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METHOD FOR FORMING CAST ARTICLES
FROM ALLOYS OF LEAD WITH CALCIUM
AND METALS OF SIMILAR PROPERTIES

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This invention relates generally to the prevention of the oxidation of the surface of molten lead-calcium alloys and molten alloys of lead containing calcium in connection with casting operations wherein the molten lead has heretofore been exposed to the open atmosphere and more specifically to the prevention of the oxidation of the heated surface of such alloys during the pouring and casting operation.

Storage battery grids have long been made of pure lead; recent proposals have been made to make such grids of lead-calcium alloy containing a substantial amount of calcium, usually somewhat above 0.08 per cent calcium and the balance pure lead. Battery grids are poured into individual molds and a serious difficulty has been encountered in that the expected desirable result, namely, a more durable and longer lived grid, of using the calcium containing alloy has not been realized. This situation has been greatly improved by the use of carbon dioxide for flooding the casting table and the molds with CO₂ before and during the casting operation.

It has generally been supposed that carbon dioxide is an oxidizing agent for calcium at the melting point of lead or above; in its specific aspect this invention is therefore based upon the discovery that the contact of carbon dioxide with the hot lead-calcium alloy prevents oxidation not only of the lead but of the calcium. It acts as a protecting agent and produces a bright mirror-like surface upon the exposed lead-calcium alloy.

In its general aspect this invention is based on the discovery that carbon dioxide acts as a preventative against oxidation during casting of lead-calcium alloys and alloys of lead with other alkali or alkali earth metals, specifically lithium, potassium, sodium, barium and strontium. There appear to be no practical beneficial effects derived from using carbon dioxide as a protection against oxidation during the pouring and casting of pure lead or alloys such as lead-antimony, lead-tin, or ternary alloys of lead with combinations of cadmium, tin, and antimony.

When molten lead-calcium is poured there is a tendency toward frothing and foaming. The use of carbon dioxide according to this invention prevents or greatly reduces this frothing or

foaming. Alloys of lead, lead-antimony and lead-tin do not exhibit this foaming tendency.

In accordance with the present invention as applied to the casting of battery grids carbon dioxide is introduced into and over the molds during casting. Experiments have shown that with the use of carbon dioxide no dross is visible upon the surface of the alloy and the surface of the lead-calcium alloy has a bright mirror-like appearance completely free from the dull gray appearance of castings made in air and therefore badly oxidized.

The principles of the invention are applicable to the melting of lead-calcium alloys and the casting of articles therefrom. In melting lead-calcium alloy a cover of CO₂ is kept over the surface of the molten metal and in pouring the material into molds, for example, to produce storage battery grids, the space in and around the mold may be filled with CO₂. In the production of such grids or other articles a calcium content of 0.08 or somewhat higher may be used.

It has been found that 100 per cent concentration of CO₂ with resultant complete displacement of all the air is not necessary for effective results; a substantial displacement of the air by CO₂ is beneficial. In practice even appreciable admixtures of air through convection currents or other effects do not alter the effectiveness of the carbon dioxide.

What is claimed is:

1. Method of forming cast articles such as storage battery grids from a molten alloy of lead with calcium which comprises maintaining an atmosphere of carbon dioxide over the molten alloy in the kettle, around the pouring spout or ladle and in the cavities of the mold during the filling thereof.

2. The method of forming cast articles, such as battery grids, from molten lead alloy containing one or more of the constituents, calcium, lithium, barium, strontium, potassium and sodium which comprises maintaining a shield of carbon dioxide over and around the alloy during the pouring and casting operations.

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