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LEAD ALLOY

Jesse O. Betterton and Yurii E. Lebedeff, Metuchen, N. J., assignors to American Smelting and Refining Company, New York, N. Y., a corporation of New Jersey

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3 Claims. (Cl. 75—166)

This invention relates to lead alloys and particularly concerns the improvement of certain lead alloys with respect to their oxidizing characteristics.

In the manufacture of cable sheathing, pipe, sheeting and the like, it has been proposed to utilize lead containing a small amount of another metal or other metals which impart to the alloy certain desired characteristics, e. g. increased tensile strength, improved resistance to corrosion, greater hardness, etc. Among the elements proposed are antimony and arsenic which occupy adjacent positions in the second family of elements in Group V of the Periodic Table.

While such lead alloys have proven themselves superior to lead with respect to the properties for which they have been employed, nevertheless an undesired characteristic accompanies the addition of these elements to lead, namely, the tendency of the alloy compositions toward excessive oxidation. That the susceptibility of such alloys to excessive oxidation is a serious disadvantage is very apparent in the extrusion of cable sheathing where the oxidation products become incorporated in the sheath causing weakness and areas favoring the inception of corrosion.

It has now been found that by incorporating phosphorus in amounts not exceeding approximately 0.01% in a lead alloy containing not more than approximately 0.5% of antimony or arsenic, or both, the tendency of the alloy toward excessive oxidation is reduced to a very great extent and this highly desirable result is obtained without materially affecting the tensile strength of the composition.

In determining the oxidation of the various compositions investigated, the following procedure was followed in all cases: a 500 gram sample of the composition was melted in a casserole and the surface stirred for ten minutes at a temperature of 355° C. by means of a rotating paddle operated at 100 R. P. M. The dross was then skimmed and weighed after which the oxide was dissolved in molten zinc chloride. Upon solidification the mass was lixiviated with water and the remaining lead button weighed. The difference between the weight of the dross skimmed and the weight of the lead button was the weight of the oxide formed in the particular test.

The following tabulated results with antimonial lead alloys will serve to illustrate the invention:

Composition	Grams oxide
Refined Pb	0.350
Refined Pb+0.03% Sb	4.799
Refined Pb+0.03% Sb+0.008% P	1.544
Refined Pb+0.03% Sb+0.007% P	1.022

It will readily be seen from the above examples that whereas the lead alloyed with antimony alone exhibited a decided tendency to oxidize as compared to refined lead, the addition of only a small amount of phosphorus very markedly diminishes that characteristic. Further, as hereinbefore stated, this beneficial effect is accomplished without material adverse effect upon the tensile strength. To illustrate:

Composition	Tensile strength (Psi)
Refined Pb	1905
Refined Pb+0.20% As+0.007% P	2825
Refined Pb+0.05% Sb+0.007% P	2920

It will thus be appreciated that the present invention provides alloys of lead with antimony or arsenic with enhanced properties for cable sheathing and other uses. As before stated the antimony and/or arsenic content should not be more than approximately 0.5% and investigations indicate that from 0.05% to 0.3% is, generally speaking, to be preferred. The phosphorus content should range between 0.001% and 0.01%. Material departure from these ranges should not be indulged in as the amount of phosphorus necessary to counteract the increased oxidation accompanying material increases of antimony and/or arsenic would adversely affect other desired properties of the particular alloy.

The present application is a division of Betterton and Lebedeff, Serial No. 70,607, filed March 24, 1936 for Lead alloys.

What is claimed is:

1. An oxidation resistant alloy consisting of 0.001% to 0.01% phosphorus, 0.05% to 0.5% of an alloying element selected from the group consisting of antimony and arsenic, and the balance lead.

2. An alloy consisting of antimony not exceeding 0.5%, phosphorus in an effective amount but not exceeding 0.01% and the balance lead.

3. An alloy consisting of arsenic not exceeding 0.5%, phosphorus in an effective amount but not exceeding 0.01% and the balance lead.

JESSE O. BETTERTON.
YURII E. LEBEDEFF.