

Who Invented the Fitch Sash Fastener?

Michael F. Lynch

Hundreds of sash-fastener devices were marketed in the nineteenth century, but one supplanted them all. If Mr. Fitch did not invent this device, who did?



Fig. 1. Advertisement from *Carpentry & Building Magazine*, December 1896. Technically, a sash lock requires a key, and this is a meeting-rail sash fastener that simply holds the sash in place.

In response to the near-monopoly of British-made window-sash hardware supplied to its former colony, the first United States patent for window-sash hardware was granted to Benjamin S. Wolcott, of Connecticut, in 1802.¹ Since then, thousands of U.S. patents have been granted for a wide variety of ways to keep single- and double-hung window sash closed, open, or fixed somewhere in between. Of these thousands, hundreds were manufactured and released into the market, and of these hundreds, only a few dozen achieved any widespread success. The most successful of them all was the single-action-cam meeting-rail sash fastener, originally marketed as the Fitch Sash Lock (Fig. 1). This article explores how window hardware evolved throughout the nineteenth century and how this particular item became the dominant sash fastener into the twenty-first century.

The Fitch sash fastener, like the Phillips-head and Allen-head screws introduced in the 1930s and 1940s, is not named for the person who invented it but for the company that marketed it. Inventors usually are required to assign the patent to their employer, which then has exclusive rights to manufacture and market the device. As discussed below, a single-action-cam sash fastener was patented by an employee of the W. & E. T. Fitch Company, of New Haven, Connecticut, at the end of the nineteenth century. So quickly did other companies copy this fastener and so rapidly did this type of fastener take

command of the U.S. market that it was referred to as the “Fitch sash fastener” for only a relatively brief period, although the moniker survives in Ireland and the United Kingdom to this day.²

Knowing who invented something is only one piece of the interesting puzzle of what is invented and how it performs in the market. In the U.S., there are essentially two types of patents: utility patents (awarded for objects that perform a task or are manufactured in some way not previously known or are an improvement on something that already exists) and design patents (granted for specific decorative designs). The difference can be summarized this way: Utility patents are for the way something is made or works; design patents are for the way something looks.³

Rarely is something so radically new that it is the first of its type and not an improvement of something that already exists. The vast majority of patents are granted for such improvements, and utility patents for window hardware fall into this category. It is through a series of these improvements over a half century that this single-action-cam sash fastener came into being.

What Is a Sash Fastener?

There are many types of window hardware that have as their primary purpose holding single- and double-hung sash in a fixed position—either closed, partially opened, or fully opened.⁴ The terminology used in patent records and marketing materials of the time includes sash holders, fasteners, fasts, anti-rattlers, props, locks, springs, and bolts. Sash hardware can function in a myriad of ways: It can be placed at the meeting rail to engage both sash, at the bottom rail to engage the sill, or at one of the stiles to engage the jamb.⁵

A sash fastener is placed at the meeting rails to hold the upper and lower sash together and prevent either sash from opening or rattling. The earliest known type of sash fastener used in the U.S. was the quadrant type imported from England, in which the arm rotates 90

degrees in only one direction, a design that predominated in the U.S. until the 1850s when it was replaced by an American version invented in Connecticut.⁶

Morton Judd, New Britain, Connecticut. In 1847 Morton Judd (1808–1901), partnering with his brother Oliver in M. & O. S. Judd Manufacturing Co., of New Britain, was granted U.S. Patent 5,279 for the first significant improvement of the sash fastener (Fig. 2).⁷



Fig. 2. Morton Judd, sash fastener, ca. 1847. The improvement was to add a flat spring that engages the flat end of the lever to hold it in place. Unlike the British quadrant-style sash fastener, the lever could be swung 90 degrees in either direction to disengage the keeper. Photograph by author.

An article published during Morton Judd’s lifetime indicates how quickly the English-style sash fastener had been supplanted: “[Judd’s] sash fastener was simple in construction and effective, and soon began to displace the goods of English manufacture imported by the trade in builders’ hardware. An incident illustrates the point. A few years after the manufacture was begun, Mr. Judd tried to increase his sales in the New York market. He appealed to a merchant and received the following reply: ‘No. I have got \$5,000 worth of imported fasteners there on my shelves, and I would have sold all of them and as many more if it had not been for your fastener.’”⁸

Innovation after the Civil War

After the Civil War, there was apparently no limit to the ingenuity of U.S. inventors and tinkerers, and hundreds of patents were granted for improvements to the meeting-rail sash fastener. Many were aimed at improving security, claiming in the patent applications and marketing materials that the device prevented the opening of the sash fastener by slipping a thin-bladed knife between the sash. Dozens of these sash fasteners entered the market and achieved significant success (Fig. 3).

Some of the methods devised to prevent the knife-blade entry were simple. Others were more complicated, but most involved multiple moving parts and some way of engaging and disengaging the lever that could be activated only from inside the building. Multiple parts complicated fabrication, as well as function. Some even required two hands to operate.



Fig. 3. Packaging for one type of “burglar proof” window hardware, ca. 1935. Photograph by author.

One type of sash fastener designed to foil the knife-wielding burglar incorporated an eccentric cam that converts rotational motion to lateral motion. The rotational center is offset from the actual center of the cam, resulting in the outer surface rising and falling as the cam is turned. Used for millennia for pumping water and for lifting heavy drop hammers at forges, the eccentric cam made its most visible appearance in hardware with James Carpenter's 1830 patent lock in England, in which the rotation of the handle lifts the latch bar up and out of the keeper. It appears that the eccentric cam did not surface in window hardware in the U.S. until near the end of the Civil War.⁹ An eccentric cam is an effective way to draw two sash together, and this attribute was used to advantage by several subsequent sash-fastener inventors.

Oliver Judd, New Britain, Connecticut.

Oliver S. Judd (1839–1903), partner in Judd & Blakeslee, of New Britain, was granted U.S. Patent 50,136 on September 26, 1865, for what may be the earliest use of an eccentric cam in a sash fastener in the U.S. (Fig. 4).¹⁰



Fig. 4. Oliver Judd, "Patent Burglar Proof Sash Fastener," ca. 1865. The hinged hasp (at right) is brought down over the vertical turn button. The lever is then turned by means of an eccentric shank that draws the two sash firmly together. Photograph by author.

Otto F. Fogelstrand, Kensington, Connecticut. Swedish immigrant Otto F. Fogelstrand (1843–1937) was employed by the Hart, Bliven & Mead Manufacturing Co., of Kensington.¹¹ In 1877 he was granted U.S. Patent 197,026 for a sash fastener (Fig. 5). The patent was assigned to his employer, as were the more than 20 other design patents granted to him between 1872 and 1877 for a variety of handles, pulls, brackets, pen racks, and inkstands.



Fig. 5. Otto F. Fogelstrand, sash fastener, ca. 1877. This device incorporates a lever with a large hub at one end into which is cast a recessed eccentric groove. As the lever is turned, the groove engages a post or lug in the keeper (removed to reveal the groove) and draws the sash together. Photograph by author.

George M. Baker, New Britain, Connecticut.

George Baker (1836–1906) is listed in the 1860 census of Hartford, Pennsylvania, as a "scale maker."¹² In the 1870 and 1880 U.S. censuses, he was living in New Britain, where his trade was listed as "works in hardware shop."¹³ Because there were many hardware shops in New Britain at this time, it is not possible from that brief description to determine in which shop he worked. He appeared in the 1882 New Britain city directory as a "machinist" at the Stanley Rule and Level Co., and from 1883 to 1891, he was listed as a "contractor" at that firm. He was promoted to foreman in 1892, a position he held until his death.¹⁴ In the 1900 New Britain census, he was once again listed as "scale maker," indicating what his role then was at the Stanley Rule and Level Co.¹⁵

In 1885, while working as a contractor for Stanley Rule and Level, Baker was granted U.S. Patent 316,219 for a meeting-rail fastener (Fig. 6). The letters patent claim the following function: "the keeper-cam pulls upon the hooked latch, thereby forcing the lower sash downward and the upper sash upward, bringing them home in case they were not fully closed, and then . . . it pulls the sash-rails firmly together, making a firm lock, which cannot be picked."¹⁶ Unlike Judd's and Fogelstrand's patents, this invention was not assigned to a manufacturer. Perhaps Baker did not assign his patent because he was a contractor and not an employee. Or perhaps the reason was that—except for a very brief period in the early 1870s when it offered a frame pulley for an operable sash—the Stanley company did not manufacture or sell window hardware.¹⁷ Apparently, the invention did not get picked up by any other hardware manufacturer, and the idea went no further than the U.S. Patent Office.

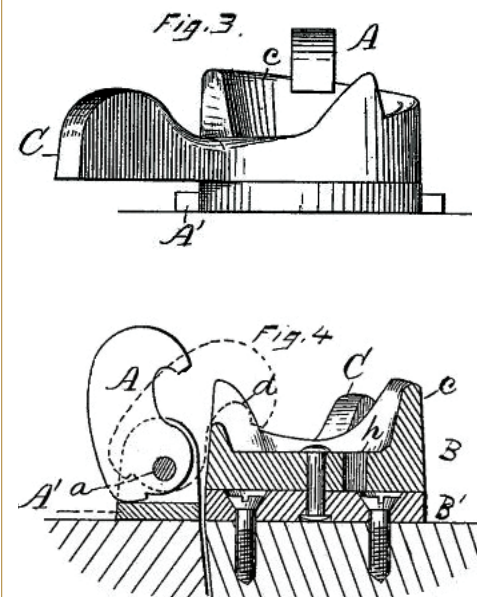


Fig. 6. George Baker, Fastening for Meeting Rails of Sashes, U.S. Patent 316,219, granted April 21, 1885. The hub has two cams that work in sync: a "rotatable side acting cam" (C) and a pivoting hooked keeper (A) to engage the cam. The vertical incline pushes the two sash apart, and the horizontal cam pulls the meeting rails together.

Hobart B. Ives, New Haven, Connecticut. Just three weeks after George Baker received his patent for a meeting-rail sash fastener, Hobart B. Ives (1843–1926), president of the Hobart B. Ives Co., of New Haven, was granted U.S. Patent 317,540 (Fig. 7).¹⁸ This type of fastener was offered in a wide variety of patterns and finishes and was improved upon by several inventors as late as 1901.



Fig. 7. Hobart B. Ives, double-action-cam sash fastener, ca. 1885. It uses an internal cam to operate an arm to first hook the keeper and then draw the two sash together. Photographs by author.

The Hasenpflugs, Cleveland, Ohio. In 1887 machinist John T. Lister (ca. 1840–1923), of Cleveland, Ohio, was granted U.S. Patent 373,143 for a sash fastener that incorporated a raised eccentric cam, as opposed to the recessed eccentric channel in Fogelstrand’s patent. He assigned the patent to his employer, the Champion Safety Lock & Novelty Co., which had been founded by German immigrant and evangelical minister George Hasenpflug (1834–1896).¹⁹ Hasenpflug, in turn, improved upon this patent with one of his own, U.S. Patent 423,761, granted on March 18, 1890 (Fig. 8). The operation of this fastener was described as follows: “When the eccentric cam is by its handle turned half-way round, it will engage the lip on the locking plate, and the motion of the handle being continued, the sashes are locked tight together.”²⁰



Fig. 8. George Hasenpflug, sash fastener with raised single-action cam, ca. 1890. Photograph by author.

In 1894 John A. Hasenpflug (1879–1945), secretary of his father’s renamed Champion Safety Lock Co., was granted U.S. Patent 528,369 for a double-action modification of the sash fastener already manufactured by the company.²¹ Notably, the product name, “The Champion,” was cast in the top face of the base and keeper (Fig. 9). The Champion was promoted as having “but 5 parts.”²² The problems with any of these complex, multi-action fasteners are that fabrication required assembling multiple cast or stamped pieces and that the more pieces involved, the greater the likelihood of the parts wearing out or becoming dif-

ficult to operate without being cleaned and greased.



Fig. 9. John A. Hasenpflug, sash fastener, “The Champion,” with double-cam action, ca. 1894. The eccentric cam first engages the keeper (similar to the previous single-action version), but the cam itself is then drawn tight to the base by a second cam, and the sash are thus tightly drawn together (much as in the Ives patent). Photograph by author.

William Fitch and Eleazer T. Fitch, New Haven, Connecticut. The W. & E. T. Fitch Company was founded prior to 1853 by brothers William Fitch (1820–1877) and Eleazer T. Fitch (1826–1896) and was mainly a producer of cabinet, carriage, and harness hardware.²³ The company was sold in 1919 to the North & Judd Manufacturing Co., of New Haven, makers of saddlery and harness hardware. After the sale, the Fitch name disappeared from the American hardware scene.²⁴

George M. Hubbard, New Haven, Connecticut. George M. Hubbard (1848–1923) was the son of mechanic Asa Hubbard (1823–1881). The 1866 New Haven city directory lists Asa Hubbard as working “at Sargent & Co.” He continued to be listed in the New Haven city directories as a mechanic until his death.²⁵ George Hubbard’s occupation is listed as “pattern-maker” in the U.S. census of 1870 and in the New Haven city directories from 1870 to 1885. He appears to have worked for several small hardware manufacturers in the latter half of the nineteenth century.²⁶

George Hubbard was granted his first patent in 1870 for an “Improvement in locks for the meeting rail of sashes.”²⁷ He was 22 years old; his 34-year-old co-patentee was Frederick W. Judd, a nephew of Morton and Oliver S. Judd. The patent was not assigned to a company, so it is not known which of the many hardware manufacturers in New Haven employed either man at that time. The principal improvement of this patent was the introduction of a spring-loaded catch-pin to secure the lever in place to “prevent the lever from being turned to the side, and thus unlocked by means of any thin implement inserted between the sashes.”²⁸

In 1871 Hubbard patented another “Improvement in fasteners for the meeting rail of sashes.” This time the patent was assigned to the Parker & Whipple Company, of West Meridian, Connecticut, a small hardware manufacturer.²⁹

Hubbard was granted another patent in 1873 for an improvement in a snap hook, which he assigned to the W. & E. T. Fitch Company, suggesting that he was then working for this company, which he would rejoin about a decade later.³⁰ In October 1876 Hubbard was granted a patent for another snap hook, which he assigned to O. B. North & Co., of New Haven.³¹ Established in 1855, this firm specialized in saddlery and hardware. Over the next six years, Hubbard was granted five additional patents, which he assigned to O. B. North & Co., all for harness- and carriage-related hardware.³²

From 1886 through 1913, Hubbard is listed in the New Haven city directories as either superintendent or foreman “with the W. & E. T. Fitch Co.”³³ Between 1885 and 1912, he was granted 18 utility patents and 13 design patents, all of which he assigned to the W. & E. T. Fitch Company. Two of the utility patents and four of the design patents were for the single-action-cam sash fastener; the others were for harness- and saddle-related hardware.

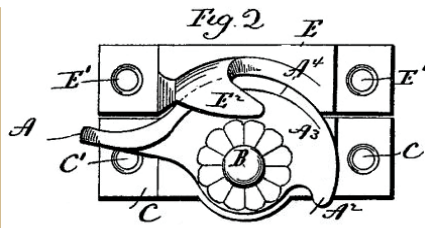


Fig. 10. George M. Hubbard, Sash Lock, U.S. Patent 564,426, granted July 21, 1896. Similar to Baker's patent, the vertical incline pushes the two sash apart, and the horizontal cam pulls the meeting rails together, but in this design, the keeper is fixed.

Hubbard was granted U.S. Patent 564,426 for a single-action-cam sash fastener in 1896, which he assigned to his employer (Fig. 10). This design quickly became known as the “Fitch sash fastener.” Its chief benefit was that the lever and cam were cast as one piece, making manufacture and assembly easier and reducing the opportunity for parts to wear out. In promotional literature, the primary selling point was described thus: “Its construction is such as to securely lock the window, at the same time lifting the upper sash from the point to which it frequently rebounds or sags. The lock is arranged also to prevent rattling by drawing the sash together.”³⁴

Hubbard was granted an additional utility patent for both a lever and a keeper in 1900 and several design patents for variations on the shape of keepers or levers in 1897 and 1900.³⁵ The W. & E. T. Fitch Company achieved success in marketing the sash fastener, but this appears to be the company's only foray into building hardware.

In the 1900 census, George Hubbard listed his occupation as “Inventor,” and in the 1910 census as “Designer-Hardware.”³⁶ He retired in 1913 and died in New Haven in 1923.³⁷

The Imitators

The ease of manufacture and the simplicity of operation appear to have made quite an impression on the market and major building-hardware manufacturers

followed Hubbard's lead. Some manufacturers offered their own versions under the Fitch patent, but in 1900 Sargent & Co. Hardware, Reading Hardware Co., and Yale & Towne Manufacturing Company each obtained design patents for slightly modified versions of a Fitch-type fastener.³⁸ Each functioned the same way as the Fitch fastener, but variations in the shape and profile of the lever and cam enabled each company to manufacture and promote its own version, becoming popular competitors (Fig. 11).



Fig. 11. George E. Tyson, Design for a Lever for Sash-Fasteners, U.S. Design Patent 32,817, granted June 12, 1900.

The Ascendancy of the Fitch-Type Sash Fastener

In 1898, just two years after the Fitch patent was issued, the author of the first edition of *F. E. Kidder's Building Construction and Superintendence* stated that

A great change has taken place in the design of sash fasts in common use during the past fifteen years. . . . Probably the most popular style of sash fast at the present time is the cam sash fast. . . . The cam sash fast was first brought out by Hobart B. Ives & Co., but there are now several other cam sash fasts in the market that are made on practically the same principle and in very nearly the same shape: most of these, however, are inferior to the Ives.³⁹

The accompanying illustration is labeled as the “Ives” cam sash fastener. An illustration of the Fitch sash lock in this book is described as “an entirely new form of sash lock recently placed on the

market, which is neat in appearance, very simple in construction and works nicely.”⁴⁰

By 1904 Henry R. Towne, president of Yale & Towne Manufacturing Company, wrote in *Locks and Builders Hardware* that the “helical cam type is best known by the names of its earlier makers, Ives and Fitch, but it is now made by many others.”⁴¹

In 1906, in the first edition of the *Sweet’s Indexed Catalogue of Building Construction*, the Hobart B. Ives Co. placed a full-page advertisement, which listed the Ives patent sash lock, but illustrated the Ives “Crescent Sash Fastener,” a Fitch-type fastener that was available in 42 different materials, finishes, and sizes.⁴² The second edition of *Sweet’s*, published in 1907, included, in addition to an Ives advertisement, a full-page advertisement by the W. & E. T. Fitch Company, followed by two full pages of advertisements by the Champion Safety Lock Co.⁴³

Builders’ Hardware, issued in 1908 by the International Textbook Company, illustrates five sash fasteners and describes three cam-style fasteners (Ives, Champion, and Fitch), plus the Yale screw fastener and the Boston quadrant (a variation on the earlier English lever type). The Fitch fastener is described as follows:

The Fitch . . . is made by several manufacturers, and can be procured in all finishes of iron for the cheaper class of buildings, and also in bronze metal for high-class work. It is composed of a helical cam, which is fastened to the top of the meeting rail of the lower sash and engages a hook, or a lug, that is secured to the bottom of the upper sash. The operation of this fastener is rapid, and the rotary movement draws the two sashes together horizontally and forces them in opposite directions vertically. In this way, it holds the sash fast and prevents rattling and air leaks. It also has an advantage in that it cannot be moved by inserting a knife blade between the sashes from the outside.⁴⁴

In the second edition of *Builders’ Hardware*, published in 1932, the only sash fastener illustrated is the Fitch type, but it is no longer identified by name. The description states only “The type shown . . . is made by several manufacturers.”⁴⁵

Thus, it appears that by 1932 the Fitch sash fastener had vanquished all competitors in the North American market, and with the patent expired and the company absorbed by North & Judd, the fastener had become so ubiquitous that it was no longer named. However, the name does survive in Ireland and the United Kingdom to distinguish it from the traditional quadrant-style sash fastener.⁴⁶

Epilogue

As with the many patents issued before it, Hubbard’s fastener was the source for many “improvement” patents that followed.

One of the first was awarded to another employee of the W. & E. T. Fitch Company, master mechanic Walter Petrie (1858–1946), of New Haven. His 1909 patent was for a Fitch-type sash fastener made of stamped sheet metal instead of cast metal.⁴⁷

Alexander F. Smith (1862–1939), of Reading, Pennsylvania, an architect born in Inverness, Scotland, was granted a patent in 1910 for a multi-port keeper for a Fitch-type fastener (Fig. 12).⁴⁸

Utility patents were also granted for improvements in how the lever was spring-loaded, including one to S. R. Parkes, an inventor in England. In his 1915 U.S. patent application, Parkes says his improvement “has reference to fasteners for window sashes of the kind commonly known in the trade as ‘Fitch Fasteners.’”⁴⁹

In 1945 Frederick Granberg, of Chicago, was granted a patent for a Fitch-type fastener that shut automatically when the window was closed (Fig. 13).⁵⁰

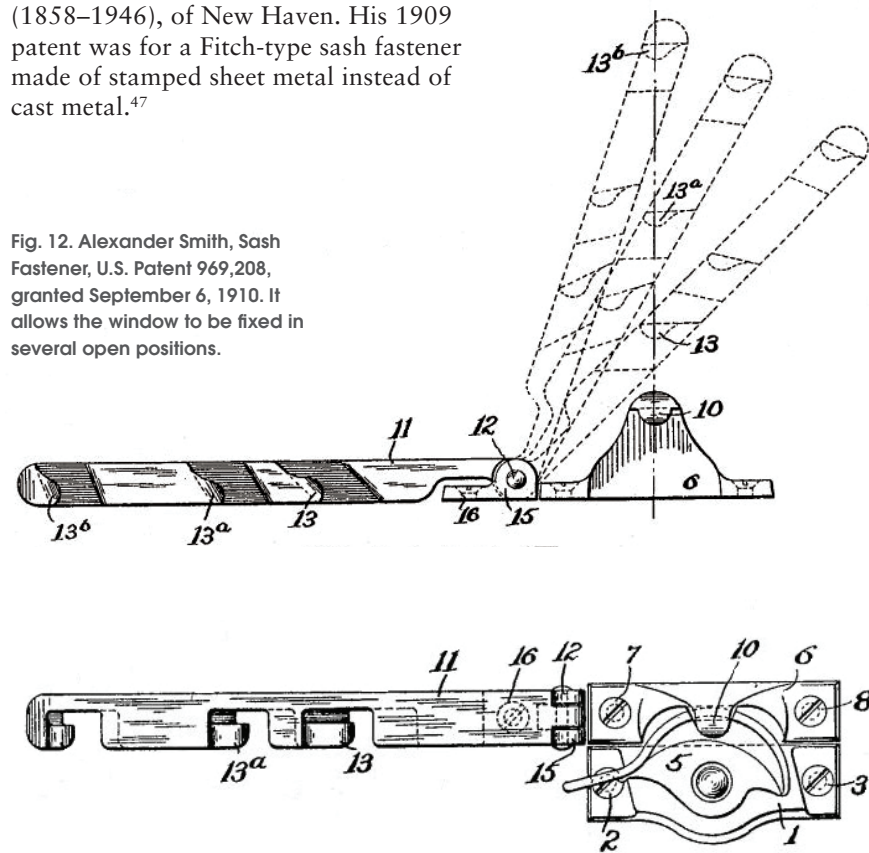


Fig. 12. Alexander Smith, Sash Fastener, U.S. Patent 969,208, granted September 6, 1910. It allows the window to be fixed in several open positions.

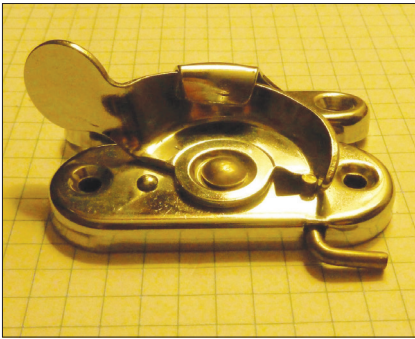


Fig. 13. Frederick Granberg, self-locking sash fast, ca. 1949. The wire in the foreground trips the lever when the bottom sash is closed. Photograph by author.

So, Who Invented the Fitch-Style Sash Fastener?

So, back to the initial question: Who “invented” this ubiquitous piece of window hardware? The adage “success has many parents” provides some direction.

Although there were several sash fasteners that utilized eccentric cams in one way or another to secure the sash and although a crescent-shaped lever appears as early as 1816 in England and although George Baker appears to have developed a fastener very similar to the Hubbard-designed fastener 11 years before Hubbard that apparently never went into production, it was George M. Hubbard who was granted the patent and the W. & E. T. Fitch Company that manufactured and marketed the Fitch-style sash fastener, to wide acclaim. Although Baker and Hubbard worked for companies in the same city, they lived in different places (Baker in New Britain and Hubbard in New Haven), and research to date does not indicate that their paths crossed at any point in their careers. Although it is possible that Hubbard knew of Baker’s earlier work and although the language describing their function in both letters patent is similar, ultimately it is Hubbard who earns the credit for having “invented” the meeting-rail sash fastener that captured the market and continues to be made and sold today.

Michael F. Lynch, P.E., AIA, FAPT, first lectured on window hardware in 1986 at the *Window Conference and Exposition for Historic Buildings in Boston* and first exhibited historic window hardware at the 1992 *Windows Conference in Washington, D.C.* He has been collecting sash fasteners and other window hardware ever since. He can be reached at mflynch49@yahoo.com.

Notes

1. Benjamin S. Wolcott, Window Sash and Shutter Fasten’g, U.S. Patent, unnumbered, granted Dec. 4, 1802. *A Digest of Patents Issued by the United States From 1790 to January 1, 1839* (Washington, D.C.: Henry L. Ellsworth, Commissioner of Patents, 1840), 83, https://books.google.com/books?id=qnfPAAAAMAAJ&pg=PA602&dq=Benjamin+Wolcott+patent&hl=en&newbks=1&newbks_redir=0&sa=X&ved=2ahUKewjrwaAG-1MTmAhWko1kKHYYCmDr8Q6AEwAHoECAEQAg#v=onepage&q=Benjamin%20Wolcott%20patent&f=false/.
 2. Personal observation by the author at hardware stores in 2014 and 2018.
 3. There is an excellent discussion of U.S. patents in Carole L. Perrault, “Researching 19th-Century American Patents: The Journal of the Franklin Institute,” *APT Bulletin: The Journal of Preservation Technology* 8, no. 2 (1976): 24–36.
 4. For an excellent explanation of the development of single- and double-hung windows, see Hentie Louw, “The Development of the Window,” in *Windows: History, Repair and Conservation*, ed. Michael Tutton and Elizabeth Hirst (Shaftesbury, England: Donhead Publishing, 2007), 7–96.
 5. For a detailed explanation of the application and function of many types of window hardware, see the article entitled “Builders’ Hardware—XIV” by architect Clarence Blackall (1857–1941) on sash fasteners published in *American Architect and Building News* 24, no. 676 (Dec. 8, 1888): 263–266. The article was later reprinted in a book, with other articles, by Clarence Blackall, as *Builders’ Hardware: A Manual for Architects, Builders and House Furnishers* (Boston: Ticknor and Co., 1890), 122–146, https://books.google.com/books?id=Zfb2O0x7a48C&printsec=front-cover&dq=Builder%27s+Hardware+Blackall&hl=en&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwiq7K_dj8XmAhXNKM-0KH5mRDiEQ6AEwAXoECAQQAg#v=onepage&q=Builder's%20Hardware%20Blackall&f=false. Blackall devotes an entire 25-page chapter in the book to sash fastening,
- illustrating and describing the function of no fewer than 18 meeting-rail sash fasteners.
6. For a detailed description of English sash hardware in the U.S., see Steven Stuckey, “Early Brass Sash Locks in the United States,” *APT Bulletin: The Journal of Preservation Technology* 50, nos. 2–3 (2019): 67–72.
 7. Everett Gleason Hill, *A Modern History of New Haven and Eastern New Haven County*, vol. 2 (New York: S. J. Clarke Publishing Co., 1918), 770, https://books.google.com/books?id=EeknAQAAAMAAJ&pg=PA770&dq=Morton+L.+Judd&hl=en&newbks=1&newbks_redir=0&sa=X&ved=2ahUKewipok_pxL_mAhWqwFk-KHatyBIAQ6AEwAXoECAEQAg#v=onepage&q=Morton%20L.%20Judd&f=false. This publication provides a brief history of the various business names and family members with whom he was involved.
 8. John L. Rockey, ed., *History of New Haven County, Connecticut* (New York: W. W. Preston & Co., 1892), 434, https://books.google.com/books?id=94g6AQAAIAAJ&printsec=front-cover&dq=History+of+New+Haven+County&hl=en&newbks=1&newbks_redir=0&sa=X&ved=2ahUKewix3ciyyr_mAhUQx1kKHVDaDXoQ6AEwAHoECAMQAg#v=onepage&q=History%20of%20New%20Haven%20County&f=false.
 9. A sash fastener with an eccentrically mounted crescent-shaped lever appears in a ca. 1816 brass-works catalog issued by a Birmingham, England, company, but it did not replace the more popular quadrant type and does not appear to have been used in the U.S.; see <https://babel.hathitrust.org/cgi/pt?id=gri.ark:/13960/t4jm9jc3g&view=1up&seq=109>.
 10. “Death of Oliver S. Judd,” *The Iron Age Magazine* 72 (Oct. 22, 1903): 59, https://books.google.com/books?id=jOUcAQAAAMAAJ&pg=RA12-PA59&dq=Oliver+S.+Judd&hl=en&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwj_iqvxb_mAhXpV98KHAM-kAB04ChDoATAFegQIBRAC#v=onepage&q=Oliver%20S.%20Judd&f=false. This obituary provides a brief history of the various business names and family members with whom he was involved.
 11. Information on Otto F. Fogelstrand’s Swedish origin appears in the U.S. Census, 1900, San Francisco, Calif. Information on his death appears in *Springfield, West Springfield, Longmeadow Chicopee Directory 1938* (Springfield, Mass.: Price & Lee Co., 1938), 359.
 12. U.S. Census, 1860, Hartford, Susquehanna, Pa.
 13. U.S. Census, 1870, 1880, New Britain, Hartford, Conn.

14. *New Britain City Directory for 1878–79* (New Britain, Conn.: Adkins Brothers, 1878).
25. See the *New Britain City Directory* (New Britain, Conn.: Price & Lee Co., 1882–1906), especially 1883, page 83, for the first “machinist” reference. The date of his death is found in *Connecticut, Deaths and Burials Index, 1650–1934* (Provo, Utah: Ancestry.com Operations, Inc., 2011).
15. U.S. Census, 1900, New Britain, Hartford, Conn.
16. George Baker, Fastening for Meeting Rails of Sashes, U.S. Patent 316,219, granted April 21, 1885.
17. *Stanley Rule and Level Co. Catalog* (New Britain, Conn., 1870), 48; repr. in *The Stanley Catalog Collection, 1853–1898* (Mendham, N.J.: Astragal Press, 2000).
18. U.S. Census, 1900, New Haven, Conn. The date of his death is found in *Connecticut, Deaths and Burials Index, 1650–1934*.
19. U.S. Census, 1870, Bath, Summit, Ohio.
20. Product announcement in *Carpentry & Building Magazine* 10, no. 3 (March 1888): 63–64.
21. *The Cleveland Directory for the Year Ending July 1894* (Cleveland, Ohio: Cleveland Directory Publishing Co., 1893), 405.
22. Advertisement in *Carpentry & Building Magazine* 18, no. 1 (Jan. 1896): xv.
23. *Official Catalog of the New-York Exhibitions of the Industry of All Nations, 1853* (New York: George P. Putnam & Co., Publishers, 1853), 76, https://books.google.com/books?id=Qm-NUkikOKrYC&printsec=frontcover&dq=Official+Catalog+of+the+New+York+Exhibitions+of+the+Industry+of+All+Nations&hl=en&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwiM272K1b_mAhWJylkKHXHeAnUQ6AEwAXoECAQQA-g#v=onepage&q=Official%20Catalog%20of%20the%20New%20York%20Exhibitions%20of%20the%20Industry%20of%20All%20Nations&f=false. Among those listed has having exhibited in the category of “Class 22. Iron, Brass, Pewter and General Hardware” is “81-A general assortment of cabinet locks.—W. & E. T. Fitch, many. New Haven, Connecticut.” For information on birth and death dates, see *Connecticut, Deaths and Burials Index, 1650–1934*.
24. *Poor’s Industrial Section*, vol. 2 (New York: Poor’s Publishing Co., 1925), 133, https://books.google.com/books?id=UQhN-AQAAMAAJ&q=Poor%27s+Industrial+Section+Vol+II+K+to+Z&dq=Poor%27s+Industrial+Section+Vol+II+K+to+Z&hl=en&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwiOl-6Wkj8XmAhWDG80KHU83D0wQ6AEwA3oE-CAEQAg.
25. U.S. Census, 1900, New Haven, Conn. *New Haven City Directory* (New Haven: Benham’s, 1866–1878). *New Haven City Directory* (New Haven: Price & Lee Co., 1879–1882).
26. U.S. Census, 1870, New Haven, Conn. *New Haven City Directory* (New Haven: Price & Lee Co., 1879–1885).
27. George M. Hubbard and Frederick Judd, Window Button, U.S. Patent 106,830, granted Aug. 30, 1870.
28. Hubbard and Judd, Window Button, U.S. Patent 106,830.
29. George M. Hubbard, Improvement in Fasteners for Meeting Rails of Sashes, U.S. Patent 120,441, granted Oct. 31, 1871.
30. George M. Hubbard, Improvement in Snap Hooks, U.S. Patent 136,728, granted March 11, 1873.
31. George M. Hubbard, Improvement in Snap Hooks, U.S. Patent 183,460, granted Oct. 17, 1876.
32. George M. Hubbard, Snap-Hook, U.S. Patent 172,319, granted Jan. 18, 1876; Adjustable Carriage-Top, U.S. Patent 211,861, granted Feb. 4, 1879; Trace-Buckle, U.S. Patent 219,864, granted Sept. 23, 1879; Buckle, U.S. Patent 250,542, granted Dec. 6, 1881; Gag Runner, U.S. Patent 278,554, granted May 29, 1883.
33. *New Haven City Directory* (New Haven: Price & Lee Co., 1886–1913).
34. George M. Hubbard, Sash Lock, U.S. Patent 564,426, granted July 21, 1896. *New Haven City Directory* (1886–1913).
35. George M. Hubbard, Sash Fastener, U.S. Patent 661,404, granted Nov. 6, 1900; Lever for Sash Fastener, U.S. Design Patent 27,572, granted Aug. 24, 1897; Lever for Sash Fastener, U.S. Design Patent 32,745, granted May 29, 1900; Keeper for Sash Fastener, U.S. Design Patent 32,815, granted June 12, 1900; Keeper for Sash Fasteners, U.S. Design Patent 32,816, granted June 12, 1900.
36. U.S. Census, 1900, 1910, New Haven, Conn.
37. *Connecticut, Deaths and Burials Index, 1650–1934*.
38. Henry B. Sargent, Lever for Sash Fastener, U.S. Design Patent 32,532, granted April 17, 1900.
- George E. Tyson, assigned to Reading Hardware Co., Lever for Sash Fastener, U.S. Design Patent 32,817, granted June 12, 1900. W. H. Taylor, assigned to Yale & Towne Manufacturing Company, Cam for Sash Fasteners, U.S. Design Patent 33,618, granted Nov. 27, 1900.
39. Frank E. Kidder, *Building Construction and Superintendence* (New York: John Wiley & Sons, 1898), 396–397.
40. Kidder, 396–397.
41. Henry R. Towne, *Locks and Builders Hardware* (New York: John Wiley & Sons, 1904), 184.
42. *Sweet’s Indexed Catalogue of Building Construction* (New York: The Architectural Record Co., 1906), 423.
43. *Sweet’s Indexed Catalogue of Building Construction* (New York: The Architectural Record Co., 1907), 593–595.
44. *Builders’ Hardware*, 1st ed. (Scranton, Pa.: International Textbook Co., 1908), 83–84.
45. *Builders’ Hardware*, 2nd ed. (Scranton, Pa.: International Textbook Co., 1932), 84.
46. Treve Rosoman, “History of Window Fittings,” in *Windows: History, Repair and Conservation*, 111–112.
47. Walter Petrie, assigned to W. & E. T. Fitch Co., Sash Lock, U.S. Patent 910,850, granted Jan. 26, 1909.
48. Alexander Smith obituary, *New York Times*, Dec. 3, 1939, 60. Alexander Smith, Sash Fastener, U.S. Patent 969,208, granted Sept. 6, 1910.
49. Samuel R. Parkes, Window-Sash Fastener, U.S. Patent 1,338,250, granted April 27, 1920.
50. Frederick Granberg, Sash Lock, U.S. Patent 2,480,016, granted Aug. 23, 1949.



The *APT Bulletin* is published by the Association for Preservation Technology. APT’s mission is to advance appropriate traditional and new technologies to care for, protect, and promote the longevity of the built environment and to cultivate the exchange of knowledge throughout the international community. A subscription to the *Bulletin* and free online access to past articles are member benefits. For more information, please visit www.apti.org.