

The Advantages of Balloon Frame

Exam #2 • Question #1

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“The invention in 1832 of a new system for erecting wooden buildings called Balloon Framing helped to make possible the phenomenal growth of American cities in the treeless regions west of Chicago during the 9th century.”¹

- Paul Sprague

Balloon framing is a system of construction that utilizes lighter wooden elements than traditional braced framing, and a version of it (platform framing) continues to be employed as the main method of wooden frame construction in the US today. In this essay I will describe the history of balloon framing, define the elements of balloon frame construction, and explain some of its advantages over traditional timber construction.

According to architectural historian Paul E. Sprague, balloon framing was first used by George Washington Snow in the construction of a warehouse in Chicago in 1832.

Previously, historian and architecture critic Siegfried Giedion believed that the first use

of balloon framing was by George Washington Snow, but in 1833--not 1832—on St. Mary’s Church in Chicago. Sprague disproved Giedion’s theory in his 1981

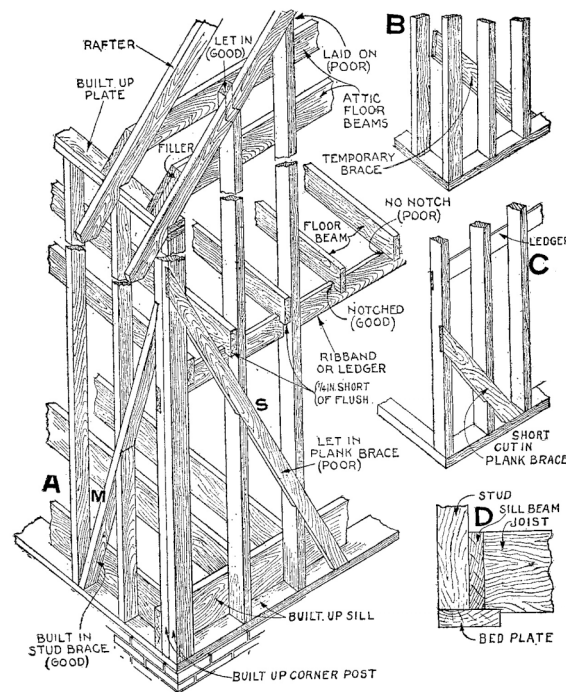


Figure 1 - Image of a balloon frame from Audel's *Carpenter's and Builder's Guide*, Copyright 1923. Retrieved from Wikipedia.com February 28, 2007.

¹ Paul E. Sprague, “Chicago Balloon Frame: The Evolution During the 19th Century of George W. Snow’s System for Erecting Light Frame Buildings from Dimension Lumber and Machine-made Nails,” in *The Technology of Historic American Buildings: Studies of the Materials, Craft Processes, and the Mechanization of Building Construction*, ed. H. Ward Jandl (Washington, D.C.: Foundation for Preservation Technology for the Association for Preservation Technology, 1983), p. 35.

article, *The Origin of Balloon Framing*.² The use of the term “balloon” construction was originally derisive, “presumably by persons who expected his [Snow’s] lightly built structure to be blown away in the first storm.”³

According to historian Kingston Heath, “The balloon frame is clearly a product of the American Industrial Revolution.”⁴ It is characterized by its use of thinner, standardized sawn framing members and machine-made nails, as opposed to the heavy timbers and complicated joinery used in traditional wooden construction methods. Balloon framing utilizes continuous vertical framing members, called studs, which carry an equal distribution of the building’s vertical compressive load. The studs are usually 2x6 or 2x4 inches and are placed approximately sixteen inches apart.⁵ (See Figure 1) A major difference between balloon frame and previous wood framing techniques is its lack of girts, the horizontal framing members that held together the individual bays of traditional framed buildings. Instead of girts, balloon framing utilizes the outer sheathing to make the buildings rigid, and the floor joists of upper stories rest on ledgers that are nailed horizontally across the studs. Before balloon framing was “invented,” traditional wood frame buildings, or braced frame buildings, had “diagonal

² Paul E. Sprague, “The Origin of Balloon Framing,” *Journal of the Society of Architectural Historians*, 40 no. 4 (December 1981): 311.

³ Sprague, “Chicago Balloon Frame,” p. 36.

⁴ Kingston W. Heath, “Balloon Frame,” in *The Dictionary of Art* Vol. 30, ed. Jane Turner (London: Macmillan Publishers Limited, 1996), p. 898.

⁵ *Ibid.*, p. 899.

members between the posts, sills, and girts to brace the structure against wind pressure.”⁶

“The principal advantages that the balloon frame had over the traditional jointed frame were that it used one third the volume of lumber, involved less construction time and required less skilled labor. As a result, the balloon frame cost c.40% less to construct.”⁷ The use of the machine cut nails was much less expensive than hand-wrought nails, and because the nails were used to attach all parts of the frame, no time-consuming mortise and tenon joinery or skilled carpenters were needed. Dell Upton succinctly explains the industrialization of the building process, “After about 1790, nails could be cut rapidly and mechanically from sheets of iron. Forty years later, the invention of a machine to form heads on cut nails gave nailing the edge over joinery in speed and labor costs. The invention of fast steam-powered circular saws augmented balloon framing’s advantages after 1840.”⁸

The cheap balloon frame buildings could even be prefabricated and shipped out via the railroad to the rapidly developing American West. Upton describes the mechanization of the building process, “the individual carpenter or building worker who devoted a variety of subtle skills to creating a unique building on site gave way to the off-site machinist. Whose equally subtle skills created a machine that could make many parts for many buildings at once. In short, building skill

⁶ Sprague, “Chicago Balloon Frame,” p. 40.

⁷ Heath, “Balloon Frame,” p. 899.

⁸ Dell Upton, *Architecture in the United States* (New York: Oxford University Press, 1998), p. 153.

significant and permanent place in the annals of building technology history."¹¹

¹¹ *Ibid.*, p. 49.

Bibliography

Heath, Kingston W. "Balloon Frame." In *The Dictionary of Art* Vol. 30, edited by Jane Turner. London: Macmillan Publishers Limited, 1996.

Sprague, Paul E. "Chicago Balloon Frame: The Evolution During the 19th Century of George W. Snow's System for Erecting Light Frame Buildings from Dimension Lumber and Machine-made Nails." In *The Technology of Historic American Buildings: Studies of the Materials, Craft Processes, and the Mechanization of Building Construction*, edited by H. Ward Jandl. Washington, D.C.: Foundation for Preservation Technology for the Association for Preservation Technology, 1983.

Sprague, Paul E. "The Origin of Balloon Framing." *Journal of the Society of Architectural Historians*, 40 no. 4 (December 1981): 311-319.

Upton, Dell. *Architecture in the United States*. New York: Oxford University Press, 1998. p