

The Henry-Lepaute Clock and Lens Works Producers of the Fresnel Lens

Part Three

By Thomas Tag

This is a continuation of the story of the Fresnel lens makers. In this article the Henry-Lepaute Company, in France, is described from its beginnings as a clock maker, to its production of Fresnel lenses for the world market, to its current status.

Augustin Henry-Lepaute

(pronounced: On-ree Lua-po-teh)



he founder of the Lepaute dynasty of clockmakers was Jean André Paute, born in 1720 in Thonne-la-Long, France. He was the son of André Paute, blacksmith and maker of plows. André Paute had nine children and two of his sons were Jean André Paute and Jean Baptist Paute.

Jean André Paute had a high level of intelligence and had thought briefly about entering into a religious order as his vocation. However, his passion for mechanics quickly changed his mind and he decided that there was a vocation in working metals, and especially in clock making. He started his career in the countryside where he had grown up, and moved to Paris in order to complete his education. There he established his clock making business, which was an immediate success. He married twenty-eight year old Nicole Reine Ebable, whose father was attached to the Court of Spain. Jean André also invented the peg escapement and became the official clock supplier appointed to the principal observatories of Europe. The Pautes became renowned clock makers and several generations followed in Jean André's footsteps.

There was a second family of clock makers in Paris, the Henrys. Augustin Michel Henry lived from 1800 to 1885 and was the youngest son of Pierre Henry and Elisabeth Paute, sister of Jean André Paute and Jean Baptist Paute. Augustin Henry became the successor in the Lepaute clock making business. Augustin married his cousin Anaïs Paute, daughter of Jean



Augustin Michel Henry-Lepaute. Photo from Author's Collection.

Joseph Paute, another member of the family and watchmaker to Napoléon. (Note: In the family records, during the early years, the family name Lepaute and Paute are used interchangeably and only after about 1820 does the family name become firmly 'Lepaute').

From 1819 to 1825, Augustin Fresnel, who was then engineer to the French Lighthouse Service, studied the application of clockwork movements for the rotation of the optics in lighthouses. The rotation of the optics had to be very precise to assure that the mariner would see the same timing between each flash of the rotating lens; the use of a clockwork driven by a weight seemed indicated. Unfortunately most of the clockwork movements at that time were based on the escapement principal. For a period of two years, the rotation of the optics in Fresnel's first rotating lens, installed in the lighthouse at Cordouan, was produced by a clockwork escapement device designed and manufactured by Monsieur Bernard Wagner. The considerable inertia of this heavy flashing lens caused jerky movements of both the lens and clockwork, Fresnel concluded that it was an "unceasing cause of deterioration," especially for optical devices made from glass, which were much heavier than the reflectors used at Cordouan during the previous thirty years.

Fresnel wanted to use a device with continuous rotation, without an escapement system, and began a search for a new clockwork design.

According to the writings of Augustin Henry's sons, Fresnel and Augustin Henry met during the opening of the new breakwater constructed in the harbor of Dunkerque in 1824, where Henry had just installed a new bell tower. Fresnel explained the problems with the escapement clock drive to Augustin Henry. Within a few months Monsieur Henry created a new clock mechanism that, while preserving the main workings of his clocks, was supplied with a regulator based on centrifugal force. This was the kind used by James Watt for steam engines; it allowed the clock to maintain a continuous rotation with sufficiently regular speed for the needs of the lighthouses.

Early in 1825, Augustin Henry executed his first clockwork equipped with the new design that he called the "flying pendulum". Augustin Fresnel wrote about the new regulator, stating: "The testing of the first machine with a flying pendulum was done in front of the Commission of the Lighthouses on March 25 1825; but the inventor of the new regulator was not sure enough to make it the final application." It took several months of testing before Augustin Henry would commit to the use of the "flying pendulum," but ultimately he introduced it into all the clockworks he produced that were used for lens rotation within lighthouses. The Wagner escapement clockwork at Cordouan was replaced in 1825 with the new Augustin Henry clockwork design.

After the death of Augustin Fresnel in 1827, Leonor Fresnel asked Augustin Henry to undertake a survey of the manufacture of lighthouse optics. It was through this survey that Augustin Henry became interested in the construction of Fresnel lenses in addition to the clockworks used to rotate them in lighthouses. The Henry lens factory was founded in 1838 and built next to the old Lepaute clockwork manufacturing buildings.

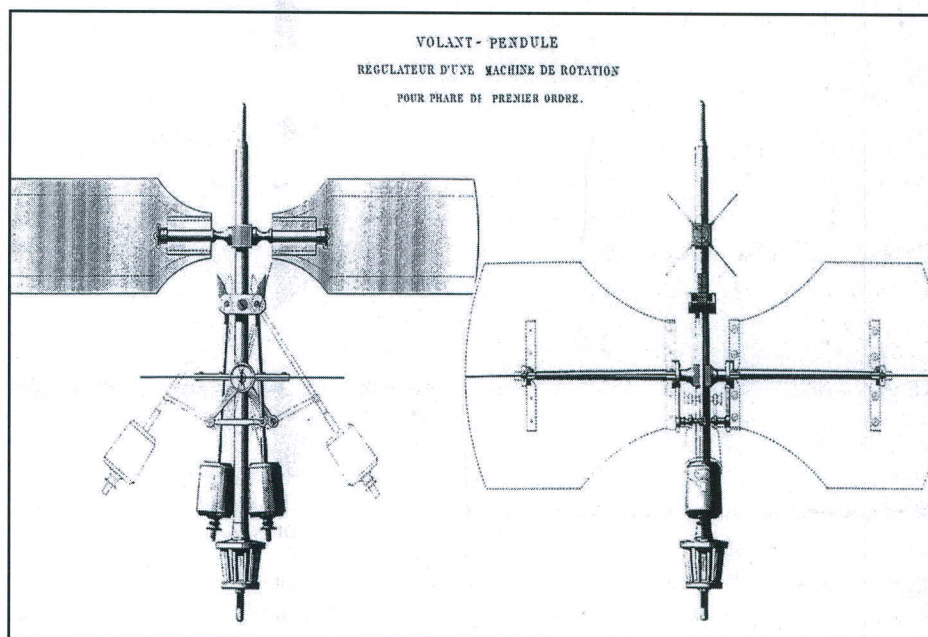
In early 1838, Augustin Henry made a bid, with the support of the engineers of the French Department of Bridges and Roads, on an order for manufacturing the lens and clockwork for the Spanish lighthouse of Santander; this appears to be the first lens he manufactured. Another of the early orders received by his new factory was for two lenses for America. In early 1838, Congress had approved a trial of Fresnel lenses and sent Naval Captain Perry to Paris to meet with Augustin Henry, who by this time was unofficially calling himself Henry-Lepaute. Captain Perry ordered a first order lens originally intended for the Isle of Shoals lighthouse and a second order lens originally intended for the Sandy Hook lighthouse. These lenses were shipped at the end of 1839 and were delayed for many months during shipment. Finally in early 1841, Augustin Henry sent a trained workman to install the lenses and train the keepers in their operation and maintenance. These Fresnel lenses became the first installed in America, and due to the shipping delays, were actually installed at the Navesink Lighthouse in New Jersey – the first-order lens in the south tower and the second-order lens in the north tower.

Another of Augustin Henry's trained clockmakers (Stanislaus Fournier) was sent to New Orleans in 1841 with a special tower clock destined for the Saint Louis Hotel. After installing the clock, Monsieur Fournier decided to stay

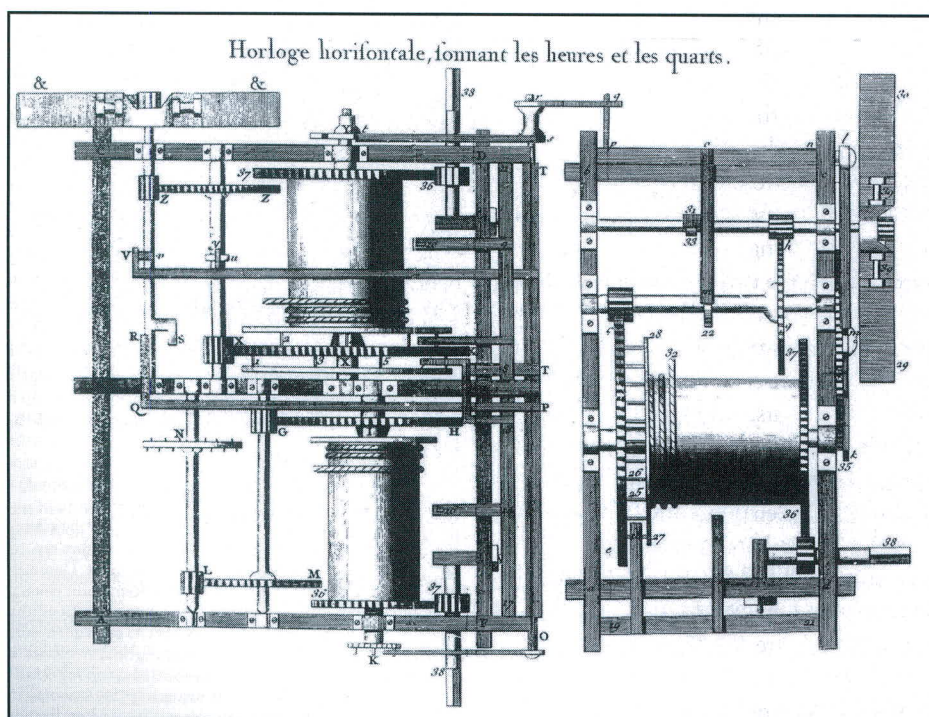
in America and became a famous clockmaker here in the 1840 – 1870 time period.

Léonor Fresnel suggested that Augustin Henry should associate himself with the new glass works at Prémontre instead of the Saint Gobain Glass Company used by the Jean Jacques François lens factory. Augustin got the glass for his early designs from Prémontre, but soon had to deal with Saint Gobain when it bought Prémontre Glass in 1843.

The Henry lens factory had relationships with both the Jean Jacques François lens factory and later with the Létourneau lens factory. In addition to his work on lens design and manufacture, Augustin Henry continued to work on clockworks with continuous rotation and also on the clockwork that powered the four-wick Fresnel lamps. The lens designs and updated manufacturing tools and methods of Henry-Lepaute allowed for the manufacture



The Flying Pendulum design of Augustin Henry. Drawing from *Oeuvres Completes de Fresnel*.

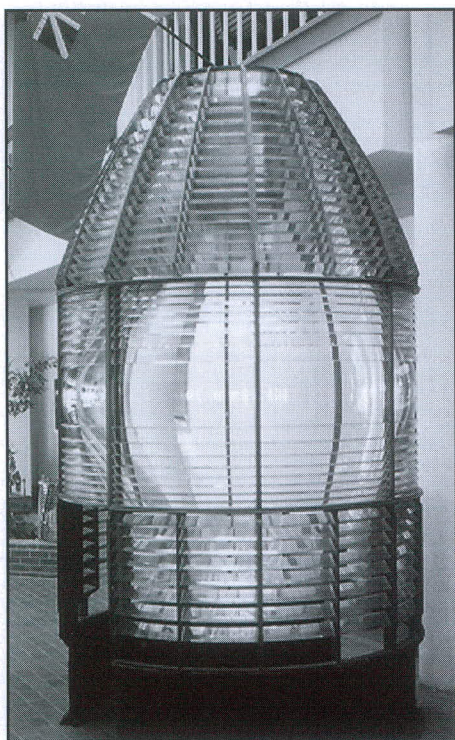


Drawing of a Tower Clockwork by Jean André Paute in 1767. Drawing from *NAWCC Bulletin* No. 287 pp. 720.

of larger curved prisms and dioptric rings, thus reducing the number of individual pieces of glass in each lens.

Napoléon III allowed Augustin Henry to officially join "Lepaute" to his name, so in 1854 he became known as Augustin Michel Henry-Lepaute. At the same time the factory was renamed Henry-Lepaute.

In 1861, Monsieur Reynaud, Director of the French Lighthouse Service, stated that: "The administration always desires to maintain two construction establishments for lighthouses in Paris (on a plan of equality) and therefore distributes the work as equally as possible." However, he also acknowledged his preference for the devices produced by Henry-Lepaute, because his devices were more perfect in execution than those of Sautter, Lemonnier et Cie. The American Lighthouse Board split its lens purchases roughly fifty-fifty between Henry-Lepaute and Louis Sautter during the main conversion to Fresnel lenses. In the years 1853 through 1860 it purchased 336 Fresnel lenses from Henry-Lepaute.



Henry-Lepaute First-Order Fixed Lens. Photo from Author's Collection.

During the 1860s, Henry-Lepaute began to sell electrical generators and arc lamps for lighthouse use. However, the company purchased most of the electrical equipment from other suppliers. Later, the creation of the French railroads forced Henry-Lepaute to begin work on the use of electricity to both drive and regulate clocks and networks of clocks specifically designed to maintain the exact same time in the many railroad stations around France. The application of electricity to the clock was not new. The first electric clock was developed in the city of Bath, England in 1840. Many tests of electric clocks had been made, but few electric clocks were then in use.

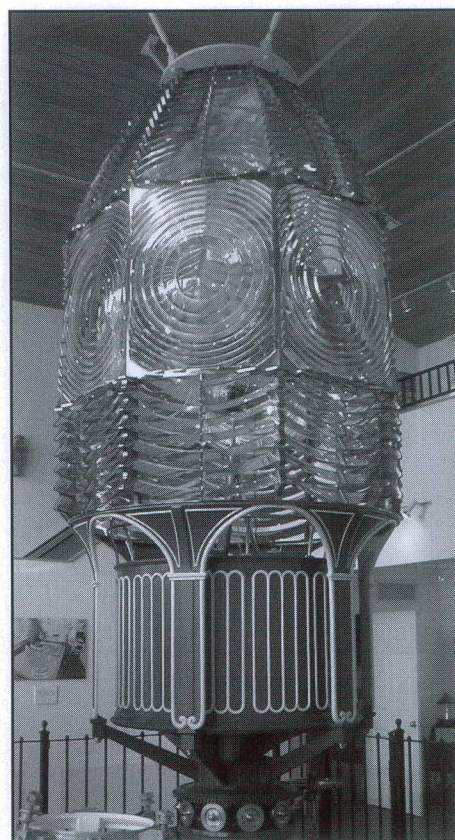
The successors to Augustin Henry-Lepaute were his sons Léon and Paul. Léon, the eldest, was made particularly responsible for the manufacture of equipment for lighthouses, and Paul was responsible for the manufacture of clockworks. Sometime after the 1860s the factory was renamed Henry-Lepaute & Sons. Until 1896, the House of Lepaute was controlled by the two brothers, and at the end of this era the Establishment-Henry-Lepaute was founded. Still later, Henry-Lepaute's grandsons Andre and Marcel took over operation of the factory. Throughout its existence the Establishment-Henry-Lepaute remained family owned and operated.

During the First World War, the Establishment-Henry-Lepaute worked exclusively for the French national defense. Further development of the electric clock had to be abandoned, and at the end of the war, it was found that the Henry-Lepaute clock designs were greatly out of date due to other French and foreign competition. However, the Establishment Henry-Lepaute quickly reentered the field of electric clocks, as well as other areas of electronics, and became leaders in the field of small electrical instruments. It continued to perfect a series of master/slave clock networks where a master clock sent signals over telephone lines to other slave clocks which were then forced by the master signal into synchronized operation.

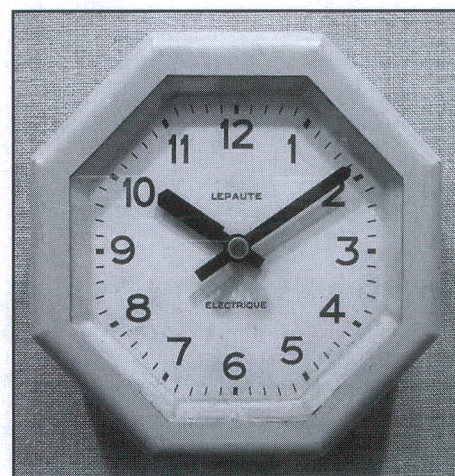
On March 27, 1952, a fire occurred during the lunch hour in the factory of the Establishment Henry-Lepaute, located on Desnouettes Street in Paris. The fire was of such proportion that, in less than a quarter of an hour, all the workshops were almost completely destroyed. The local newspaper reported that: "The workmen who were just returning to work from the lunch hour immediately began, despite the danger, to save anything that could be saved. The office files, small equipment, clocks, the finished devices nearly ready to be delivered, and also, as if it was a piece of their own heritage, the portraits of Lepaute's forebears which hung on the walls of the managerial offices and all the relics of the company's glorious past, which had been accumulated over more than two centuries."

The company was rebuilt in 1952 as a smaller enterprise at a new location, Litre au Mesnil-le-Roi, near Paris. It was fully functional by 1955. At this time, Fresnel lenses were no longer made.

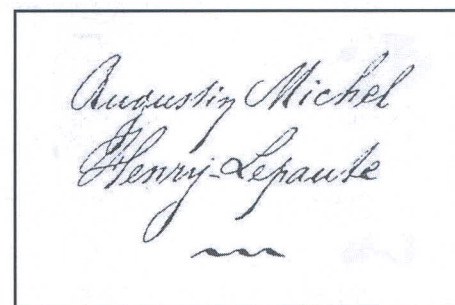
After 1955, the Henry-Lepaute factory's major products were electric clocks, the 'Vibrograf,' which is a highly advanced watch timing machine still in use today, and its railway and other clock networks. The Vibrograf included an early electronic printer that produced line graphs. Business continued at the Litre au Mesnil-le-Roi location until 1960 when the company further downsized and moved to 15 Rue Aubepines, in Orly near Paris. The company remains in business today. Until 1972, it was under the direction of Michel Henry-Lepaute, the last clockmaker of the Henry-Lepaute dynasty. It currently makes a line of electric clocks and small office equipment.



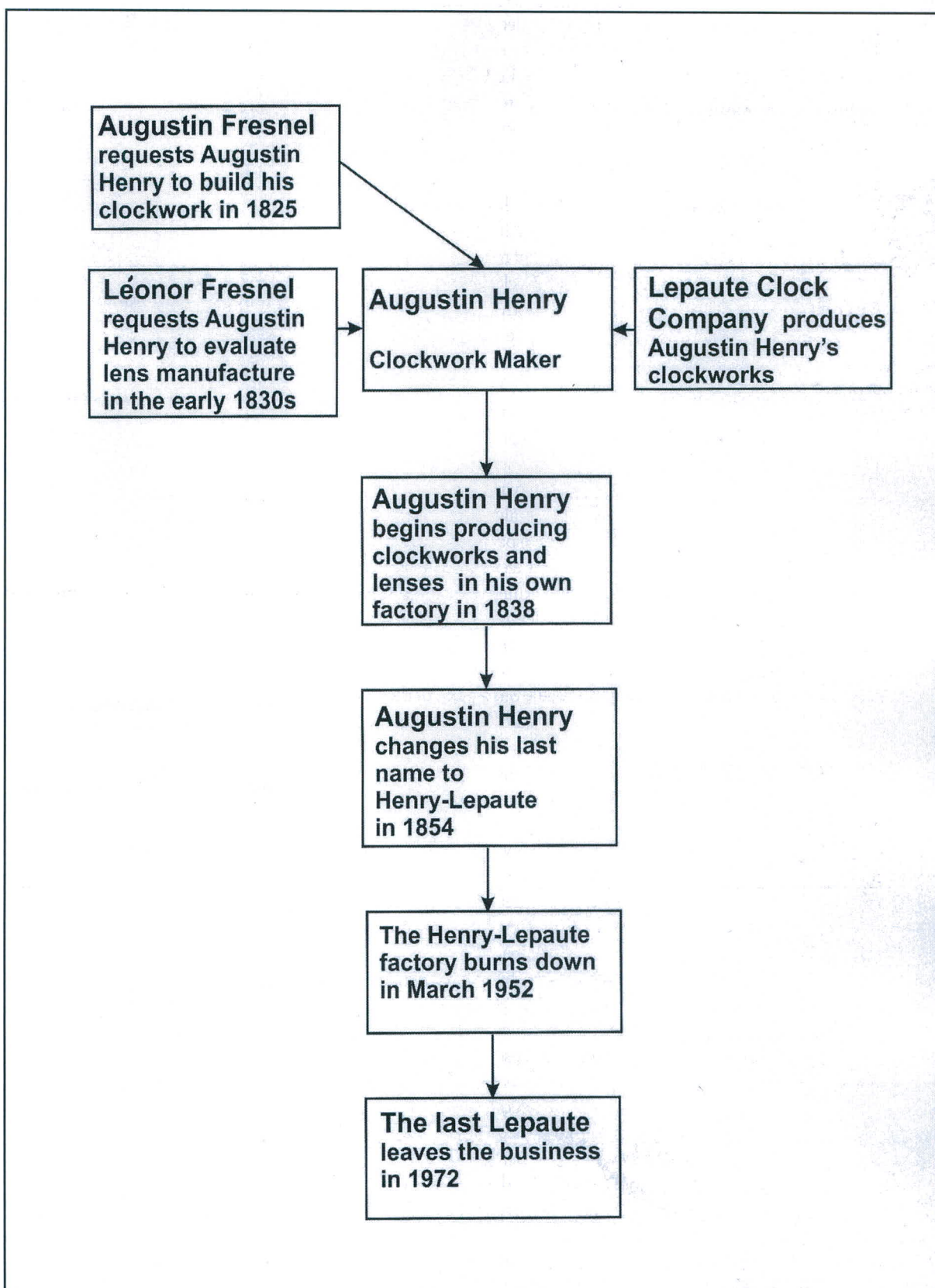
Henry-Lepaute First-Order Flashing Lens. Photo from Author's Collection.



Henry-Lepaute Electric Clock. Photo from Author's Collection.



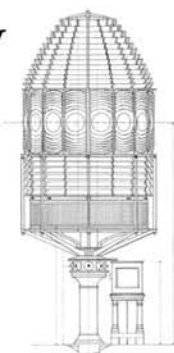
Signature of Augustin Michel Henry-Lepaute. Photo from Author's Collection.



Henry-Lepaute Lens Works through Time.
Chart by Author.



Join the U.S. Lighthouse Society Today or Give the Gift of Membership!



Restoration & Preservation



Thomas Point Shoal Lighthouse, MD

The U.S. Lighthouse Society has donated to many lighthouse preservation projects throughout the U.S. Most recently we were honored by being presented with the Preserve America Stewardship Award from The White House for our restoration work at Thomas Point Shoal Lighthouse.

*To learn more visit
www.uslhs.org
or
call Headquarters at
415-362-7255*

Help Support Our Important Mission!

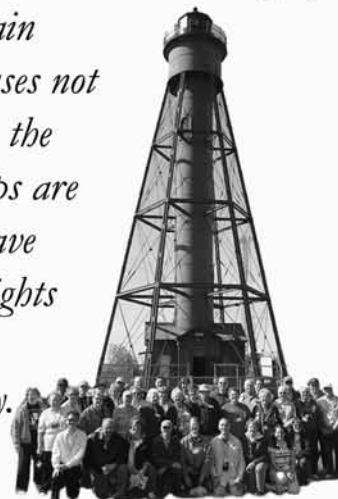
Education



The Keeper's Log magazine is the only one of its kind and has been published quarterly since 1984.

Receive this award-winning publication as a benefit of membership.

The Society organizes domestic and international lighthouse tours. Many of our excursions gain access to lighthouses not normally open to the public. These trips are a great way to have fun, see lots of lights and learn about lighthouse history.



Tinicum Lighthouse, NJ