

inventions were described in 1885.* Their furnace was heated by passing an electric current through coarsely powdered charcoal or gas carbon. This new method was used for a variety of purposes, one of these being the production of aluminium alloys by heating a mixture of alumina and carbon with copper or some other alloying metal.

Fig. 4 represents the Cowles furnace for aluminium alloys. It consists of a rectangular brick chamber fitted with inclined carbon electrodes, A and B, and filled with the mixture of alumina, carbon and copper. The electric current flows between the electrodes through some pieces of retort carbon, C, and thus heats the charge, which, when heated, carries part of the current. The gases resulting from the chemical reaction escape and burn at D, and the molten alloy collects at the bottom of the furnace.

In 1886, Hall,† and Heroult‡ patented processes for the production of aluminium, and their processes, as now used, consist

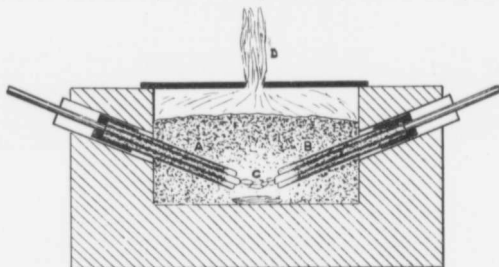


Fig. 4.—Cowles' Furnace for Aluminum Alloys.

keeps the material fused.

in passing an electric current through fused compounds of aluminium; the electrolytic action of the current liberates the aluminium from these compounds, and the heat of the current

Fig. 5 may be considered to represent either the Hall or the Heroult furnace. Each of these consists of an iron tank, A, lined with carbon, B, and provided with a number of carbon rods, C,

*Dr. T. Sterry Hunt, *Amer. Inst. Min. Eng.* (Sept. 16, 1885), vol. xiv., p. 492. Prof. C. F. Mabery, *Amer. Assoc. for the Adv. of Science*; Aug. 28, 1885, vol. xxxiv., p. 136. E. H. and A. H. Cowles, U.S. patents, 319,795 (1884), see *Borchers' Electric Smelting*; and 324,658 and 324,659 (1885), see *Richards' Aluminium*.

†C. M. Hall, U.S. patents 400,766 and 400,664, April 2, 1889 (applied for July 9 1886), see *Richards' Aluminium*.

‡Paul Heroult, French patents, 175, 711, April 23, 1886, and 170,003, April 15, 1887, see *Richards' Aluminium*.