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ALLOY

Franz E. Hensel and Earl I. Larsen, Indianapolis, Ind., assignors to P. R. Mallory & Co., Inc., Indianapolis, Ind., a corporation of Delaware

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This invention relates to alloys, and more particularly copper alloys of improved characteristics.

The object of the invention is to produce an improved copper base alloy.

Another object is to produce a copper-magnesium alloy of comparatively low magnesium content, which can be hardened by means of the addition of a small percentage of silver, to a higher degree than has heretofore been possible.

Another object is to produce a copper alloy which has an excellent combination of hardness, electrical conductivity, resistance to annealing and resistance to scaling.

Specific objects are the provision of improved copper-silver-magnesium alloys, especially suitable for fabrication into current carrying members, electrical contactors, welding electrodes, current carrying bearings, soldering irons, retainer rings, pole shaders, collector rings, small gears, switch blades, circuit breaker parts, internal combustion engine parts, turbine blades, parts which have to withstand oxidation and in general, parts which have to combine high thermal conductivity with high strength.

Other objects of the invention will be apparent from the following description, taken in connection with the appended claims.

The present invention comprises a combination of elements, methods of manufacture and the product thereof, brought out and exemplified in the disclosure hereinafter set forth, the scope of the invention being indicated in the appended claims.

While a preferred embodiment of the invention is described herein, it is contemplated that considerable variation may be made in the method of procedure and the combination of elements, without departing from the spirit of the invention.

According to the preferred method of carrying out the present invention, an alloy is made containing copper, silver and magnesium, in the following proportions:

Silver	Per cent
Magnesium	.05 to 15
Copper	.05 to 3
	Substantially the balance

It is likewise possible to improve the characteristics of other copper-magnesium alloys, containing small percentages of additional ingredients, by the addition of silver. Thus, copper-magnesium alloys, containing small proportions of beryllium, calcium, zinc, cadmium, indium, boron, aluminum, silicon, titanium, zirconium,

tin, lead, thorium, uranium, lithium, phosphorus, vanadium, arsenic, selenium, tellurium, manganese, iron, cobalt, nickel, and chromium, can be improved by the addition of silver, in substantially the proportions indicated above.

A number of preferred compositions are given below:

	Per cent
(1) Magnesium	.5
Silver	2
Copper	Balance
(2) Magnesium	1
Silver	1
Copper	Balance
(3) Magnesium	.5
Silver	.05
Copper	Balance
(4) Magnesium	1
Silver	6
Copper	Balance
(5) Magnesium	.50
Silver	.25
Chromium	.50
Copper	Balance
(6) Magnesium	1½
Silver	2
Cadmium	1½

The above compositions are given by way of example only and we have found that a large number of variations can be made, producing desirable results within the composition range specified.

In carrying out the present invention, a copper-magnesium alloy may first be made according to the conventional alloy making procedure of the prior art, and then the silver may be added. After the alloy has been prepared according to such alloying methods as described above, also a heat treatment may be applied to the alloys, consisting either in a quenching and subsequent aging operation, with or without intermediate working, or in a quenching operation only, or in an aging operation only. The quenching operations may be carried out at temperatures above 500 degrees C. and the drawing operations at temperatures below 500°.

Both magnesium and silver have a solid solubility in copper, which decreases with temperature and therefore the alloys of the present invention can be improved by heat treatment, usually called, "age hardening treatment", as far as physical properties are concerned, and more par-

ticularly as far as thermal and electrical conductivity are concerned.

Copper-magnesium-silver alloys provide new materials which will retain their properties even at elevated temperatures.

- 8 If these materials are being used for contactor contacts, they will show a longer life than materials of the prior art and more particularly copper, and they can be operated under more severe electrical loads, without causing fusing and sticking. At the same time, the contact resistance will remain low.
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While the present invention as to its objects and advantages has been described herein, as car-

ried out in specific embodiments thereof, it is not desired to be limited thereby, but it is intended to cover the invention broadly, within the spirit and scope of the appended claims.

What is claimed is:

1. An alloy containing about .05 to 3% magnesium, .05 to 15% silver and the remainder copper.

2. An alloy containing about .5 to 2% magnesium, .05 to 2% silver and the remainder copper.

3. An alloy containing about .1 to 2% magnesium, 1 to 6% silver and the remainder copper.

FRANZ R. HENSEL.
EARL I. LARSEN.