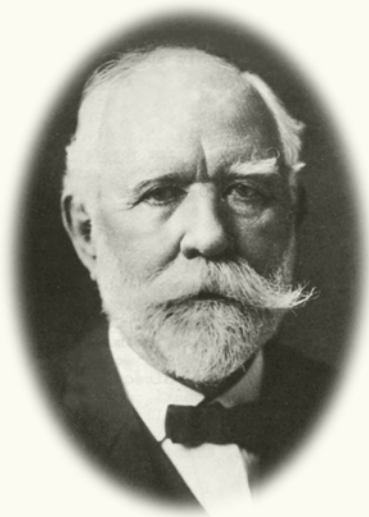


# William Sellers and The United States Standard Screw Threads

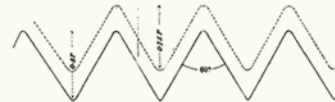
at The Franklin Institute: A Mechanical  
Engineering Heritage Site



**Fig I**  
Graphic Representation of  
Formulas for the pitches of Threads of  
Screw Bolts.

*Horizontal scale 10 vertical scale 1/32 times full size*

*The dotted lines show the usual best form of Threads of merchantable bolts.*



**Fig. H.** Usual Form of Threads best Workshop practice.



**Fig. III.** Form of Thread introduced Mr. Whitworth.



**Fig. IV.** Form of Thread proposed by Mr. Sellers.

Sunday, June 12, 2005  
6:00 pm  
Philadelphia, Pennsylvania



The Franklin Institute  
Science Museum



Celebrating ASME's 125<sup>TH</sup> Anniversary

# ASME Historic Mechanical Engineering Landmark Designation

The Franklin Institute

Jordan Lobby

Sunday, June 12, 2005, 6:00 pm

Welcome	Kenneth A. Kroos Past Vice President, Mid-Atlantic Region
Introductions and Recognitions	Kenneth A. Kroos Harry Armen President, ASME
History and Heritage Program	John K. Brown ASME History and Heritage Committee
William Sellers and The Screw Thread Standard	John Alviti Senior Curator, The Franklin Institute
Plaque Presentation	Harry Armen
Acceptance	Steven L. Synder VP, Exhibit and Program Development The Franklin Institute
Closing	Kenneth A. Kroos
Exhibit Overview	Steven L. Synder

Please join us for the ASME Summer Annual Meeting Opening Reception following the ceremony. Preview *Sir Isaac's Loft*, an exhibit co-sponsored by ASME which aims to encourage young people to explore science as a field of interest and as a potential career.

In honor of ASME's designation, a special display of fourteen of the Sellers Collection of Mechanical Drawings will be available for display in the gallery area of *Sir Isaac's Loft* and in Harcourt Lounge. The entire collection consists of nearly 890 drawings from the Sellers company dating from 1848 to 1914.

The United States Standard Screw Threads  
1864  
William Sellers at The Franklin Institute

By the 1850s, American machinery makers built a range of sophisticated technologies. Textile machines, metal planers, steam engines, locomotives, rotary printing presses, and a myriad of other high-technology products powered an era infatuated with machines. But infatuation turned to frustration when those machines broke down. The country lacked any national or industry standards for the most basic mechanical elements, the nuts and bolts that created a functional machine from disparate parts. So when a bolt broke or a nut was lost, the user had to make a new one to fit its mate or to send for a replacement from the builder.

No one could deny the value of a national standard for these essential fasteners. Indeed by that time the world's industrial leader, Great Britain, was adopting a comprehensive system of screw threads promulgated in 1841 by that nation's leading maker of machine tools, Joseph Whitworth (1803-1887). His American counterpart, tool builder William Sellers (1824-1905) of Philadelphia, understood the value of Whitworth's standard, a clear improvement over the various "mongrel" threads that U.S. machinery makers had adopted. But Sellers decided to improve upon Whitworth's approach, creating a system of threads adapted to American needs.

In April 1864 Sellers laid out his proposed system of screw threads in a paper delivered at Philadelphia's Franklin Institute. Sellers simplified Whitworth's design by adopting a thread profile of 60 degrees (versus 55 degrees), which was easier for ordinary mechanics and machinists to cut. In addition to this profile, Sellers offered systematic approaches to thread pitch (the number of threads per inch), form, and depth, as well as rules to proportion hex nuts — for each fractional size from 1/4-inch to 6-inch diameter bolts.

The Franklin Institute was America's leading forum for developing the art and science of mechanical engineering in this era before the founding of the ASME, and Sellers was its president. On December 15, 1864, a special committee of the Institute endorsed the Sellers or Franklin Institute threads. To aid their adoption throughout the United States, the Institute lobbied the U.S. Army, Navy (whose Bureau of Steam Engineering was a leading mechanical innovator), and the master mechanics of America's largest railroads.

The new thread standards did not sweep the nation overnight. The inertia of old approaches was difficult to surmount, while thorough adoption required newly precise taps and dies as well as reliably dimensioned steel bar stock. But by the 1880s, the system had triumphed, as machines with interchangeable parts — from typewriters to locomotives — flooded the national economy. Known originally as the Sellers or Franklin Institute threads, they became the United States Standard threads. Other systems of screw threads have since come into widespread use. But down to the present day, William Sellers' innovation remains a ubiquitous

standard. Take a quarter-inch nut from a Portland, Maine, hardware store and it will reliably fit a quarter-inch bolt in Portland, Oregon. The economy and simplicity of this elegantly rational system represents William Sellers' legacy and the enduring quality of fine mechanical engineering.

John K. Brown  
*Associate Professor*  
*Department of Science, Technology and Society*  
*School of Engineering and Applied Science*  
*University of Virginia*

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### **The History and Heritage Program of ASME**

The History and Heritage Landmarks Program of ASME (the American Society of Mechanical Engineers) began in 1971. To implement and achieve its goals, ASME formed a History and Heritage Committee initially composed of mechanical engineers, historians of technology and the curator of mechanical engineering at the Smithsonian Institution, Washington, D.C. The History and Heritage Committee provides a public service by examining, noting, recording and acknowledging mechanical engineering achievements of particular significance. For further information, please contact ASME, Three Park Avenue, New York, NY 10016-5990, 1-212-591-7740.

Founded in 1880 as the American Society of Mechanical Engineers, today's ASME is a 120,000-member professional organization focused on technical, educational and research issues of the worldwide engineering and technology community. In 2005, ASME celebrates 125 years of continued service and leadership — setting the standard — for professional engineering societies worldwide.

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