COPPER-TIN-PHOSPHORUS-ZINC ALLOY

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No Drawing. Application August 26, 1936, Serial No. 98,864

5 Claims. (Cl. 75—157)

This invention relates to a copper base alloy, and more particularly to a copper base alloy containing tin, zinc and phosphorus. I have discovered that by adding a relatively large amount of phosphorus to a copper-zinc-tin alloy containing about 70 to 90 percent copper the phosphorus imparts improved spring properties to the alloy which are ordinarily obtained by large amounts of tin. That is a smaller amount of phosphorus has a similar effect to a larger amount of tin so that the tin content may be greatly reduced.

The alloy has a copper content of from about 70% to 90%, a tin content of from about 0.25% to 1%, a phosphorus content of about 0.15% to 0.5% and balance zinc. With additions of small amounts of phosphorus up to about 0.15% there is a gradual and only small improvement, but at about 0.15% phosphorus there is a very marked improvement. The range of phosphorus may be from about 0.15% to 0.5% with the greatest improvement at about 0.25% phosphorus. At about 0.15% phosphorus and up to about 0.5% there is also a material increase in the tensile strength of the alloy.

The preferred specific alloy has about the following composition, 81% copper, 1% tin, 0.15% to 0.5% phosphorus and the remainder zinc.

Another specific alloy which has been found to be very useful is of about the following composition, 89% copper, 1% tin, 0.15% to 0.5% phosphorus and balance zinc.

Still another very useful alloy is of about the following composition, 88.25% copper, 0.75% tin, 0.15% to 0.5% phosphorus and balance zinc.

The alloy may be hot or cold rolled into plate, sheet, strip, rod—in fact, all rolled shapes. It may be forged hot or cold as in die pressing or similar forming operations. It may be extruded into shapes such as bars and rods.

The alloy, because of its hot and cold working properties, can be used to advantage in the manufacture of bolts, nuts, U-bolts and similar articles.

The alloy may be soldered, welded or brazed and is thus suitable for use in the production of all types of fabricated articles either by gas, electric or other welding methods. The alloy may also be used as a filler material for welding or brazing.

The alloy has good corrosion resistance being equal to or better than copper (depending upon the corrosive agent and the method of its use) and may obviously be used to advantage wherever corrosion resistant properties are desired with the added advantages of strength, hardness and wear resistance superior to copper.

Having thus set forth the nature of my invention, what I claim is:

1. A copper base alloy composed of about 70% to 90% copper, 0.25% to 1% tin, 0.15% to 0.5% phosphorus and balance zinc.

2. A copper base alloy composed of about 81% copper, 1% tin, 0.15% to 0.5% phosphorus and balance zinc.

3. A copper base alloy composed of about 89% copper, 1% tin, 0.15% to 0.5% phosphorus and balance zinc.

4. A copper base alloy composed of about 88.25% copper, 0.75% tin, 0.15% to 0.5% phosphorus and balance zinc.

5. A copper base alloy composed of about 70% to 90% copper, 0.25% to 1% tin, 0.15% to 0.5% phosphorus, and balance substantially zinc, said alloy having improved strength and spring properties over the same alloy without the phosphorus.

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