

# UNITED STATES PATENT OFFICE.

GEORGE O. SEWARD AND FRANZ VON KÜGELGEN, OF HOLCOMBS ROCK, VIRGINIA, ASSIGNORS  
TO VIRGINIA LABORATORY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW  
YORK.

## ELECTROLYTIC PRODUCTION OF MAGNESIUM.

No. 931,092.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed March 28, 1906. Serial No. 308,454.

*To all whom it may concern:*

Be it known that we, GEORGE O. SEWARD, a citizen of the United States, and FRANZ VON KÜGELGEN, a subject of the German Emperor, both residing at Holcombs Rock, in the county of Bedford and State of Virginia, have jointly invented certain new and useful Improvements in the Electrolytic Production of Magnesium, of which the following is a specification.

This invention relates to the production of magnesium by electrolysis of its fused salts. Such electrolysis affords serious difficulty, because the difference in the specific gravity of the liberated metal differs so slightly from that of its fused salt, that the metal does not readily separate. It is practically necessary for good results to use an electrolyte whose specific gravity is so different from that of magnesium, that the latter will either sink readily to the bottom or rise freely to the top of the bath, where it can be collected. For a metal as light as magnesium it is extremely difficult to find electrolytes which have so low a specific gravity that the separated metal will readily sink to the bottom, and in such cases it is preferable to add to the electrolyte a component which will make it materially heavier than the metal, so that the latter will rise to the top of the bath. Such added component should be a flux which is efficient when used in comparatively small quantities, and should not be decomposed by the current.

The present invention is characterized by the use for this purpose of the salts of the alkali-earth metals, which are peculiarly suited to this use because (1) they have a high specific gravity, and (2) they are difficult to decompose electrolytically.

As an example of the practical application of our invention, we will describe the production of magnesium by electrolysis of magnesium chlorid, using barium chlorid to increase the specific gravity of the electrolyte.

At present magnesium is produced electrolytically from an electrolyte of fused

magnesium chlorid, with potassium chlorid added as a flux, the separated magnesium being collected at the bottom of the vessel. It is only under certain conditions of temperature that such an electrolyte is lighter than the separated magnesium, and it is difficult to so manage the process that these temperature conditions are maintained so that a good separation of the magnesium results.

In producing magnesium according to the present invention, we replace the potassium chlorid partly by barium chlorid, so that we obtain an electrolyte which is so much heavier than the magnesium, that the latter rises readily to the top, where it may be collected. Although the proportion of barium chlorid may be greatly varied, we have found an electrolyte of the following composition to give suitable results:— $MgCl_2$  5 parts,  $KCl$  5 parts,  $BaCl_2$ , 3.5 parts.

Instead of barium chlorid we may use the chlorid or other suitable salt of calcium or strontium.

We are aware that alkali-earth salts have been used before as fluxes, but not for the purpose of regulating the specific gravity of the electrolyte.

What we claim is:—

1. The electrolytic production of magnesium by electrolyzing fused magnesium chlorid to which is added enough of a denser alkali-earth chlorid to render the bath heavier than the separated magnesium.
2. The electrolytic production of magnesium by electrolyzing a fused bath of magnesium chlorid and barium chlorid.
3. The electrolytic production of magnesium by electrolyzing a fused bath of magnesium chlorid, potassium chlorid, and barium chlorid.

In witness whereof, we have hereunto signed our names in the presence of two subscribing witnesses.

GEORGE O. SEWARD.

FRANZ VON KÜGELGEN.

Witnesses:

J. H. WEBB,  
F. V. BIDDER.