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ALLOY

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5 Claims. (Cl. 75—168)

This application is a division of my prior application Ser. No. 656,765, filed February 14, 1933.

The present improved alloy is one in which magnesium is the predominant element, the primary object being to develop an alloy that will possess the characteristic low specific gravity which is obtained by the use of magnesium in excess of 80 per cent while such alloy will be characterized by higher resistance to corrosion and at the same time will have a higher strength than the known alloys of this kind.

The known alloys in use containing generally more than 85% magnesium and as principal additional ingredient aluminum or zinc or both of these ingredients, other constituents such as manganese being present in relatively small amounts, do not exhibit sufficient resistance to corrosion by water or even by damp air, and cannot be used at all when in continuous contact with sea-water. Various attempts have been made to render the surfaces of these metals more resistant by applying coatings, but such attempts failed since corrosion often takes place to an increased extent when the superficial protective layer is damaged.

The object of the invention is attained by the addition of further additional metals to the alloys, namely antimony or bismuth or both of these metals amounting in general to not less than 0,05% and not more than 2% of the total.

The most diverse alloys of the kind referred to containing antimony or bismuth have proved distinctly superior, when exposed to the action of a 3% solution of common salt, to alloys of the same kind which do not contain antimony or bismuth; whilst the alloys containing antimony or bismuth showed an almost unaltered surface, the samples devoid of antimony or bismuth were strongly corroded on carrying out the comparative tests.

In general the lower limit of efficiency is given by additions of 0,05%, and it is preferable not to exceed the upper limit of 2%.

From their position in the electrochemical series antimony and bismuth are more valuable than magnesium, and moreover do not form a solid solution with the latter; the assumption therefore would rather have been that the addition of these metals to the known alloys of magnesium would involve decreasing their resistance to corrosion.

The magnesium-base alloys developed by the present invention show also a considerable increase in strength, without the elongation decreasing. As the magnesium alloys of the kind hitherto in use (electron, Dow-metal) have a comparatively small strength, this constitutes a further advance of considerable importance, the more so as the specific gravity of the alloys is scarcely increased to any perceptible extent by the small amount of the added metals.

Furthermore, the alloys according to the invention show in comparison with similarly composed known electron alloys an increase of the permanent impact strength by 50%.

The alloys may be used as cast alloys or mechanically worked alloys and may be improved by thermal treatments.

Satisfactory formulae for an alloy according to my invention in which aluminum and zinc are the principal additional ingredients are as follows, viz.:—

Magnesium 93.5%, aluminum 4%, zinc 1%, manganese 1%, antimony 0.5%.

Magnesium 90.3%, aluminum 5%, zinc 3%, manganese 1.2%, bismuth 0.5%.

Magnesium 94.2%, aluminum 4%, zinc 1%, manganese 0.3%, antimony 0.3%, bismuth 0.2%.

What I claim is:

1. A low specific gravity magnesium base alloy containing from 1 to 15 per cent of aluminum, from 1 to 15 per cent of zinc, the combined content of aluminum and zinc being not more than 16 per cent, from 0.12 to 2 per cent of manganese, from 0.05 to 2 per cent of a metal selected from the group consisting of antimony and bismuth, and the remainder of the alloy being substantially all magnesium, the alloy being more resistant to corrosion than an alloy of the same composition but not containing a metal selected from said group.

2. A low specific gravity magnesium base alloy containing from 1.1 to 15 per cent of aluminum, from 1 to 7.4 per cent of zinc, the content of aluminum exceeding that of zinc and the combined content of aluminum and zinc being not more than 16 per cent, manganese in an amount from 0.12 to 2 per cent, from 0.05 to 2 per cent of a metal selected from the group consisting of antimony and bismuth, and the remainder of the alloy being substantially all magnesium, the alloy being more resistant to corrosion than an alloy of the same composition but not containing a metal selected from said group.

3. A low specific gravity magnesium base alloy containing from 1 to 15 per cent of aluminum, from 1 to 15 per cent of zinc, the combined content of aluminum and zinc being not more than 16 per cent, from 0.15 to 2 per cent of manganese, more than about 0.05 per cent of antimony, more than about 0.05 per cent of bismuth, the sum

of the content of antimony and bismuth being not more than 2 per cent, and the remainder of the alloy being substantially all magnesium, the alloy being more resistant to corrosion than an alloy of the same composition but not containing said antimony and bismuth.

4. A low specific gravity magnesium base alloy consisting of 1 to 15 per cent of aluminum, 1 to 15 per cent of zinc, the combined content of aluminum and zinc being not more than 16 per cent, from 0.15 to 2 per cent of manganese, from 0.05 to 2 per cent of a metal selected from the group consisting of antimony and bismuth, and the remainder of the alloy being all magnesium.

5. A low specific gravity magnesium base alloy consisting of 1 to 15 per cent of aluminum, 1 to 15 per cent of zinc, the combined content of aluminum and zinc being not more than 16 per cent, from 0.15 to 2 per cent of manganese, more than 0.05 per cent of antimony, more than 0.05 per cent of bismuth, the sum of the contents of antimony and bismuth being not more than 2 per cent, and the remainder of the alloy being all magnesium.

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