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ALLOY OF LEAD AND ANTIMONY

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My invention relates to an alloy of lead and antimony and to the process of producing the same.

The principal object of the invention is the production of an alloy of this kind of greater than normal hardness and having an antimony content higher than was heretofore deemed permissible. I attain this object by adding suitable quantities of arsenic and tin to the lead and antimony alloy.

Lead and antimony alloys of greater than normal hardness are well known. The increase in hardness beyond normal is usually achieved by the following sequence of steps:— (*a*) tempering the alloy at a temperature closely below the eutectic temperature, (*b*) quenching and (*c*) seasoning. The improvement thus effected is ascribable to the intermediate formation of a saturated solid solution of antimony in the lead, the saturation concentration of such solution being at approximately 2.5% of antimony. Inasmuch as any excess of antimony beyond approximately 2.5% counteracted increase of hardness of the alloy (see Western Electric Company British Patent 248,458), it was customary heretofore to subject to this hardness increasing action only such lead-antimony alloys whose antimony content did not exceed approximately 2.5%.

By means of the present invention I am enabled to obtain improved alloys of lead and antimony in which the antimony content may be substantially greater than 2.5% which is at present deemed the permissible maximum. In accordance with my invention I add suitable quantities of arsenic and tin to the lead and antimony alloys, which are subjected to the usual steps of tempering, quenching and seasoning.

I find that arsenic and tin are particularly effective. Not only does the use of these substances prevent the reduction in hardness which occurs upon the tempering, quenching and seasoning of an antimony-lead alloy containing over 2.5% antimony, but surprisingly enough the presence of arsenic and tin will cause the excess of antimony to enhance the hardness of such alloy containing over 2.5% antimony and will thus greatly increase the beneficial effect. For example, with an antimony content of 4 to 8% Sb (the balance lead), in the absence of arsenic or tin the hardness decreased from the maximum of 28° Brinell when Sb content is approximately 2.5% to 25 to 20° Brinell, while in the presence of say 0.4% arsenic the conditions were reversed to the extent that with increasing antimony content there was a parallel increase in hardness until the latter had attained 28 to 30° Brinell.

The effect just described is peculiar to arsenic and tin; in the case of arsenic it extends from about 0.2 to about 2% and in the case of tin it is such that its optimum effectiveness is present when the tin content is about one-fifth that of the antimony content. The antimony content itself is preferably between approximately 1% and 10%. A special advantage of the use of arsenic and tin as contemplated by the present invention is that by their presence, the temperature duration as well as the seasoning duration may be materially curtailed.

I claim:

As a new article of manufacture, a lead-antimony alloy of greater than normal hardness, comprising a maximum of 10% antimony, from approximately 0.2% to approximately 2% arsenic and from approximately 0.1% to approximately 2% tin, the tin content being substantially one fifth of the antimony content.

In testimony whereof I affix my signature.

PAUL KEMP.