

The Sautter Lens Works Producers of the Fresnel Lens

Part Two

By Thomas Tag

This is a continuation of the story of the Fresnel lens makers. In this article the Louis Sautter Company, in France, is described from its beginnings as the Fresnel lens maker originally owned by François Soleil Sr. We will discuss Sautter's involvement in the production of Fresnel lenses and other lighthouse equipment for the world market from 1852 to the company's final demise when it was bought in 1970.

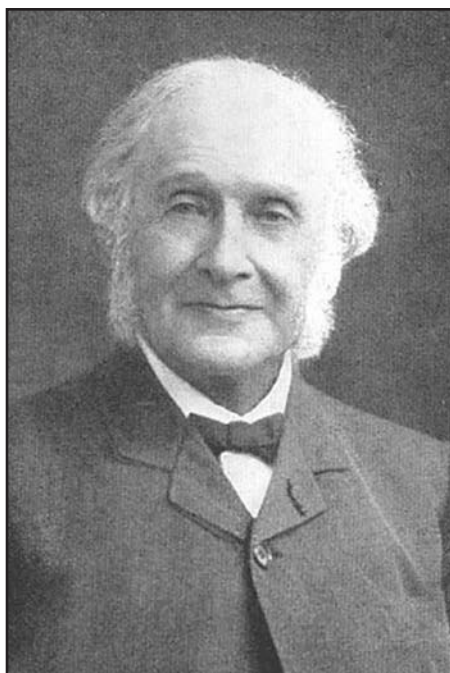


Louis Sautter (pronounced So-tay) completed engineering school at the Central School of Arts and Manufactures in 1846. Helped by one backer, Fernand Raoul-Duval, Sautter entered the navigation aids business in 1852, when he assumed ownership and management of the company that would carry his name. The business was previously owned by François Soleil Sr., which by this time had passed from him to his son-in-law Jean Jacques François and ultimately to François' son-in-law Theodore Létourneau. The factory was then located at 37 Avenue Montaigne on the Champs-Élysées in Paris.

Sautter immediately began to improve on the lens designs that had been made by Létourneau. He introduced new construction methods and increased the quantity and quality of lenses produced.

Sautter's first lens sent to America was the third-order lens made for Alcatraz Island, California in 1853. 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.

In 1854, two years after his arrival as the head of the company, Louis Sautter submitted his first patent relative to the construction of lighting for lighthouses: "a modification in



Louis Sautter. Photo from Author's Collection.

the construction of the mechanical part of the rotating devices, for lighthouses using flashing lenses, and a new system of lamps for the lighting of these lighthouses." Many other industrial patents followed this first submission. According to one of his engineers, Sautter also developed designs that allowed improvements in the size of the glass that could be delivered by Saint Gobain.

Sautter became a major supplier of lighthouse equipment by 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." The two firms were Henry-Lepaute and Sautter.

In 1867, the company moved to 26 Avenue Suffren in Paris, not far from the Eiffel Tower. Today its former factory workshops are mostly demolished and what remains is completely surrounded by apartments and other business buildings.

Sautter, Lemonnier & Cie.

The next step in the evolution of Louis Sautter's company happened in 1870 when Paul Lemonnier (pronounced Lemon-yea), a civil engineer, became a partner in the business. The company then became known as Sautter, Lemonnier and Cie. The factory of Messieurs Sautter and Lemonnier manufactured all of the various types of devices relating to lighthouses and to sound signals. Beginning in the 1860s Sautter started the study of the use of electricity and the arc lamp for lighthouse illumination. When Lemonnier joined the firm they began to work closely with the Gramme and De Meritens companies who produced electrical generators and Sautter, Lemonnier sold the generators for use in lighthouses. Sautter would later take over production of the Gramme generator. Sautter's son, Gaston joined the firm in 1878.

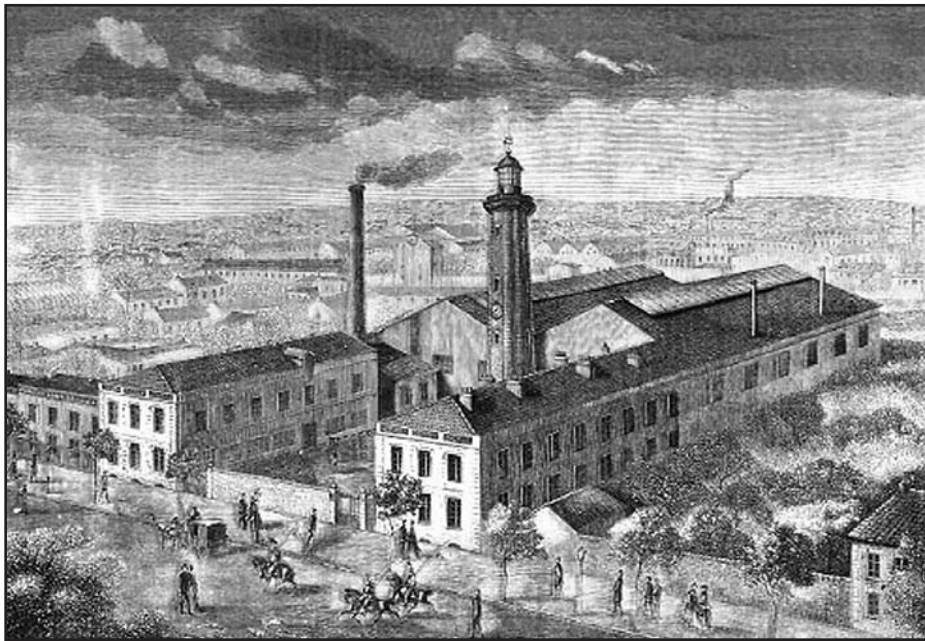


Paul Lemonnier. Photo from Author's Collection.

Sautter, Lemonnier had sufficient business by 1889 to divide the company internally into three major areas of development: electrical products, optical products and products of a general mechanical nature.



Sautter, Lemonnier & Cie. Stamping on lens frame. Photo from Author's Collection.



Exterior of the Sautter, Lemonnier & Cie. Factory 1872. Etching from Author's Collection.

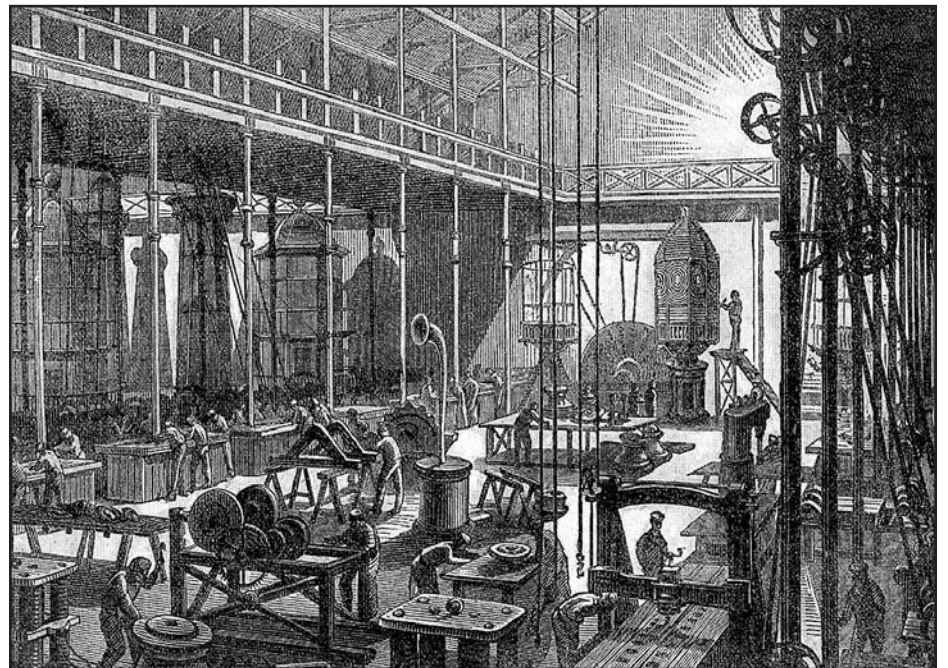


L. Sautter script name stamping on lens. Photo from Author's Collection.

The lighthouse equipment industry was dramatically changed in 1890 when Leonce Bourdelles invented the mercury float to support the rotating Fresnel lenses. This design greatly reduced the friction associated with lens rotation. Production of mercury floats was quickly taken up by the Sautter, Lemonnier factory and it produced nearly all of the early mercury flotation lenses. Sautter saw the potential to significantly speed lens rotation from the previous speed of as little as one revolution every 4 to 8 minutes to 1 or more revolutions per minute. This created what was known as the *feux-éclair* or 'lightning light'.

Sautter Harlé

In 1869, Henri Harlé (pronounced Are-L-yea), who had married into the Dolfuss family of Alsatian industrialists, started as an engineer in the French Department of Ponts et Chaussées. Harlé resigned from the Department of Ponts et Chaussées in 1890.



Interior of the Sautter, Lemonnier & Cie. Factory in 1872 when building Fresnel Lenses. Etching from Author's Collection.

The Sautter, Lemonnier Company continued to evolve when Harlé who had become a close friend of Sautter's son, Gaston, bought into the company in 1890. He became a full partner in the firm, which was now known as Sautter Harlé. Henri Harlé became the joint manager taking over the duties from which Lemonnier had retired in 1890; and his association with Sautter increased the company's capital by over 2 million francs.

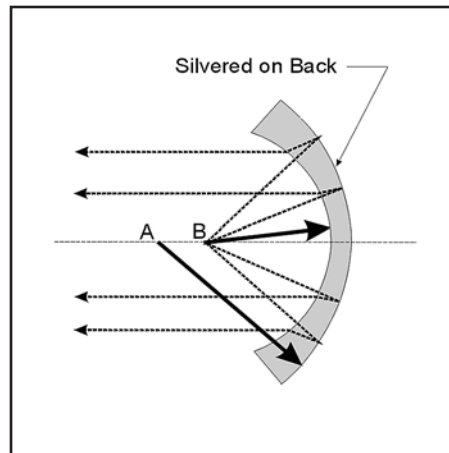
Sautter Harlé's chief engineer, Jean Rey, was a specialist in the design of lighthouse lamps and was responsible for the perfection of the incandescent oil vapor lamp in the late 1890s and early 1900s. At this time Sautter Harlé also entered the railroad signal business. For a short time, from 1910 to 1915, the company was known as just Harlé et Cie.

Searchlights

The first searchlight with an optical lens made by Louis Sautter had illuminated the Champs-Élysées in honor of Napoléon III in 1867. It lit the whole upper terrace of the Arch de Triomphe. By the end of the 1800s searchlights had become one of the major parts of Sautter's business.

The power of searchlights was dramatically increased with the invention of the Mangin mirror that combined the effects of two spherical surfaces, the outer formed with a large radius 'A', the inner with a smaller radius 'B'. Sautter, Lemonnier, after receiving a license from Mangin, created varied models of the Mangin mirror reaching up to 1.50 meters in diameter for use in searchlights. During this time, Sautter's technicians also perfected the arc lamp, steam driven electric generators, and later, the oil vapor lamp to give additional power and range to the searchlights used by the Army and Navy of France.

As technology progressed, searchlights using a parabolic mirror were developed. The biggest model reached 2.3 meters in diameter. All these mirrors were produced on machines invented and built in the workshops of Sautter Harlé on the Avenue Suffren. Many types of special searchlights were delivered to the principal countries of Europe: military searchlights that were fixed or movable and mounted on automobiles or on trailers, navigation search and signal lights, and searchlights with segmented mirrors that were used for night travel in the areas near the entrances of the Suez Canal.



The Design of a Mangin Mirror. Drawing by Author.

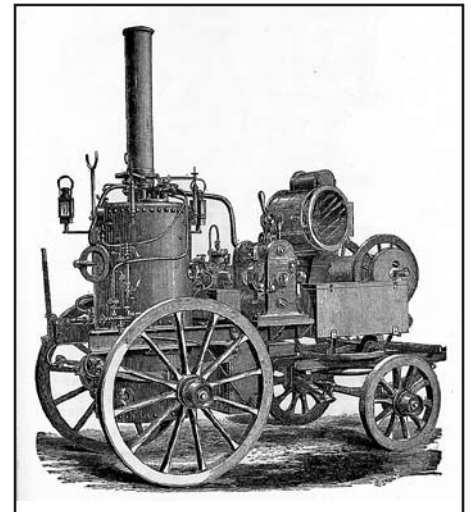
In late 1915, the company name was changed again to the Anciens Établissements Sautter-Harlé. (Note: the words Anciens Établissements were not used in the logos, name plates or stampings of the firm. These words added to a company name mean something similar to our word Incorporated).

Beginning just after World War I, Sautter Harlé converted mainly to the production of large electrical equipment such as electrical generators, compressors, and diesel engines. In 1921, Sautter Harlé began to produce equipment for lighting airports and runways. There was still a very limited production of navigational aids, mostly buoys, until about 1965.

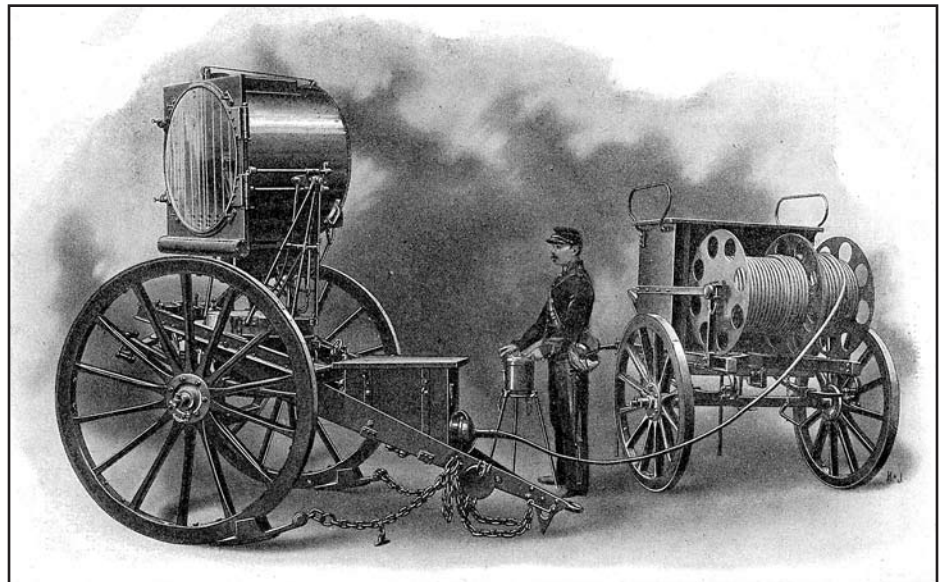
Sautter-Harlé remained in business until the end of 1969. It was finally absorbed by the Alstom Company, a French conglomerate, at the start of 1970.



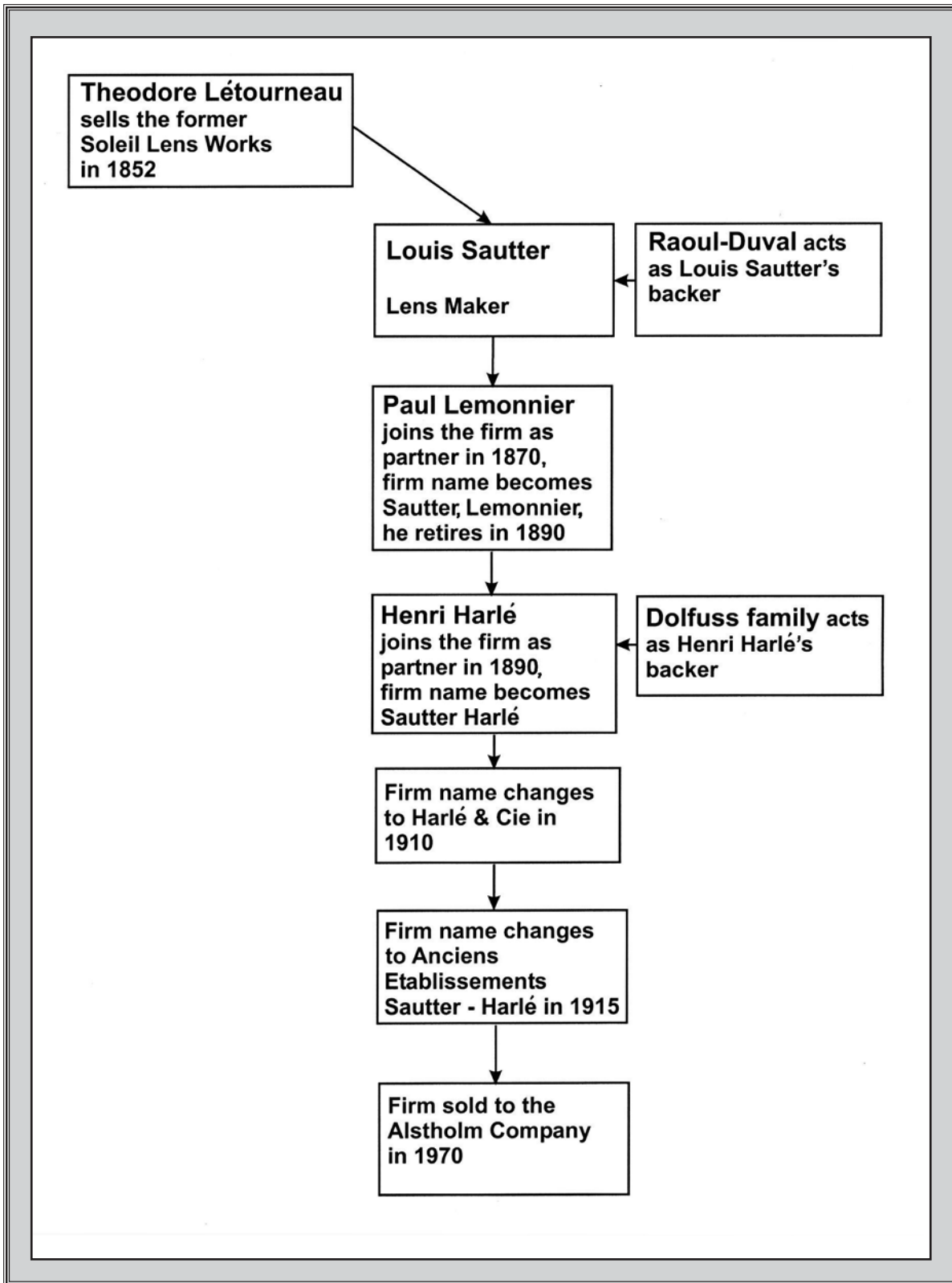
Sautter Harlé name plate. Photo from Author's Collection.



Sautter Harlé mobile generator. Photo from Author's Collection.



Harlé et Cie portable searchlight for French Military 1911. Photo from Author's Collection.



Louis Sautter Lens Works through Time. Chart by Author.