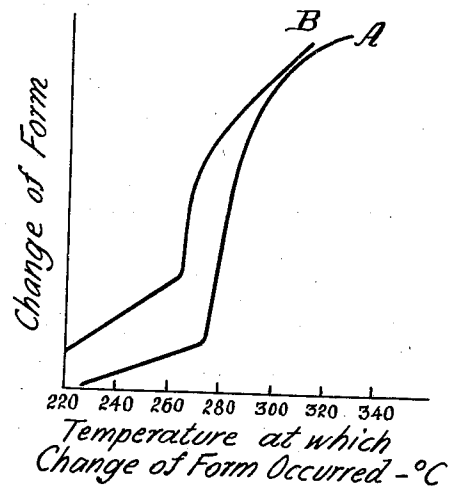
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WORKING ZINC ALLOYS

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WORKING ZINC ALLOYS

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4 Claims. (Cl. 29—18)

This invention relates to improvements in forming alloy metal objects and particularly to working zinc alloys containing from 10 to 20% aluminum to produce an alloy object without impairing the mechanical properties of the alloys.

Zinc generally is rolled at temperatures below 200° C. because its rollability is decreased at higher temperatures. The presence of other substances in the zinc generally decreases the rollability so that the rolling temperature must be increased in the case of zinc alloys. However, in practice, temperatures of 270° C. are not exceeded because this tends to bring about deterioration in the mechanical properties of the rolled alloys. Moreover, the temperature cannot be decreased below 180° C. on account of the high roll pressures then requisite. (A. Burkhardt, Technologie der Zinklegierungen, Berlin 1937, page 192.)

We have found, however, that aluminum-bearing zinc base alloys containing from 10 to 20% of aluminum can readily be rolled and otherwise worked at temperatures between 270 and 380° C., and preferably at a temperature of about 340° C. Although the addition of aluminum generally decreases the rollability of zinc so far that at medium temperatures only slight decreases in thickness are possible at each pass, it was unexpectedly found that at temperatures about 270° C. the malleability of zinc-base alloys containing 10 to 20% of aluminum increased so suddenly and the work of deformation decreased so rapidly that in this range hot working is possible with heavy reductions at each pass. The mechanical properties of the resuting zinc alloy objects are not impaired by this method of treatment, but instead are generally improved. Thus we have discovered that the malleability of an alloy consisting of 10 to 15% aluminum, 1.5 to 4% copper and .01 to .04% magnesium, the balance of the alloy being zinc having a purity of at least 99.98% (as described in co-pending United States application No. 159,711, filed August 18th, 1937, by Herbert Winter, and subsequently issued as United States Patent No. 2,102,869, on December 21, 1937) increases suddenly at temperatures above 270° C. and retains this increased malleability to a temperature of about 380° C. At a temperature of 340° C. the malleability of this alloy is optimum.

Our invention, therefore, contemplates the improvement in the manufacture of zinc base objects which comprises working at a temperature ranging from 270° C. to 380° C., and preferably at 340° C. a zinc-base alloy containing from 10 to 20% aluminum, and more particularly an alloy consisting of 10 to 15% aluminum, 1.5 to 4% copper, .01 to .04 magnesium, the balance of the alloy being zinc having a purity of at least 99.98%. When such alloys are thus worked, there is no deterioration in their mechanical properties. On the contrary, the resulting metal objects possess high tensile and impact strengths, improved machinability and high resistance to corrosion.

The curves A and B in the accompanying single figure illustrate the sudden increase in malleability of aluminum-bearing zinc base alloys that we have discovered. Two alloys A and B were subjected under constant load to different temperatures. In the figure the ordinates show the change of form suffered by the test rods under a compression of 7.5 kilograms per square millimeter. The change in form was measured in per cent decrease in the height of the pieces under compression. The abscissae in the figure show the temperature of deformation in degrees Centigrade. The compositions of the alloys investigated were as follows:

	A	B
	Per cent	*Per cent*
Copper	2	0.3
Aluminum	10	10
Magnesium	0.04	
Zinc—99.99% pure	Rest	Rest

We claim:

1. In the manufacture of zinc alloy objects, the improvement which comprises working at a temperature ranging from 270 to 380° C. an aluminum-bearing zinc base alloy containing from 10 to 20% aluminum.

2. In the manufacture of zinc alloy objects, the improvement which comprises working at a temperature of about 340° C. an aluminum-bearing zinc base alloy containing from 10 to 20% aluminum.

3. In the manufacture of zinc alloy objects, the improvement which comprises working at a temperature ranging from 270 to 380° C. an alloy consisting of 10 to 15% aluminum, 1.5 to 4% copper and 0.01 to 0.04% magnesium, the balance of the alloy being zinc having a purity of at least 99.98%.

4. In the manufacture of a zinc alloy object, the improvement which comprises working at a temperature of about 340° C. an alloy consisting of 10 to 15% aluminum, 1.5 to 4% copper, and 0.01 to 0.04 magnesium, the balance of the alloy being zinc having a purity of at least 99.98%.

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