

# UNITED STATES PATENT OFFICE.

KARL AUGUST KÜHNE, OF DRESDEN, GERMANY.

## PROCESS OF REDUCING REFRACTORY OXIDS.

No. 861,129.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, KARL AUGUST KÜHNE, a subject of the King of Saxony, residing at Dresden, Pohlandstrasse 20, in the German Empire, have invented certain new and useful Improvements in Processes of Reducing Refractory Oxids, of which the following is a full, clear, and exact description.

This invention relates to a process for the production or isolation of metals, metalloids or their alloys with aluminium and is based upon the fact that those metals, metalloids, or alloys, which cannot be produced or isolated separately in reguline form by what is known as the Goldschmidt or the Thermite process, can be reduced or isolated by aluminium and chlorate of potash, or other similar bodies, without the application of external heat.

An oxid or other compound of the metal or metalloid it is intended to produce or isolate, boron for example, is mixed with aluminium and a chlorate such as potassium chlorate, sodium chlorate or ammonium chlorate for example all three being finely powdered. This mixture is placed in a crucible and the contents ignited. The ignition may be effected by touching the mixture with a red-hot body, such as a red-hot iron rod or strip of magnesium for example. The mixture begins to burn and melts together at a white heat into a thin liquid boiling mass, which consists, after cooling,

of two easily separated layers. The upper layer consists of melted clay sometimes set or stiffened with crystals, while the lower layer consists of a regulus of aluminium which contains crystallized boron. The boron is then isolated by dissolving the aluminium in dilute acid.

As the quantities of aluminium and chlorate of potash, or other similar bodies employed have to be adjusted according to the fineness of the aluminium and other circumstances it is not possible to give fixed proportions of the component parts of the mixture; but taking the production of boron as an example, the following mixture has been proved to yield good results, namely: 2 parts of finely divided aluminium, 5 parts of chlorate of potash, or similarly acting material, and 3 parts of a compound of boron.

What I claim as my invention and desire to secure by Letters Patent is:

The process for the reduction of refractory oxids, which consists in mixing them with aluminium and chlorate of an alkali metal, and then igniting the mixture, substantially as described.

In witness whereof, I subscribe my signature, in presence of two witnesses.

KARL AUGUST KÜHNE.

Witnesses:

PAUL E. SCHILLING,  
CHENING H. SCHILLING.