated fire escapes on factories.[16]

Separate fire escape laws constituted a third way by which fire escapes were brought into existence. Pennsylvania was one of the largest manufacturing states, and it had one of the nation's largest cities—Philadelphia, ranked second or third in population through the second half of the nineteenth century, with over 674,000 inhabitants in 1870. In 1876, Philadelphia approved an ordinance that created a board to regulate fire escapes, which had the power to order "erection of fire escapes upon such buildings as they may deem necessary, and of such construction as they may deem best to secure life and property." Three years later, in 1879, Pennsylvania enacted a statewide fire escape law that called for "permanent safe external means of escape" on a range of buildings three or more stories high: schools, hotels, hospitals, warehouses, factories, and tenements (but not, unaccountably, theaters, an oversight corrected in 1885). Illinois, with the nation's fourth largest city and ranking fifth in manufacturing employment by 1880, enacted a statewide fire escape law in 1885. It called for buildings four or more stories high (excluding private residences) to be "provided with one or more metallic ladder or stair fire-escapes . . . and provided with platforms, . . . in such proximity to . . . windows of each story above the first, as to render access to such ladder or stairs from each such story, easy and safe."[17]

Thus, against the background of growing urbanization and industrialization in the latter nineteenth century, fire escapes materialized and proliferated by three regulatory routes: city building laws, state factory worker protection laws, and state or city fire escape laws. But exactly what kinds of devices were required? Generally the laws were silent as to details, or contained specifications—e.g., requiring a "metallic ladder" or "external"

16. 1877 Massachusetts Acts, chap. 214. William Willoughby, "Inspection of Factories and Workshops," in *Monographs on American Social Economics*, ed. Herbert Adams (Boston, 1900).

17. City of Philadelphia, *An Ordinance Creating a Board to Regulate the Construction and Use of Fire Escapes* (1876). *Laws of the General Assembly of the State of Pennsylvania Passed at the Session of 1879*, no. 132, 128–29. *Revised Statutes of the State of Illinois, 1885* (Hurd 1885), chap. 55A, 644–45.

APRIL
2003
VOL. 44

devices—that guaranteed impractical solutions in some situations (such as external fire escapes on very tall buildings). One knowledgeable observer, Charles J. H. Woodbury, an inspector with New England factory fire insurance companies, found that most factory fire escapes were "put up so as to conform to the letter of the law and in such manner that no one but a sailor or an acrobat would be likely to trust himself to them."[18] Besides being vague or positively requiring bad solutions, the laws were poorly enforced. Outside of large cities, which might have building inspection departments, public officials without any relevant experience were handed responsibility for enforcing the laws. In Pennsylvania these included fire marshals (whose job it was to investigate the causes of fires), county commissioners, and school directors.[19] Landlords could put up defective and useless fire escapes with official approval—when they put up anything at all.

From Ladders to Smoke-Proof Towers

By the latter part of the 1870s, the modern meaning of "fire escape"—an outside balcony-and-ladder system—seems to have settled in. The author of an entry for the term in Johnson's *New Universal Cyclopedia* (1876) defined a "common fire-escape" as "simply a system of fixed iron ladders attached to a building to permit descent from the upper windows; ordinarily a platform or balcony is provided to each story, and the ladders are extended from one to another, either in a vertical or inclined position." Likewise, model specifications for an outside fire escape, prepared by a New York foundry manager and published in the same year as Johnson's *Cyclopedia*, called for a balcony version, with narrow (2-feet wide) platforms connected by straight ladders.[20] Balconies connected by straight ladders (fig. 2) were probably the most common kind of fire escape in New York City before 1900. "This type," complained a writer in a fire engineers' magazine, "is always provided because it is cheap and within the law."[21]

Still, many Americans continued to believe that portable devices could serve as fire escapes. Benjamin Oppenheimer's idea for a parachute hat (fig. 3) is only slightly more ridiculous than proposals made by people who should have known better. For example, in 1883, when Montgomery C.

18. C. J. H. Woodbury, "The Evolution of the Modern Mill," *Scientific American Supplement*, 26 May 1888, 10330.

19. Sometimes these county commissioners and school directors did not realize they were responsible for enforcing the fire escape laws and did not see this duty as part of their jobs. *Proceedings of the Eighteenth Annual Convention of the Firemen's Association of the State of Pennsylvania* (Reading, Pa., 1898), 100.

20. Frederick Barnard and Arnold Guyot, eds., *Johnson's New Universal Cyclopedia* (New York, 1876); William J. Fryer Jr., *Architectural Iron Work* (New York, 1876), 75–76.

21. Owen B. Magnin, "Faulty Fire Escapes," *Fire and Water Engineering*, 14 September 1895, 436.

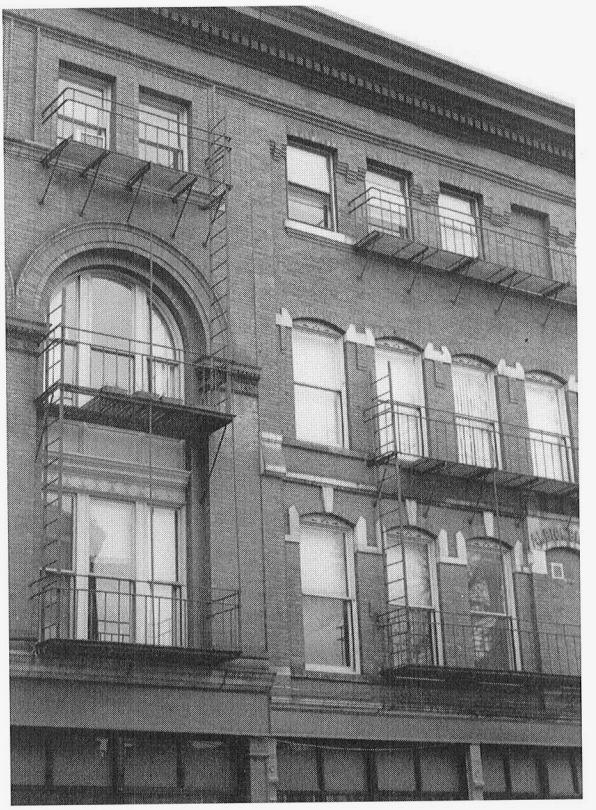

FIG. 2 Straight ladders between balconies, the type of fire escape commonly found on New York City tenements before 1900. (Photo by the author.)

Meigs, the retired quartermaster general of the United States Army, became worried about how workers at the government printing office in Washington would escape a fire, he proposed that long bows with heavy arrows and balls of twine be hung inside the doors of the building. In the event of a fire, someone (presumably the skilled archers routinely found in printing offices) could shoot an arrow with the rope attached into a window and then workers could swing down to safety. Hotel fires were second only to theater fires in numbers of fatalities, yet the solution many localities adopted to protect guests was to require owners to place ropes in guestrooms. Such laws, which assumed that frightened hotel guests could climb down ropes from windows high above the street, struck even some contemporaries as silly (fig. 4).[22]

22. B. B. Oppenheimer, "Fire-Escape," patent no. 221,855, 18 November 1879. Meigs to Edward Clark, 18 June 1883, Office of the Architect of the Capitol, Washington, D.C.,

APRIL
2003
VOL. 44

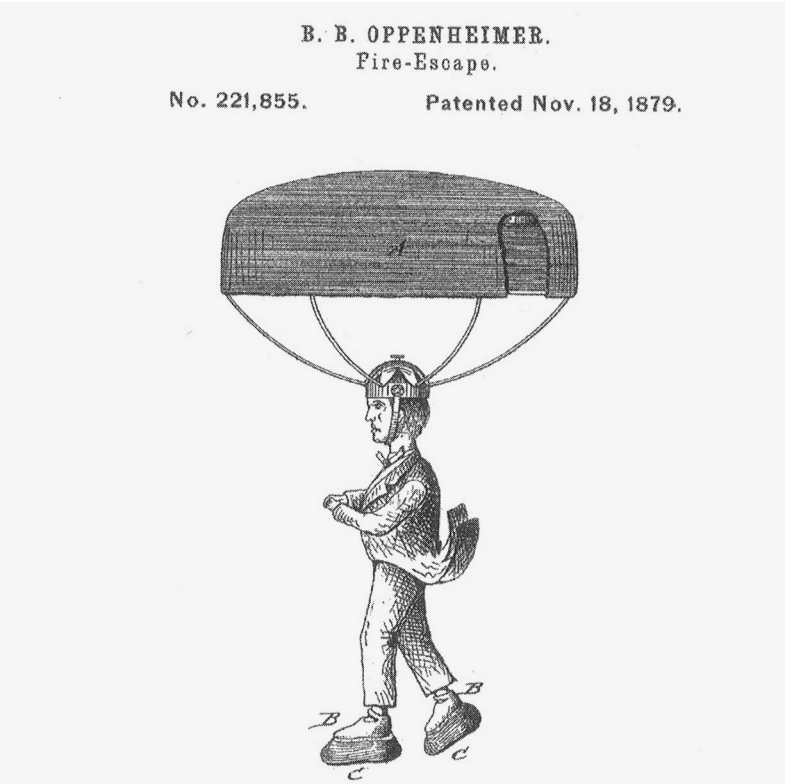

FIG. 3 Fire escape, consisting of a parachute hat and elastic-sole overshoes, U.S. patent no. 221,855, 1879.

A few people objected to fire escapes at an early date—either to specific designs or to the idea of special, outside devices for emergency use. In 1868, one critic, the architect and editor Samuel Sloan, dismissed balconies between windows connected by ladders as "a most stupid contrivance" because women, children, the aged, and the disabled could not use them. With fire lapping out the window, he asked, "would not those balconies be turned into gridirons, to roast the unhappy victims?" He returned to the subject a year later, condemning the "iron ladders clamped against the wall" as "worse than useless, because they are deceptive; giving the appearance of

"Other Public Buildings, Fire Escape and Prevention, Part C," box 7. Pennsylvania's 1883 fire escape act called for hotels and other tall buildings to have chains and ropes attached inside every sixth window; Massachusetts's 1890 law (1890 Massachusetts Acts, chap. 307) called for every hotel room not otherwise provided with a fire escape to have a "knotted rope or other better appliance for use as a fire escape." On bad press for hotel ropes, see "New York Provides a Feeble Safeguard for Hotel Guests," *American Architect and Building News*, 4 June 1892, 141.

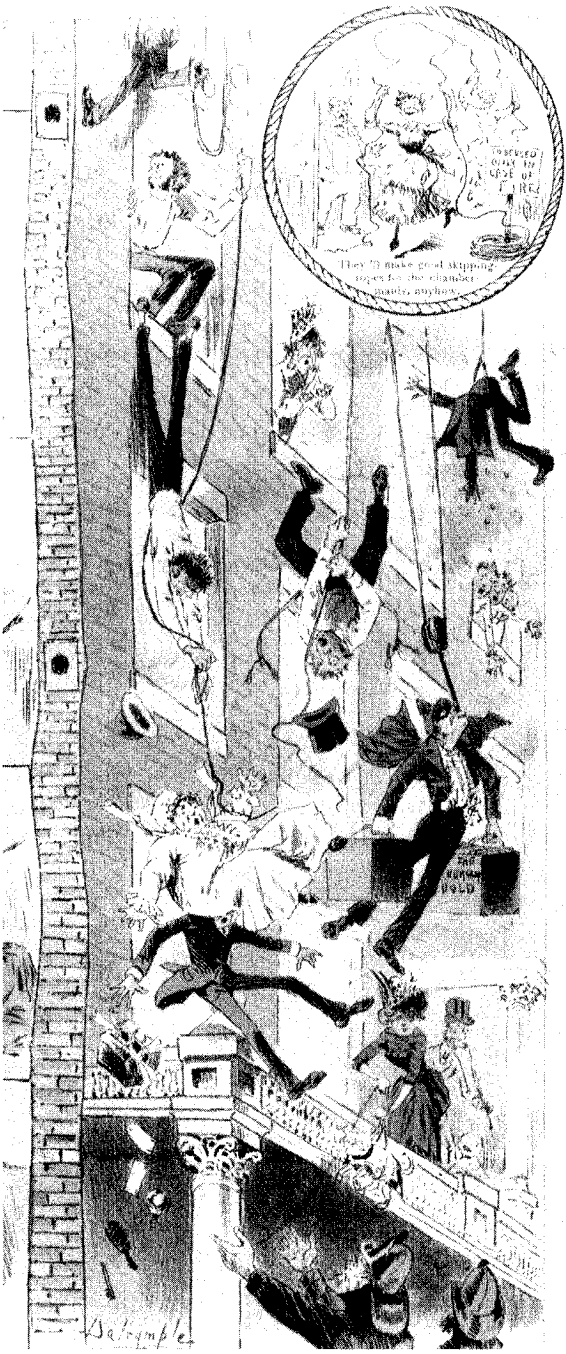

FIG. 4 "The New Rope Fire-Escape Law for Hotels; Puck's Notion of How It Will Work." (*Puck*, 14 September 1887, 48.)

APRIL
2003
VOL. 44

an escape, without the reality." He urged people to search for better solutions, although he acknowledged that "It is a most difficult study, this of perfecting the means of preservation of life from fire." His preferred solution was to protect regular stairways by walling them off and placing iron doors on the entries—a solution that came to be adopted, but not until the twentieth century.[23]

Design standards for external fire escapes emerged during the latter part of the nineteenth century and the first part of the twentieth. Probably the first standards for a substantial outside fire escape were those established in Massachusetts around 1880. These guidelines came about in order to end disputes between factory owners and inspectors over what could be considered a fire escape for the purposes of the law. Outside platforms and ladders had long been features of New England mills, although they were intended to help firefighters reach a fire from outside the building rather than to help occupants escape. To win passage of the factory bill in 1877, Massachusetts's lawmakers allowed these ladders to qualify as fire escapes, unless inspectors believed alteration was "necessary for the protection of human life." Yet when ordered to put up new fire escapes, employers often balked. As one inspector complained, "it was difficult to make the owners of factories believe anything better was needed."[24]

To end the conflicts and clarify what sort of device he considered proper, the state's head of factory inspection, Chief of the District Police Rufus Wade, published a design for an outside iron stairway and then worked to make his specifications part of the law. He succeeded in 1880, and an amended factory law required large factories to have "more than one way of egress by *stairways* on the inside or outside of a building."[25] The outside stairway or "ordinary fire-escape" was to have stairs at least 22 inches wide and balconies at least 44 inches wide (allowing a 22-inch passage around the stair opening), with stairs slanted no more than 48 degrees, which was a steep rise but closer to that of ordinary stairs than the usual inclined ladder. In a drawing of this fire escape, the terminal flight of stairs reached the ground, although the specifications permitted the stairs to end four feet above the ground.[26]

In October 1881, Pennsylvania experienced its equivalent of the Fall River mill fire, "one of the most horrible affairs that ever happened," which

23. "Fire Escapes," parts 1 and 2, *Architectural Review and American Builders' Journal*, November 1868, 352, and December 1869, 310–11.

24. 1877 Massachusetts Acts, chap. 214. John J. White, "Fifteen Years Work as an Inspector of Factories and Public Buildings in Massachusetts," *Annual Report of the Factory Inspector of the Commonwealth of Pennsylvania for the Year 1894* (Harrisburg, 1895), 488.

25. 1880 Massachusetts Acts, chap. 197. Emphasis added.

26. "Report of the District Police," *Public Documents of Massachusetts*, vol. 4, doc. 32 (Boston, 1889).

led to better fire escapes in that state and elsewhere. This fire, at a Randolph Street mill in Philadelphia, trapped thirty-five people working a night shift and injured or killed practically all of them. The workers could not escape by the mill's two narrow stairways, which filled with smoke, and as in the Fall River fire some jumped from upper stories to their deaths. Despite the city law requiring them, the mill had no fire escapes. According to a *New York Times* report, this situation was typical: the board of fire commissioners "has never done anything in the matter [of seeing that owners put up fire escapes], and owners of mills . . . have very generally neglected to comply with the law of their own accord." After the fire, the city government appealed to the Franklin Institute in Philadelphia—a venerable society organized to promote understanding of science and technology—for advice, and the institute appointed a committee to look into the question of fire escapes and elevators.[27]

The Franklin Institute committee was probably the first group of technical men to thoroughly consider the question of emergency egress, and it made some farsighted recommendations. After looking at many models, designs, and plans of fire escapes, it concluded that external means of escape had little value. Rather, like Samuel Sloan a decade earlier, the committee urged that ordinary stairways be made safer—in short, that stairways be constructed so they could serve as fire escapes. Because they were in regular use, stairways were likely to be unobstructed and accessible, and because they would be easier to descend than any sort of ladder they could serve more people. Very importantly, the committee called for all buildings to have at least two ways out, spaced far apart, and even suggested that large buildings have more than two. While the committee discouraged the use of external fire escapes, it nevertheless considered the best form for them, recommending that they be stairways rather than ladders, chutes, or hoists, and that they not be placed in front of operable or unshuttered windows.[28] A few years after the report appeared, the Pennsylvania legislature moved to require a more substantial kind of fire escape. The 1885 law defined a fire escape as an "outside, open, iron stairway, of not more than forty-five degrees slant, with steps not less than six inches in width and twenty-four inches in length."[29] Although still external, the stairs in this specification were more like regular stairs, and had steps, not rungs.

In addition to its other suggestions, the Franklin Institute committee proposed a new sort of fire escape, which became the basis for an important advance in the field of life safety. Noting that the stair towers in facto-

27. "Caught in a Death-Trap," *New York Times*, 14 October 1881; "Elevators and Fire-Escapes," *Manufacturer and Builder* 13 (December 1881): 266–67.

28. "Report of the Committee of the Franklin Institute on Fire-Escapes and Elevators," *Journal of the Franklin Institute*, 3rd ser., 112 (December 1881): 408–14.

29. *Annual Report of the Factory Inspector of the Commonwealth of Pennsylvania for the Year 1895* (Harrisburg, 1896), 47.

APRIL
2003
VOL. 44

ries often filled with smoke during a fire because workers could not, or would forget to, close the doors to them, the committee proposed a novel plan: essentially, inside fire escapes. These stairways would be "accessible from every room, separated therefrom by a broad air space but connected by bridges at each story." In other words, workers would enter the stair tower from a balcony; no door to the stairs opened into the main building. Towers like this—projecting from a building, accessible from balconies—had been used in Britain by 1880 and may have been the source of the idea. The committee noted that existing stairways could be remodeled to create such towers, by enclosing them and adding balconies.[30]

But no locality adopted this style of fire escape at the time; rather, ladders and balconies continued to be the rule. For example, in New York, the state Labor Department's specifications for factory fire escapes allowed inclined ladders.[31] Until 1901, when a new tenement house law went into effect, New York City's building department allowed straight ladders between balconies. In parts of Brooklyn, ladders clamped to walls were the only sort of emergency way out of many tenement houses. The men who shepherded New York's first comprehensive tenement house law into being, Robert DeForest and Lawrence Veiller, considered the law's higher standards for tenement fire escapes to be one of its most important features.[32]

When city and state laws required fire escapes on various kinds of high-grade buildings—apartment houses, hotels, office buildings, and retail stores—their owners resisted putting up what they considered eyesores. According to one architectural critic at the turn of the century, owners felt "that fire escapes disfigure a building or, at least, lower it in the scale, as suggesting a building of common or humble uses rather than elegance," and they tried to "evade the law in all practicable ways."[33] If enough space was available at the rear or in a light court, a fire escape could be tucked away so as not to spoil a building's façade. When it could not be hidden, it might be treated artistically. The fire escapes on many downtown buildings became architectural elements, with ornamental railings and brackets (fig. 5). The angle-shaped treads of spiral stairways might be difficult to negotiate, but the structure served as a sculptural feature

30. "Report of the Committee of the Franklin Institute on Fire-Escapes and Elevators," 408–14. Charles Rau, "A Fireproof Stairway," *American Architect and Building News*, 26 April 1890, 59–60, and letter to the editor, *American Architect and Building News*, 3 May 1890, 75.

31. "Fire Escapes in American Commercial Buildings," pt. 2, *American Architect and Building News*, 31 January 1903, 35–36.

32. New York State Tenement House Commission of 1900, *Tenement House Fire Escapes in New York and Brooklyn* (New York, 1900). Robert DeForest and Lawrence Veiller, eds., *The Tenement House Problem* (New York, 1903), xv.

33. Russell Sturgis et al., *A Dictionary of Architecture and Building* (New York, 1902), s.v. "Fire Escape".

FIG. 5 Ornamental fire escape, One Hanover Square, New York City. (Photo by author.)

(fig. 6). Since iron fire escapes had to be painted to preserve them from rust, they could be finished in a color that complemented the building's façade. Any foundry could put together an iron fire escape, and practically every city had at least one. Sometimes architects designed fire escapes, but most were designed by draftsmen at foundries or made from stock patterns.[34] Owners might order nice looking fire escapes, but, unless required to do so, not good ones.

34. A principal topic in the architectural iron design textbook used at the Mechanics Institute of New York was the design and detailing of fire escapes; see Daniel Driscoll, *Architectural Iron Design and Detailing (as Required by the Laws of New York)* (New York, 1926).

APRIL
2003
VOL. 44

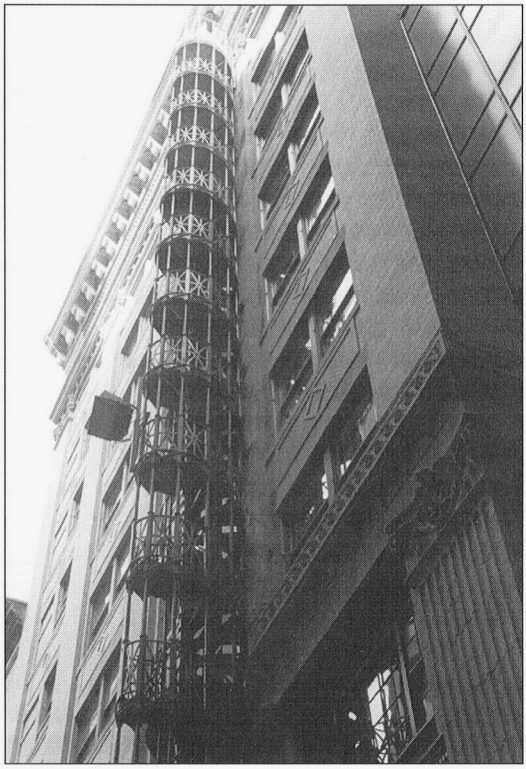

FIG. 6 Spiral fire escape on a Boston office building, 31 State Street. (Photo by author.)

The Demise of the Outside Fire Escape

As the Franklin Institute committee concluded, iron balcony fire escapes had inherent drawbacks. Being next to windows, they could become blocked by fire and smoke. They had to be maintained to prevent rust and, in cold climates, kept clear of snow and ice. Tenants often stored their possessions on fire escapes, especially those attached to the backs of buildings, regardless of rules that forbade doing so. The final flight of steps, or section of ladder, typically was stored high enough above the ground to keep out intruders, but this piece was often missing, or proved immovable when it was needed. When people finally did reach the bottom of a fire escape, they might find themselves trapped behind a locked gate.[35]

35. Peter J. McKeon, "Fires, Factories and Prevention; the Newark Casualty—the New York Dangers," and H. F. J. Porter, "Warding Off the Factory Fire Panic and Its Loss of Life," *Survey*, 7 January 1911, 533–46 and 547–57.

Getting safely down and off a fire escape was one problem; getting out to it was another. Frequently, access to fire escapes from inside a building was blocked. This was the finding of a 1910 survey by inspectors from the Joint Board of Sanitary Control—a group made up of representatives of cloak and suit industry unions, employers, and the public—who examined working conditions in about twelve hundred cloak and suit shops in New York. They found obstructed openings to fire escapes in seventy-eight of these shops, some of which were in buildings seven to twelve stories tall. Windows in some shops were high enough off the floor as to be hard to climb through; in other cases they were obstructed by machines, pressing tables, and the like, or had closed iron shutters that could only be opened from the outside. In 1916 a Pennsylvania survey of factory egress conditions found the same sorts of problems. The Pennsylvania investigators also noted that women, in their "hampering and often inflammable clothing," had particular difficulty using fire escapes that were reached through windows. They concluded that working women simply did not take the fire escapes seriously as exits.[36]

It is impossible to know how many lives were saved in fires because fire escapes were available, or how many might have been saved had they been present; likewise, it is impossible to know how many people were killed on fire escapes, or how many might have survived had something better (such as protected interior stairways) been available. No data pertinent to these questions exist. But to illustrate their problematic service in a fire, consider the 1899 blaze that destroyed New York City's Windsor Hotel. An old but still posh establishment, the Windsor was a large building, extending a full block on Fifth Avenue and variously described as six, seven, or eight stories tall. When it was finished in 1873, the structure contained up-to-date fire protection measures, notably standpipes and a rooftop water tank, and "ample" means of escape that included public stairways and a servants' stairway enclosed in a brick tower. According to a newspaper account of the fire, a careless smoker started a blaze that spread through the hotel's wide corridors and main stairways. The building had fire escapes on its Forty-sixth Street and Forty-seventh Street sides, and on the courtyard and rear walls, but none on its Fifth Avenue façade. The guests in the rooms along Fifth Avenue had to go through a smoke-filled corridor to reach the main stairs and the fire escapes; only employees knew of the servants' stairs. Some guests did reach the fire escapes and got down to safety. But eventually flames burst from the windows on these sides and turned the iron red

36. George Price, "Factory Introspection," *Survey*, 6 May 1911, 222, 224. "Fire Prevention Study Given by the Alumnae . . . of Bryn Mawr College to the Pennsylvania Department of Labor and Industry," bound in *Second Annual Report of the Commissioner of Labor and Industry of the Commonwealth of Pennsylvania*, pt. 2 (Harrisburg, 1916).

APRIL
2003
VOL. 44

hot (yet firefighters refused to throw water on them, believing they would "crack" if rapidly cooled).[37] The smoky corridors trapped people in their rooms. At least one guest on the Fifth Avenue side used his room's mandatory rope to lower his wife, daughter, and then himself from the sixth floor to the ground; no other guests were so cool-headed and athletic. The fire reportedly killed fourteen people and injured fifty-two more, some fatally, and in a few hours reduced the hotel to a pile of rubble. Thus, the fire escapes did some good, but not much. Moreover, as this case illustrates, middle-class people had no better emergency egress facilities available to them than did poor tenement dwellers.

An early step on the path to improved emergency egress was the smokeproof tower, a structure similar to the stairway proposed by the Franklin Institute committee. The first ones were installed voluntarily in Pennsylvania factories in the late 1880s. In 1893 Pennsylvania made tower stairways obligatory for several classes of buildings, and Philadelphia, in its 1899 building law, required large stores and factories to have one or more of these tower stairways, which thereafter came to be known as "Philadelphia fire towers" (fig. 7).[38] The great advantage of this design was that the stairway was enclosed and smoke could not fill it, but it also had some drawbacks—for example, the tower could not be reached except by going outside, and it was usually dark inside. Yet at the turn of the last century, little had been done apart from this solution in the way of creating more secure types of emergency egress.

A growing challenge for life safety in the latter part of the nineteenth century was the increasing size and height of buildings. Five-story hotels, stores, and office buildings could be found in cities around the United States, and while these hardly qualified as skyscrapers they still exceeded the range of most fire departments' ladders and hose streams. Chicago and New York were centers of skyscraper construction, and most large cities had a very tall building or two. In Manhattan, by the first decade of the twentieth century, there were a thousand buildings over ten stories and ninety over seventeen stories high.[39] Strange as it might seem today, few Americans at the time considered emergency egress from very tall buildings to be a particular problem, mainly because most cities required new high-rises to

37. "Windsor Hotel Lies in Ashes" and "The Hotel a Fire Trap," *New York Times*, 18 March 1899; "New Buildings in New York City," *Manufacturer and Builder* 5 (October 1873): 224; *A History of Real Estate, Building and Architecture in New York City* (1898; reprint, New York, 1967), 391.

38. Everett U. Crosby et al., *Crosby-Fiske-Forster Hand Book of Fire Protection* (New York, 1919), 558; Massachusetts State Firemen's Association, *Proceedings of the Seventeenth Convention* (Boston, 1897), 91; *Laws of the General Assembly of the Commonwealth of Pennsylvania Passed at the Session of 1899*, no. 123, sec. 38.

39. *Report of the Heights of Buildings Commission to the Committee on the Height, Size and Arrangement of Buildings of the Board of Estimate of the City of New York* (New York, 1913), 15.

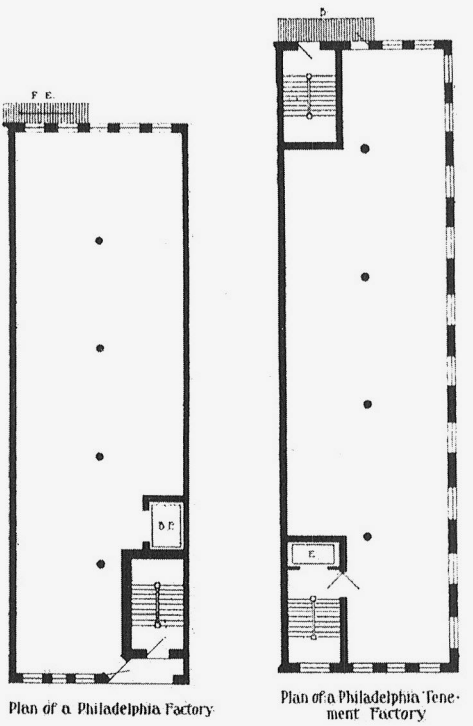

FIG. 7 Floor plans of Philadelphia smoke-proof-tower fire escapes. Left, a tower accessed via a vestibule. Right, smoke-proof tower at the rear of a factory, accessed via a projecting balcony. (Charles Daubney, "Fire-Escapes in American Commercial Buildings," *American Architect*, 31 January 1903, 38.)

be constructed in a fire-resistive manner. Moreover, many of the tall buildings were office buildings, which were considered a low fire risk. Most people believed the combination of fire-resistive construction and low-risk occupancies rendered the skyscrapers safe and made emergency exits superfluous. Thus, many pioneer skyscrapers had only one inside stairway and an outside fire escape. These stairways might run unenclosed the full height of the building and often were located near the elevator shafts. In a building with this exit configuration, a fire could cut off the stairs and elevators simultaneously, leaving the fire escapes as the only way down. Although the smoke-proof tower would have been a practical solution for such buildings, no city, not even Philadelphia, required them on tall buildings simply because of the building's height (fig. 8).

What finally launched the modern era of emergency egress regulation and led to the demise of outside fire escapes as a means of egress on large buildings was a fire in a loft building in 1911, the infamous Triangle

APRIL
2003
VOL. 44

FIG. 8 Fire escape on a fourteen-story, 1907 San Francisco office building. Fire escapes could be found on buildings taller than this. (Photo by author.)

Shirtwaist fire. In less than half an hour, 145 of the roughly six hundred women and men at work in the Triangle garment-making shop were dead and dozens more were injured. The shop occupied the upper floors of the ten-story Asch Building in Greenwich Village. Triangle employees charged that one of the ninth-floor exit doors had been locked, although this was not proved. But even if the allegedly locked door had been open, many people still would have died, because the exit facilities in the building were totally inadequate for the large number of occupants. The exits did not even comply with laws in effect at the time. They consisted of two winding staircases with landings so narrow that doors had to open inward, against the flow of traffic, and an outside fire escape. To escape the fire, some of the workers risked going out on the fire escape, only to be stopped by flames lapping out the windows. The fire escape apparently became overloaded and buckled, dropping the people on it to their deaths. What this fire showed was that on tall buildings outside fire escapes did more harm than

good; and, further, that even noncombustible buildings like the Asch needed multiple, protected routes for escape.

Building officials often were the main advocates for stronger egress rules, but they had only their direct experience—the horrible conditions they found during inspections and grisly stories about fire victims—to back up their recommendations for improvements. Before the Triangle fire, apart from the report of the Franklin Institute committee, no systematic study of egress had been undertaken. After the Triangle fire, technical men—fire safety engineers, architects, insurance inspectors, building officials, and firefighters—began to give concerted attention to the matter of proper standards and regulations for emergency egress, in order to prepare model codes that cities might adopt.

On one point the experts soon agreed: the common skeleton fire escape of the day was a "pitiful delusion."[40] But consensus broke down over the implications of this conviction. One side argued that fire escapes should be absolutely rejected: anything less that this, they believed, would merely delay the introduction of more reliable measures. The other side countered that since requirements for fire escapes were universal and likely to remain on the books of cities and states for years to come, the greatest need was to define the conditions under which fire escapes should be allowed and to establish better design guidelines for them. The great obstacle to moving outside emergency exits *inside* was their cost to building owners in lost rental income and usable space. Until the day that property owners accepted measures such as protected, interior stairways in place of outside fire escapes, this side argued, fire escapes—better ones, at any rate—would be necessary to save lives.

An important venue for debating these issues was the Committee on Safety to Life of the National Fire Protection Association (NFPA). Founded in 1896, the NFPA began as a group of fire insurance inspectors who wanted to develop, and try to get insurance boards to adopt, uniform standards for the installation of automatic sprinklers. By the time of the Triangle fire, the NFPA's mission had broadened to include developing standards for just about everything related to fire protection and fire prevention and educating the public about fire safety. Regular members included national and state organizations interested in fire safety and fire insurance boards and associations; national, state, and municipal agencies, boards of trade, chambers of commerce, businesses, libraries, and individuals could join as associate members. The NFPA formed committees on various topics in order to formulate standards, which were then presented to the general membership for a vote. The Committee on Safety to Life was formed in 1913.

40. "Fire Escapes," *Quarterly of the National Fire Protection Association* 4 (April 1911): 471.

APRIL
2003
VOL. 44

One of the committee's first products, completed in 1915, was a set of preliminary specifications for "outside stairs" intended to create a stronger and safer substitute for the skeleton fire escape. The specifications called for a protected zone around the stairs, within which windows would be nonopening and made using wire glass. The committee recommended straight run and switchback stairs, and discouraged spiral stairs. Importantly, it also urged that no outside egress be allowed on buildings over six stories high. This introduced the idea, already accepted by experts, that height itself, apart from how a building was used, should be a criterion for determining the type of emergency exits required.[41]

The experts publicized their criticism of fire escapes and design recommendations. For example, H. W. Forster, the committee's chairman and a fire insurance inspector, wrote a report on the special egress problems of hospitals, asylums, and similar institutions. Fire escapes were simply impractical for many such facilities, he noted, yet frequently he found them to be the only alternative to a single, unprotected stairway. Some of these fire escapes were well designed and rationally located, but the large majority fell far short of recommended standards. Moreover, managers of institutions did not drill occupants in using the fire escapes, so people were unlikely to go to them instead of a familiar stairway. He concluded that in new buildings "adequate exit . . . should always be secured without resorting to fire escapes."[42]

In the years after 1911 states imposed stricter requirements for exits and fire escapes. The New York legislature created a Factory Investigating Commission, which accumulated much useful expert testimony and made valuable recommendations for new regulations, the most important of which was that the number of people in a building should be limited by the capacity of its egress facilities. New Jersey's Department of Labor adopted some of the NFPA recommendations and also urged that facilities in new construction be held to higher standards—specifically, that new buildings be required to have stair towers rather than outside fire escapes. Some localities adopted the idea of requiring wire glass in the windows around fire escapes. New York City's 1916 building code substantially expanded the rules governing stairways and exits; it called for at least one fire tower in every future business building exceeding 85 feet in height, or 125 feet for buildings with sprinklers and two or more stairways. Exterior stairs on new buildings had to be built like interior stairs: accessible via doors rather than windows, surrounded with wire mesh or rigid guards on the open sides,

41. "Report on Outside Stairs," *Proceedings of the Nineteenth Annual Meeting*, National Fire Protection Association (Boston, 1915).

42. H. W. Forster, *Fire Protection for Hospitals, Asylums, and Similar Institutions* (Boston, 1920), 37.

and protected from flames. New York's tenement house law continued to allow fire escapes on new housing, but the state's labor law, after 1913, prohibited use of fire escapes as exits in new factory construction.[43]

Around the nation, changes to laws covering emergency egress came unevenly and for the most part slowly. What Boston's fire chief observed in 1895 about the progress of building regulation remained true: "[S]uch laws can advance no faster than the prejudices of interested persons will allow." Experts and interested persons continued to disagree over if and when outside stairs should be allowed as emergency exits. The Building Exits Code of 1923, a model code prepared by representatives of engineering societies and members of the NFPA, recommended prohibiting outside stairs from new buildings except in special cases. In contrast, the 1949 National Building Code, a model code prepared by a fire insurance industry association, was less restrictive. It did not prohibit outside stairs for tall buildings or new construction, although it called for them to be as wide and sturdy as inside stairs and entered by doors rather than windows. Eventually, localities banned outside stairs on new large buildings. In Massachusetts, long a leader in regulating egress, the first statewide building law, enacted in the 1970s, still allowed fire escapes, with permission, on new structures not over five stories. Finally, in the 1990s, the state code excluded them from new construction.[44]

The Evolving Infrastructure of Safety to Life in Fires

As localities raised standards for fire escapes and limited where they could be put up, and as city centers were redeveloped, old-style skeleton fire escapes became a less prevalent feature of city streets. Although the public does not recognize them as such, the fire towers and fire stairs in modern

43. New York Senate, *Preliminary Report of the Factory Investigating Commission*, 1912, vol. 1. "Report of the Committee on Safety to Life," *Proceedings of the Nineteenth Annual Meeting*, National Fire Protection Association (Boston, 1915). Powell Evans, ed., *Official Record of the First American National Fire Prevention Convention* (Philadelphia, 1914), 74, 80–81. New York (N.Y.), *Building Code as Amended to July 17, 1917, with Laws and Regulations Governing Building Construction*, chap. 5, art. 8. Driscoll (n. 34 above), 128.

44. John S. Damrell, "Building Laws, Progress in Same," *Stenographer's Report of the Sixteenth Convention of the Massachusetts State Firemen's Association* (Boston, 1896), 58–59; "Report of the Committee on Safety to Life," *Proceedings of the Twenty-Seventh Annual Meeting*, National Fire Protection Association (Boston, 1923), 248; National Board of Fire Underwriters, *National Building Code* (New York, 1949); Massachusetts State Building Code Commission, *The Commonwealth of Massachusetts State Building Code*, 2nd ed. (Boston, 1974), sec. 621.0; Massachusetts State Board of Building Regulations and Standards, *The Massachusetts State Building Code*, 5th ed. (Boston, 1990), sec. 821.0.

APRIL
2003
VOL. 44

buildings—stairways enclosed in fire-resistive walls, entered by fire-resistive, self-closing doors—are the fire escapes of the twentieth century. They were brought into existence, like their iron skeleton predecessors, by public regulations.

The prescriptive nature of these regulations has served the public well. As requirements became more detailed and more strict and were better enforced, results (as far as can be determined) improved. No long-term data on deaths and injuries in building fires, classified according to type of building, exist. But since 1977, when comparable data began to be collected, fire deaths have declined. Of course, safety measures in addition to better egress facilities, including improved fire detection and alarm equipment, more widespread use of sprinkler systems, and safer consumer products, have all contributed to this decline. Nevertheless, improved egress facilities must have had a part: the kinds of buildings most strictly regulated with respect to egress—nonresidential buildings—are safer, from the standpoint of fire, than small homes. Between 1994 and 2000, leaving aside the unusual year of 1995, roughly 2 to 4 percent of all civilian fire deaths each year occurred in nonresidential buildings. And office buildings—a category that includes high-rises—were among the safest: during roughly this same period in the 1990s, one person per year died in an office building fire, out of an annual average of about thirty-seven hundred civilian deaths in structure fires.[45]

Equally important, the building officials and factory inspectors who administer and helped draft the laws have been the most stalwart advocates for better building rules. From New York City's 1860s building superintendent, James Macgregor, to the Bay State's Rufus Wade, to Boston's fire chief and then building inspector John S. Damrell, and on, these men and their inspection forces in many cases were the only people pushing for the interests of the public in the overlooked area of safe egress in building fires. They were the ones who became knowledgeable about the defects of fire escape design, egress, and existing rules, so were in a position to recommend improvements.

Economists typically consider prescriptive regulations like these to be counterproductive and ineffective. In his book on workplace safety in the late nineteenth and early twentieth centuries—one of the few modern stud-

45. For fire loss statistics, see Michael J. Karter Jr., "2000 United States Fire Loss Report," *NFPA Journal*, September/October 2001; loss statistics published annually in the September/October issue of *NFPA Journal*; and U.S. Bureau of the Census, *Statistical Abstract of the United States, 1996* (Washington, D.C., 1996), table 361. "Structure Fires in Office Occupancies," *NFPA Journal*, March/April 2002, figures for 1994–98. In 1995, 168 civilians died in the bombing of a federal office building in Oklahoma City, roughly doubling the number of deaths in nonresidential buildings for that year over the 1990s average.

ies dealing with the United States—Mark Aldrich discounted the contribution of regulations and safety devices toward reducing deaths and injuries in the workplace. Rather, he concluded, what eventually reduced deaths and injuries was a general shift in employment out of hazardous manufacturing, mining, and transportation jobs and into comparatively safe jobs, along with the introduction of workmen's compensation programs, which increased the cost of accidents to employers.[46] Interestingly, although he discussed safety in factories, Aldrich never addressed fire safety and regulation. Fire safety in the workplace encompasses many things besides emergency egress: it involves automatic extinguishing systems, firefighting systems, alarms, and so on. These safety features, like exits, are covered by laws, and the rules—as shown by the decline in nonresidential building fire fatalities, despite the hazardous conditions in factories—have been effective. One could qualify Aldrich's conclusion by adding that in some safety matters, specifically fire safety, prescriptive rules do yield positive results. Nevertheless, performance-based building and fire codes, based on performance objectives rather than prescriptive rules, have been developed recently as an alternative to prescriptive codes, in order to allow greater flexibility in achieving safety goals.[47]

The decline in the number of fire deaths in nonresidential structures also may be partly the result of good fortune. For example, few tall office buildings have had serious fires, and some that have—such as the World Trade Center towers on 11 September 2001—come up wanting. In the case of the World Trade Center towers, while a high proportion of the occupants below the burning floors escaped, the population in the buildings was relatively low at the time of the attack. The light, brittle material used to enclose the stairways, the fact that sprinkler pipes were located in the stairways, and the lack of stairway ventilation hampered or obstructed egress.[48] Creating effective ways to save lives in fires in very tall buildings remains a challenge. The consequences of 11 September 2001, like the tragedies of earlier years, will be evaluated and perhaps lead to revised egress regulations.

Many old fire escapes remain in America's big cities. They enrich the visual texture of the streetscape as they continue to serve as emergency means of escape. As a whole, they signify where localities once stood with

46. Mark Aldrich, *Safety First; Technology, Labor, and Business in the Building of American Work Safety, 1870–1939* (Baltimore, 1997).

47. Although these are very recent data, the roughly 150 civilian fire deaths per year in nonresidential buildings in the period 1994–2000 includes people who were at work. For purposes of comparison, about thirty-five hundred people per year died in residential property fires during that period.

48. Jim Dwyer et al., "Fighting to Live as the Towers Died," *New York Times*, 26 May 2002.

respect to safety to life in building fires and mark the distance communities have come. But, as 11 September 2001 reminds us, the search for ways to safeguard life in building fires is hardly over. Improvements to building safety will happen when city and state governments call into being new sorts of safety arrangements and devices, as they called fire escapes into being long ago.

APRIL
2003
VOL. 44