

UNITED STATES PATENT OFFICE

2,101,904

RECOVERY OF COMPACT METALLIC MAGNESIUM FROM MAGNESIUM IN FINELY DIVIDED FORM

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No Drawing. Application November 20, 1934, Serial No. 753,892. In Austria May 4, 1934

3 Claims. (Cl. 75-67)

This invention relates to the recovery of substantially pure metallic magnesium from finely divided magnesium, and more particularly from magnesium dust by sublimation. The term "sublimation" is used in the following description and claims to mean vaporization of the magnesium content from the solid phase or from the fused state, in both cases with the direct recovery of a solid condensate from the vaporous phase (that is to say sublimation in the narrower and wider sense, respectively).

It is amongst the objects of this invention to provide a process of refining finely divided magnesium yielding a refined product which lends itself to easy conversion into compact metal, which process is readily practicable and effective, and affords also other advantages which will be understood by those skilled in the art.

Magnesium results in the form of dust in the refining of crude metallic magnesium or magnesium scrap, and also in the course of the recovery of metallic magnesium from oxidic magnesium compounds by reduction carried out at temperatures above the boiling point of metallic magnesium, provided the vapors be suddenly cooled down, for the purpose of condensation, to a temperature below the solidification point of magnesium. For a long time the dust evolved in refining distillation has been regarded as hardly capable of being fused together, and the dust resulting from the reduction of magnesium oxide as absolutely incapable of being fused together. It is only recently that such dust has been successfully converted into compact metallic magnesium, and that either by maintaining the dust at a temperature in the vicinity of the boiling point of metallic magnesium until such time as the particles unite to liquid metal, or by redistilling the dust.

Alternatively it has been proposed to proceed for this purpose in view, by mechanical methods (for example agitating or shaking at temperatures above the melting point but below the boiling temperature of metallic magnesium), such as were previously usual for the conversion of zinc dust into the molten state. In whatever manner this further treatment may be carried out, it is attended by the difficulty that the dust, more particularly when in a state of extremely fine subdivision, is spontaneously inflammable. Further, for the fusing together by heating at temperatures in the neighbourhood of the boiling point of magnesium and for distillation, very spacious plant is required, on account of the low volumetric weight of the dust; moreover, the heat

conductivity of the dust is slight, to the detriment of economical working.

For practicing the invention the dust is sprinkled, before storage or working up with an agglomerating agent capable of bonding the material under the action of heat, advantageously a carbonizable agglomerating agent, of which class the hydrocarbon oils are preferred. The mixture is subsequently freed of the agglomerating agent by heating, which is preferably carried out in an inert or reducing gaseous atmosphere. When hydrocarbons are used for the purpose they are preferably driven off while raising the temperature to a point at which partial decomposition by cracking takes place. This procedure yields a crumbly residual mass in which the magnesium dust is held together by a coke framework. Refining by sublimation of the dust solidified in this manner, can be carried out more conveniently and with better utilization of the heat applied. When the further treatment of the dust is effected by vaporization of the magnesium content from the fused state, there is obtained the further particular advantage that the disengaged magnesium vapors are free of pulverulent impurities, or at least carry over such impurities with them in but very slight quantities.

The volume of the paste obtained by the sprinkling of the dust with agglomerating agents can be still further reduced by compressing the mass while in the moist state.

In accordance with a particular mode of carrying out the invention, bodies of a nature to increase the heat conductivity, for example pieces of metal in the shape of rods, sheets, or wire, are embedded in the moistened magnesium dust.

The described method can also be employed to very great advantage for the pre-treatment of magnesium dust intended for refinement by sublimation in the strict sense of the term, that is to say by the immediate conversion of the metal from the solid into the vaporous state.

The sublimation is preferably effected in a current of a non-oxidizing gas.

The magnesium obtained as a crystalline sublimate is then, if desired, converted into compact metal by various further operations. It can be freely melted together or directly shaped by extrusion or compression.

What I claim is:

1. The method of producing substantially pure magnesium from magnesium in a finely divided state, which comprises making the finely divided magnesium into a paste with a liquid hydrocarbonaceous impasting agent, heating the said

paste up to a temperature at which partial decomposition, by cracking, of the hydrocarbonaceous impasting agent occurs while agitating the mass under treatment to form solid granular aggregates therefrom, and recovering the magnesium from the said aggregates by sublimation.

2. A method according to claim 1, said sublimation being conducted under reduced pressure.

3. The method of purifying magnesium in a finely divided impure form, which comprises ad-

mixing the finely divided magnesium with a liquid hydrocarbonaceous impasting medium to make a paste therefrom, heating said paste, while agitating it, up to partial cracking of the said hydrocarbonaceous impasting medium to agglomerate the magnesium by the coke resulting from the said heating, and extracting from the agglomerated matter, by sublimation, pure magnesium in crystalline form.

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