Patented Dec. 26, 1933

1,941,230

UNITED STATES PATENT OFFICE

1,941,230

BERYLLIUM-ALUMINUM ALLOY

Joseph Kent Smith, Detroit, Mich., assignor to The Beryllium Corporation, New York, N. Y., a corporation of Delaware

No Drawing. Application December 22, 1931
Serial No. 582,655

3 Claims. (Cl. 75—1)

This invention relates to alloys in which aluminum predominates, and to which alloys, other metals, beryllium in particular, have been added not only to improve strength and mechanical characteristics, but also at once to reduce the specific gravity of the alloy and to give it greater resistance to atmospheric corrosion and similar influences.

It has long been known that the addition of beryllium to aluminum results in an alloy which is considerably lighter than is pure aluminum itself, the lessening in weight varying linearly with the beryllium content by volume. At the same time, the resistance to corrosion is considerably improved as beryllium increases in content.

Because of the relatively high cost of beryllium, it is frequently desirable to keep the proportion of this element as low as possible, yet not sacrifice its valuable strengthening effects. For this reason, I have sought for combinations of metals which added to aluminum-beryllium alloys, would intensify the effects of beryllium, and this invention relates to alloys of such type. Only those alloys higher in aluminum than in beryllium are here considered.

I have found that, by the addition of small quantities of manganese and zirconium, with and without simultaneous additions of small quantities of molybdenum, the effect of beryllium is magnified, and the resulting alloy has materially greater strength, workability, castability, bendability, as well as resistance to corrosion, than the simple binary alloy possesses. In general, I prefer compositions in which the content of aluminum and beryllium is at least ninety-five percent.

The manganese and zirconium, with the molybdenum if desired, as well as the beryllium for alloys low in beryllium, may be added as a master alloy, alloyed with any convenient percentage of aluminum. These metals may also be added individually directly to an aluminum-beryllium alloy previously made in any of the standard manners, or the final alloy can be formed by reduction of convenient manganese and zirconium (also molybdenum if desired) compounds directly by the previously-formed binary aluminum-beryllium alloy.

The multi-constituent alloys made in accordance with this invention are particularly well suited for castings requiring strength beyond that of ordinary aluminum, or even its stronger alloys, like duralumin. They are also well adapted for use in sheet form, as in the case of airplane wings or fuselage parts, or wherever the combination of low specific gravity, great strength and ready bendability without breaking is essential.

I prefer to have the aluminum content run from about 55% to about 70%, the beryllium from about 25% to about 40%, with the balance of about 5% made up of approximately equal amounts of manganese and zirconium and molybdenum, if used—about from approximately ½% to approximately 2½%, each but with a total of not more materially than 5%.

A preferred analysis is:—

	Per cent
Al	60.0
Be	38.2
Mn	.5
Zr	.4
Mo	.5
	99.6
Mg added	.7

The percentages are by weight.

I claim:—

1. A beryllium-aluminum alloy containing from about 55% to 70% aluminum, from about 25% to about 40% beryllium, and the balance manganese molybdenum and zirconium from about ½% to about 2½% each.

2. A beryllium-aluminum alloy of approximately the following compositions: aluminum 70%, beryllium 25%, with the balance manganese molybdenum and zirconium in approximately equal amounts.

3. A beryllium-aluminum alloy containing a preponderance of aluminum by weight but not less than approximately 55% and not in excess of approximately 70% of the total, said alloy comprising manganese, molybdenum and zirconium from about ½% to about 2½% each, with the balance of the alloy consisting of beryllium.

JOSEPH KENT SMITH.