Patented Feb. 6, 1934 1,945,565

UNITED STATES PATENT OFFICE

1,945,565

PROCESS OF PRODUCING HEAVY METAL BERYLLIUM ALLOYS

Ernst Pokorny, Leipzig, and Kurt Schneider, Bitterfeld, Germany, assignors to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany

No Drawing. Application August 11, 1932, Serial No. 628,366, and in Germany September 5, 1931

2 Claims. (Cl. 75—17)

This invention relates to a process for the production of alloys of beryllium with heavy metals.

The production of metallic beryllium by aluminothermic methods has, hitherto, been possible only by operating with the application of external heat or with the addition of chlorates or peroxides. Even under these conditions, however, only a pulverulent, sintered product is obtained, whereas the production of the beryllium in a reguline form has, so far, been impracticable by this method.

On the other hand, since beryllium is mainly employed in the form of alloys with heavy metals, such as copper, iron and the like, it has been proposed to produce copper-beryllium alloys by the aluminothermic reduction of beryllium compounds in presence of copper, with the aid of aluminium. Although, by this means, the alloy is obtained in a reguline form, it is, nevertheless, contaminated by substantial amounts of aluminium, and, moreover, the yield is by no means satisfactory.

The present invention aims at producing alloys of beryllium with heavy metals in a manner similar to the aluminothermic method, without aforesaid disadvantages. To this end, according to the invention there are employed calcium-magnesium alloys and preferably those of a composition ranging between about 40 to 60 percent of calcium. When these alloys are used, there is no contamination of the resulting heavy-metal-beryllium alloys by the reducing agent (since calcium and magnesium do not alloy with the heavy metals concerned) and the slag, which has a lower melting point than when pure aluminium is employed, separates easily from the resulting regulus.

It has been found advantageous to replace about 10 to 20 percent of the magnesium-calcium alloys employed as reducing agents, by aluminium granules or by a crushed aluminium-magnesium alloy, and it has unexpectedly transpired that, whilst still no contamination of the products by aluminium takes place, the melting point of the reduction slag is still further lowered due to the presence of alumina.

If necessary, chlorates or peroxides may be added, in known manner, to the reaction mixture, in order to increase the heat of reaction.

All reducible beryllium compounds, especially oxides and halides, may be employed as beryllium-bearing originating products.

In order to obtain a more fluid slag, calcium oxide, fluor spar, alumina and the like may be added in known manner.

Examples

(1) 14 parts of beryllium oxide
55 parts of magnetite
7 parts of ferric oxide
39 parts of Ca-Mg alloy (50/50); and
4 parts of granulated aluminium metal

are intimately mixed and are brought into reaction by ignition in a refractory crucible. A metallic regulus is obtained which contains

8.7 percent of beryllium
90.4 percent of iron
0.1 percent of aluminium and
0.5 percent of silicon.

(2) 90 parts of beryllium fluoride
232 parts of magnetite
80 parts of ferric oxide
275 parts of Ca-Mg alloy (50/50)

are intimately mixed and are brought into reaction by ignition in a refractory crucible. An alloy of

7.8 percent of beryllium
91.7 percent of iron
0.21 percent of silicon

is obtained in the form of regulus.

We claim:—

1. A process for the production of iron-beryllium alloys containing beryllium in a quantity of the order of 10 percent which comprises causing a beryllium compound to react with an alloy substantially consisting of between about 40 and about 60 percent of calcium, the remainder being magnesium, in the presence of an iron compound, the quantity of the calcium-magnesium alloy being sufficient to cause by oxidation reduction of the beryllium and the iron compound and the melting of the alloy formed.

2. A process for the production of iron-beryllium alloys containing beryllium in a quantity of the order of 10 percent which comprises causing a beryllium compound and an iron compound to react with an alloy containing between about 40 and about 60 percent of calcium, the remainder being magnesium, and with a quantity of aluminium in the form of granules, the weight of the aluminium being not more than about 20 percent of the calcium-magnesium alloy and the total of the said light metals being sufficient to cause reduction of the beryllium and the iron compounds and the melting of the alloy formed.

ERNST POKORNY.
KURT SCHNEIDER.