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ALUMINUM ALLOYS

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1 Claim. (Cl. 75—1)

This invention relates to aluminum base alloys containing magnesium, nickel, and cobalt, and to certain alloys of this nature which have improved properties at elevated temperatures.

One of the important uses to which aluminum base alloys are put is as reciprocating parts operating at elevated temperatures, i. e., temperatures in the neighborhood of about 400 to 700° Fahrenheit. At these temperatures it is the common tendency of aluminum base alloys to decrease in strength, and the provision of alloys which will have a good strength at elevated temperatures and a substantial ductility is among the important problems of the art. Moreover, such alloys, in order to be generally satisfactory, must be light in weight and must have such casting characteristics as will allow the alloy to be readily cast to intricate shapes in permanent molds as well as sand molds.

We have discovered an alloy which has many of the foregoing characteristics. This one is one which contains 3.0 to 8.0 per cent by weight of magnesium, 0.5 to 4.0 per cent by weight of nickel, and 0.1 to 3.0 per cent by weight of cobalt, the balance being principally aluminum. This alloy has, at elevated temperatures, a strength which is greater than many of the alloys heretofore known and combines with such strength an adequate ductility, good casting characteristics, and a lightness of weight conducive to its use in the manufacture of reciprocating parts.

As exemplary of the excellent properties of the alloy at elevated temperatures is the case of an alloy containing 6.0 per cent of magnesium, 2.0 per cent of nickel, and 1.5 per cent of cobalt, the balance being principally aluminum. This alloy in the form of a sand casting was heated for 4 hours at 700° Fahrenheit and cooled to 600° Fahrenheit and tested at the latter temperature. The tests showed a tensile strength of 16,220 pounds per square inch and an elongation of 0.5 per cent in 2 inches. An indication of the improved properties of our new alloys may be obtained by comparing these properties with those of an alloy containing 6 per cent of magnesium, balance principally aluminum, which was thermally treated at the same temperature and for the same time and tested in the same manner. The test showed the casting to have a tensile strength of 14,880 pounds per square inch and an elongation of 7.5 per cent in 2 inches.

The alloys of the present invention may be manufactured by any of the usual methods such as melting the aluminum and adding thereto the other metals.

Another property of these alloys is their improved fluidity as compared with the alloys which have, heretofore, been widely used as a material for parts operating at elevated temperatures. Comparative tests, based upon the distance that the molten alloy, originally heated to a given temperature, will flow through a spiral formed in a sand mold, have shown that our novel alloys are very superior with respect to fluidity.

The aluminum used in the manufacture of the alloys may be of the highest purity or it may contain amounts of usual impurities, and the term "aluminum" as used herein and in the claims designates the aluminum of commerce. It is an incidental property of our alloys that the presence of iron in amounts as high as 2 per cent by weight is not harmful to the high temperature properties of the alloys and, therefore, a wide choice between the various grades of commercial aluminium is possible.

We claim:

A metallic alloy characterized by high physical and tensile properties at elevated temperatures and good fluidity and consisting of 3.0 to 8.0 per cent by weight of magnesium, 0.5 to 4.0 per cent by weight of nickel, 0.1 to 3.0 per cent by weight of cobalt, the balance being aluminum.

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