Patented July 2, 1940 2,206,109

UNITED STATES PATENT OFFICE

2,206,109

COPPER-ZINC ALLOYS

Wolf Johannes Müller and Moritz Niessner, Vienna, Germany, assignors to Oesterreichische Dynamit Nobel Aktiengesellschaft, Vienna, Germany, a firm of Germany

No Drawing. Original application June 25, 1938, Serial No. 215,856. Divided and this application July 1, 1939, Serial No. 282,522. In Austria July 21, 1934

1 Claim. (Cl. 75—155)

This invention is a division of our application Ser. No. 215,856, filed June 25, 1938, for Copper-zinc alloys.

It is known that gamma-brass, that is to say copper-zinc alloys with a copper content of about 31–40%, i. e. alloys which are characterized by a low copper content, are more resistant to corrosion than the brass alloys of the alpha and alpha and beta region with for instance 68–72 percent and more of copper, i. e., a higher copper content. The technical employment of gamma-alloys poor in copper is however impossible, since these alloys are extremely hard and brittle and are consequently not machinable.

From such alloys, as is described in our prior Patents Nos. 2,006,598 and 2,006,599, it has been disclosed that it is possible, by the addition of a few percent of a metal soluble in gamma-brass or alloyable therewith, such as nickel or, with more advantage cobalt, preferably by a simultaneous addition of nickel and cobalt, to obtain alloys, which possess the good resistance to corrosion of gamma-alloys poor in copper, but are also capable of being worked up, that is to say can be treated with machine tools and can also be rolled hot. Such alloys with an addition of approximately 3–12% of cobalt, nickel or the like individually or in mixture, that is to say for instance pure copper-zinc alloys with a minimum content of nickel of approximately 7–8% or of cobalt of approximately 5–6% have extremely good technical properties, and when cobalt and nickel are used simultaneously it is possible with a much smaller cobalt content to obtain the same effects as with the use of cobalt alone. Consequently alloys that are deficient in copper, even those most deficient, can be made utilisable for industrial purposes or as constructional material for the production of articles, if the copper-zinc alloys are alloyed with cobalt, nickel or the like individually or in mixture.

The present invention is based on the ascertained fact that such copper-zinc alloys, containing between 30 and 45% of copper and between 3 and 12% of cobalt and/or nickel, can have their properties substantially improved when containing also between 4 and 15% of manganese and at least a small but effective amount of one of the metals of the following group:

	Percent
Iron	Up to 1.8
Aluminium	Up to 1.5
Silver	Up to 2.0
Chromium	Up to 3.0
Tin	Up to 2.0
Lead	Up to 0.3
Selenium	Up to 0.6
Tellurium	Up to 0.6

but in no greater amounts than are soluble in the solid solution and the zinc constituting substantially the remainder.

It has been ascertained that such alloys are suitable for cold working, including cold rolling, pressing and drawing and at the same time have a high resistance to corrosion.

In carrying out the invention, the manganese content should be smaller in the case of alloys of higher copper content than in the case of alloys of lower copper content. The higher the manganese content the more suitable is the alloy for cold working, a rising addition of manganese up to about 10% leading to an approximately proportional improvement in the cold working properties.

By the addition of the metals of the group: iron, aluminium, silver, chromium, tin, lead, selenium and tellurium the workability in the cold, the color and other properties of the alloys are favourably influenced as compared with such alloys containing only copper, zinc, nickel and/or cobalt and manganese as are subject of our copending application Ser. No. 148,506, filed June 16, 1937.

Thus an enhanced workability in the cold can be imparted to the alloys of the invention, by the addition of suitable amounts of one or more of the elements iron, lead, tin, selenium and tellurium within the limits hereinbefore set forth while their corrosion resistance can be enhanced by the addition of one or more of the metals aluminium, chromium and tin within the limits hereinbefore set forth.

It is easy to ascertain empirically, the amount of each element that will produce the most favourable effect.

A suitable alloy in accordance with the invention is one containing between 30 and 45% of copper, between 3 and 12% of cobalt and/or

nickel, between 4 and 15% of manganese and between 0.5 and 1.5% of iron.

The addition of up to 0.3% of phosphorus to the hereindescribed alloys is advantageous since it very considerably improves the fineness of structure of the alloys.

By means of the additions according to the invention the range of the solid solution can also be increased, to some extent, beyond that of the binary alloy, and alloys with a somewhat higher copper content which however must be substantially less than 45%, which come within the beta + gamma range in the binary alloy, can also be converted into a state corresponding to gamma brass and rendered suitable for applications, such as cold rolling or drawing, from which they are otherwise excluded on account of their copper content.

The following is a typical example of an alloy according to the invention:

	Percent
Cu	36
Ni	6
Co	2
Mn	10
Fe	1.2
Zn	Remainder

What we claim is:

A corrosion-resistant copper-zinc alloy which is workable in the cold state, comprising copper in the amount of 30 to 45%, at least one metal of the group cobalt and nickel in an amount of 3 to 12%, manganese in an amount of 4 to 15% and a small but effective amount of each of the following elements, iron up to 1.5% and silver up to 2.0% to improve the fineness of grain of the alloy, the zinc constituting substantially all the remainder of the alloy.

WOLF JOHANNES MÜLLER.
MORITZ NIESSNER.