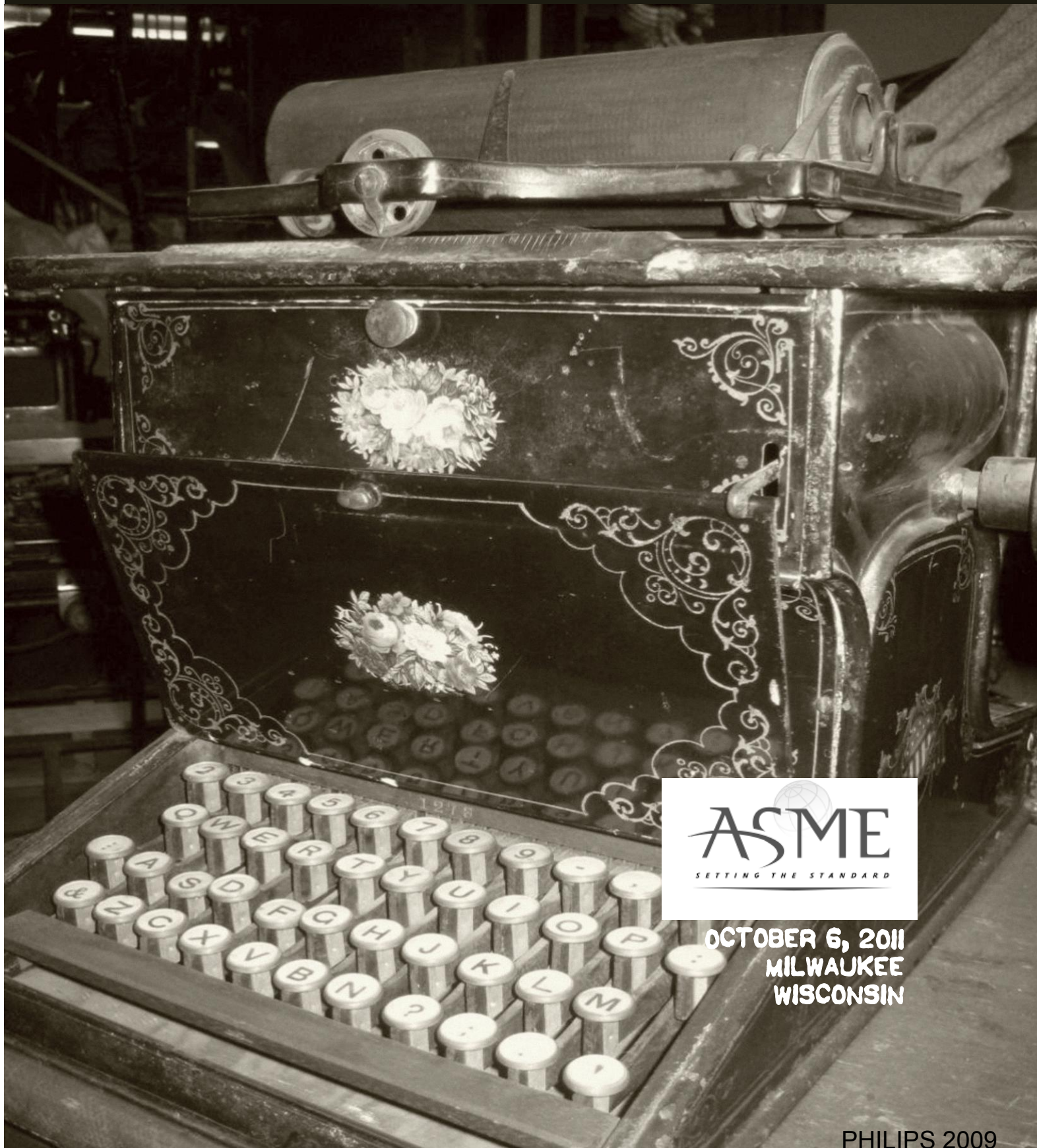


SHOLES & GLIDDEN 'TYPE WRITER'

A HISTORIC MECHANICAL ENGINEERING LANDMARK



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CHRISTOPHER LATHAM SHOLES

Born February 14, 1819
Died February 17, 1890
Resting place Forest Home Cemetery, Milwaukee, Wisconsin
Known as "The Father of the Typewriter"



C. Latham Sholes

Born in Mooresburg, Pennsylvania in 1819, Christopher Latham Sholes worked as an apprentice to a printer in nearby Danville as a youth. He moved to Green Bay, Wisconsin when he was eighteen where he initially worked for his brothers who were publishers of the *Wisconsin Democrat*. Within a year he was promoted to edit the *Madison Enquirer*. In 1840, Sholes established the *Southport* (eventually renamed, 'Kenosha') *Telegraph*, which he published for many years. He eventually became associated with various Milwaukee newspapers, such as the *News*, and the *Sentinel*.

In addition to working as a publisher, Sholes played a key role in early Wisconsin politics. He helped to organize the 'Free Soil' and Republican parties in Wisconsin and served several terms in the state senate and assembly. Perhaps his most memorable legislative accomplishment was leading the successful campaign to outlaw the death penalty in Wisconsin in 1853. During the Civil War, Sholes also served for a time as Milwaukee postmaster, and was later port collector and commissioner of public works.

A practical and active inventor, Sholes developed several devices in the course of his newspaper career, including a newspaper addressing machine (ca 1840-1850s), and a paging or numbering device (1864), before becoming involved in the development of the typewriter which interested him for the remainder of his life. He, with the assistance of others, developed the first commercially successful typewriter.

Cover Photograph:

The cover features the Sholes & Glidden 'Type Writer' that is being designated by ASME as a Historic Mechanical Engineering Landmark. The photograph was taken as the typewriter was being removed from storage and prior to being cleaned. Of the five similar machines in the Milwaukee Public Museum's extensive collection, this appears to be the first manufactured.

Catalog notation: H34385/24284 Sholes & Glidden typewriter, marked #1276, 4 bank, 44 glass top keys, all capitals, black enamel iron frame, Japanned dustcovers ornately decaled and with stencil designating E. Remington & Son as maker. Mounted to treadle sewing (style) machine stand. Made circa 1873, this typewriter is part of the extensive Carl Dietz Collection at the Milwaukee Public Museum.

HISTORY OF THE DEVELOPMENT OF THE TYPEWRITER

Charles F. Kleinsteuber's machine shop on State Street in Milwaukee must have been an interesting place in the mid-1860s. In addition to providing machining and foundry services, the shop served as an informal incubator for would-be inventors. Carlos Glidden was working on designs for a steam-driven rotary plow and a mechanical spade. Christopher Latham Sholes had developed a newspaper addressing machine and a page numbering device.

It is reported that in 1867 Glidden, while observing Sholes's work on perfecting his page numbering device, encouraged him to develop a mechanical writing machine. With the aid of Glidden, machinist and clock-builder Mathias Schwalbach and fellow inventor Samuel Soulé, Sholes produced a functioning machine by the fall of that year.



The machine shop of Charles F. Kleinsteuber, as it appeared in 1867. Photograph courtesy of the Milwaukee Public Museum

Sholes and various associates toiled for nearly seven more years before his design of the world's first practical typewriter was introduced for mass production in 1874. The innovations and refinements that occurred during this seven year period are what distinguished the Sholes & Glidden typewriter from that of the numerous other innovators who had previously attempted to create a mechanical typing machine. With extensive testing and numerous refinements, they converted a crudely built model into a device that typed reasonably well. With the assistance of process engineers at Remington, the resulting machine was reliable, rugged and able to be manufactured in large numbers.

James Densmore, a former newspaper associate of Sholes, provided financing to assist in moving the development into manufacture. Of equal importance, Densmore continuously prodded Sholes to test and tweak the design in order to improve functionality, reliability and ease of use – essentially moving the typewriter from a rough model to a marketable, mass-produced product.

Historian Richard N. Current, formerly a member of the history faculty at Lawrence College in Appleton, Wisconsin, provided the most extensive record of the development work during this time.^{1,2} He relied on extensive correspondence between Densmore and Sholes and others involved in the development. According to these accounts, Densmore agreed to provide financing in exchange for an ownership share, prior to actually seeing the device. By the time he saw the typewriter in March 1868, there were two versions: the original relied on long wires to connect the type bars and key levers, and a refinement developed by Samuel Soulé involved a simplified arrangement for striking the keys onto paper. In the summer of that year, Densmore attempted to manufacture the refined machines in Chicago. After making fifteen typewriters and observing them in use – some of which were used in a school for telegraphers in Chicago, he concluded that the design was not yet suitable for the market.

Current reports that this prompted Sholes, for the first time, to look into the record of what previous inventors had done. He came to the conclusion that all had failed because they had not satisfied one or more of the “fundamental ideals” that he and Densmore considered “essential to success.” These ideals were that, “the machine must be simple and not liable to get out of order,” that “it must work easily and be susceptible of being worked rapidly,” and that “it be made with reasonable cheapness.” Additionally, Densmore insisted that a successful typewriter be capable of writing on paper of ordinary thickness – as opposed to the early designs by Sholes that only printed satisfactorily on paper that was tissue-thin.

To satisfy this last requirement, Sholes abandoned the flat platen design and devised a revolving cylindrical platen to serve as the paper carrier. Sholes employed the cylinder in a novel way to avoid infringing on an existing patent. The cylinder rotated to space the letters, and indexed along its axis to change the lines. While this permitted thick paper to be used, the page was limited to the width of the cylinder – roughly three inches.

In September, 1869, Sholes declared that he had perfected all the necessary principles, writing to Densmore on the machine, “I am satisfied the machine is now done.”

Densmore continued to press for improvements, much to the annoyance of Sholes. However, Sholes continued to work on refinements. He next adopted a refined keyboard, devised by Schwalbach, which involved four rows of metal key levers and buttons set in ascending banks. At the urging of a customer who tried this design, a space bar was added underneath the four rows.

In the summer of 1871, Densmore manufactured in Milwaukee a sufficient number of typewriters to “supply the present demand, pay up the debts and have one or two over to sell.” In addition to durability issues, the type bars wouldn’t stay in line. Sholes, Glidden, Schwalbach and Densmore’s stepson, Walter J. Barron, worked together to resolve this problem. The design was using short, stiff wires, which directly connected the key levers and type bars and pulled at an angle. Glidden initially suggested a system of intermediate levers. Despite Sholes’s disapproval, Densmore pressed on with this approach – which ultimately failed. Barron meanwhile suggested an alternative method which reduced the angle. Sholes and Schwalbach redesigned the machine using that approach, which while not perfect, improved type alignment.

That year, Sholes also tackled an issue for another customer. D. N. Craig, of the Automatic Telegraph Company, told him that his typewriter would be much more useful if it could accommodate a continuous roll of paper. To meet this request, Sholes redesigned the cylindrical platen to move

¹ Current, Richard N. *The Typewriter and the Men Who Made It*. Champaign: University of Illinois Press. (1954) ISBN 0911160884 and;

² Current, Richard N. *The Original Typewriter Enterprise 1867–1873*, *Wisconsin Magazine of History* Madison: State Historical Society of Wisconsin. (June 1949).

lengthwise to space the typed letters, and to rotate to index to the next line. Since letters were typed on the underside of the cylinder, Sholes also hinged the mechanism so that it could be swung up to allow the typist to review typed print. While that was a significant improvement, it infringed on a patent that had recently been issued to Charles A. Washburn of San Francisco, requiring the payment of a license fee to Washburn.

Finally, to reduce the nuisance of type-bar collisions, which were frequent, Sholes and Densmore worked out a non-alphabetical arrangement for the keys, resulting in the QWERTY layout that became and remains the standard for keyboards everywhere.

With these improvements in hand, Densmore began his third attempt to manufacture typewriters for sale. He rented a former wheelwright's mill between the Milwaukee River and the Rock River Canal. With Schwalbach's assistance, he equipped the shop, using water power from the canal. The machines were produced individually, which allowed him to continue to incorporate changes in design as the manufacturing process progressed.



Picture of a Milwaukee-built Sholes & Glidden "Type Writer" Courtesy of the Buffalo Museum.

OUTSOURCING TYPEWRITER MANUFACTURING

While Schwalbach and his workmen were turning out typewriters in their improvised factory, Densmore calculated that the machines were costing more to build than they could be sold for. For advice, he turned to his friend and former business associate, George Washington Newton Yost who was then managing a farm implement factory at Corry, Pennsylvania.³ Yost visited him in Milwaukee to observe his operations and suggested that he contact E. Remington & Sons. Remington manufactured guns, farm implements, and sewing machines, in Ilion, New York. Yost made the introductions and arranged for himself and Densmore to visit their factory in Ilion.

On March 1, 1873, Densmore signed a contract under which Remington agreed to have their lead mechanics, William Jenne and Jefferson Clough, rework the machine and to produce a minimum of a thousand machines. Under the contract, Densmore agreed to pay them \$10,000 for manufacturing the typewriters, plus agreeing to pay a royalty for the services of Remington's lead mechanics. Jenne and Clough prepared the design for mass production, encasing the production version in metal instead of wood, and somewhat reducing the size. In principle, the final Sholes and Glidden typewriters were the same in form and function as the last Milwaukee-built machines.⁴ However, the refinements of Jenne and Clough were significant and often understated, in advancing the design of the machine.⁵

³ This was at least the second time Densmore had contacted Yost to obtain his advice – the first having occurred approximately four years earlier when Yost viewed a much earlier model in New York.

⁴ Ibid. Under the contract, Remington agreed to produce as many as 24,000 typewriters, at its discretion -

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