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ALLOY

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2 Claims. (Cl. 75—1)

The invention relates to magnesium base alloys. It is particularly directed to the development of alloys of this nature of excellent corrosion-resistant properties.

Perhaps the main disadvantage of many magnesium base alloys at the present time is the fact that they are more susceptible to corrosion than are the alloys of the other commonly used light metal, namely, aluminum. Efforts are constantly being directed toward the development of magnesium base alloys of improved corrosion resistance and adequate physical properties.

I have discovered such an alloy. I have found that magnesium base alloys containing from about 0.5 per cent to about 8.0 per cent of silver are unusually resistant to corrosion; alloys within this range exhibit a very satisfactory combination of strength, ductility and corrosion resistance especially in the wrought condition.

I have subjected magnesium-silver alloys of varying silver content to severe tests under aggravated corrosive conditions. One such test which has been standardized for the purpose of comparing different alloys consists in repeated immersions of the test specimen in a 3 per cent aqueous solution of sodium chloride alternating with exposures to the atmosphere. This test was chosen primarily for the reason that its severity is productive of numerically measurable corrosion effects within a fairly short time, and a duration of 40 hours has been adopted as a standard.

In carrying out the test a number of tensile specimens identical as to composition and fabricating conditions are divided into two groups, and one group is tested for physical properties, for instance tensile strength. The other group is put through the alternate immersion test just described and is tested after the procedure. The difference between the average strengths of the two groups is a measure of the deterioration caused by corrosion, and is usually termed "per cent loss".

The magnesium base alloy of the prior art most widely used in the United States as a wrought alloy lost 61 per cent of its original strength at the conclusion of the alternate immersion test.

After this alternate immersion test an alloy of magnesium with 2.22 per cent of silver lost only 5 per cent of its original strength in the wrought condition. An alloy of magnesium with 4.37 per cent of silver lost only 6 per cent of its original strength after the same test. The 4.37 per cent silver alloy, in the extruded condition, and after 40 hours of severe corrosive conditions, had a tensile strength of 32,570 pounds per square inch and an elongation of 19 per cent in two inches, while its original strength was 34,700 pounds per square inch and its elongation 20.1 per cent in two inches. This variation presumably caused by the corrosion is so slight as to be practically within the usual experimental variation. The magnesium base alloy containing 2.22 per cent of silver had a tensile strength, as extruded, of 30,450 pounds per square inch. After the alternate immersion corrosion test its strength was 29,270 pounds per square inch. Here again the variation was virtually within the limits of experimental error.

I have discovered that while the mechanical properties continue to improve as the silver content exceeds about 8 per cent the corrosion resistance begins to decrease so that I prefer to restrict the scope of this invention to amounts of silver not exceeding 8 per cent. As a preferred alloy I use about 4.0 per cent of silver and have found the extruded condition to embody a very desirable combination of yield strength, tensile strength, Brinell hardness, elongation and corrosion resistance.

The alloy may be compounded in any of the ways familiar to the art. Metallic silver may be added to molten magnesium and will dissolve readily or a preliminary rich alloy of magnesium may be previously prepared and calculated amounts of this rich alloy added to the magnesium melt.

I claim:

1. A magnesium base alloy containing from 0.5 per cent to 8.0 per cent of silver, the balance being substantially magnesium.

2. A magnesium base alloy containing about 4.0 per cent of silver, the balance being substantially magnesium.

ROY E. PAINE.