

Illumination. As early as 1826, Drimmond evolved the lime-light. (It is claimed by some that Guerny (Sir Goldsworthy) discovered the lime-light (1793-1875), which depends upon directing an oxy-hydrogen flame on a pencil of calcium oxide.) Tessie du Motay, in 1867, substituted bituminous coal gas for the hydrogen. Lime was found not to answer the full requirements, on account of slaking when not in use, so Linnemann substituted a plate of zirconium oxide. Koch also prepared, for medical purposes, porous glow-pieces of zirconium. Klorinsky used various oxides, among them zirconia, and gaseous or pulverized hydrocarbons, whose combustion was facilitated by oxygen. Clamond suspended his glowing material in the form of a basket over a central spiral tube, from which issued a mixture of the gas and heated air. Falschjelm formed the incandescent portion out of fine, flat or round, needles, set close together and suspended in a rack above the burning mixture; water-gas was used. While this was reported as successful in Germany, in the three places it was tried in America (Chicago, Jackson, Mich., and St. Joseph, Mo.), it was found impracticable.

Haitinger prepared a mantle for incandescent gas-lighting, composed of aluminum and chromium oxides. It gave a rose-red light, but did not possess the necessary resistance to atmospheric influences and mechanical shock. In 1885, Carl Auer obtained his first patent for a mantle to be used in incandescent gas-lighting.

At first, thorite and orangite were the sources of the thorium. The location of the somewhat extensive deposits of monazite, a double complex phosphate and silicate of the rare-earths, sands in the Carolinas and Brazil gave larger sources of raw material.*

It will be of interest to note the lowering in price of thorium nitrate due to its increased use, to new sources of the raw material, to improvements in extraction, etc. Prior to 1893, the price per kilogram varied between \$125 and \$500. Now it may be had for from \$7 to \$10 per kilogram. (Prices went off somewhat with the attack of the Austrian Welsbach Company on the "Thorium Convention" in December, 1909, but it would appear that there is some possibility of an understanding).

* The speaker then described, using lantern slides, the manufacture of the Welsbach mantle, and showed the difference in quality and quantity of light produced by varying the percentage of cerium oxide.