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COPPER-ZINC-LEAD-PHOSPHOROUS ALLOY AND ARTICLES

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This invention relates to a leaded copper-zinc alloy having improved strength and other properties, and also to a machined article made of this alloy, and particularly to an improved high copper leaded alloy for screw machine work.

A particular object of the invention is to produce a readily machinable alloy which has a high strength, is tougher and has increased resistance to abuse, and which resists deformation under action of a wrench, that is has increased resistance to distortion.

It has been known to add lead to copper-zinc alloys to improve their machining or cutting properties. It has also been known to add small amounts of phosphorus to copper-zinc alloys as a deoxidizer.

I have found that by adding a relatively large amount of phosphorus, about 0.25%, to leaded copper-zinc alloys an increase of from 10 to 25% in tensile strength is secured, and this is accomplished without any lowering of the elongation. The phosphorizing of the alloy also improves its extrusion properties. It can be more easily extruded and with less pressure.

It also tends to make sounder castings and the alloy can be cast at a lower pouring temperature.

In this alloy the range of copper may be from about 67% to about 91%, the lead from about 0.35% to about 4%, the phosphorus from about 0.15% to about 0.5%, and the balance zinc. I have found that at about 0.15% phosphorus and up to about 0.5% there is a material increase in tensile strength, there being a marked increase at about 0.15% and with the greatest effect at about 0.25% phosphorus. There is only a very gradual and small improvement with a phosphorus content below about 0.15%.

The preferred alloy is from about 80% to about 90% copper with about the same content of lead and phosphorus and balance zinc, because at above about 80% copper the tendency to season or corrosion cracking is practically eliminated.

An alloy which has been found very useful is composed of about 90% copper, about 1.75% lead, about 0.15% to 0.5% phosphorus and balance zinc.

Another very useful alloy is composed of about 85% copper, 1.75% lead, 0.15% to 0.5% phosphorus and balance zinc.

The above alloy has been found to be tougher with high strength, and as having greater resistance to distortion and abuse, such for example as deformation under action of a wrench, than the same alloy without the phosphorus. It is tough and still is ductile. It has been found to be very useful and a great improvement for splicing clamps and similar accessories for the electrical industry. Heretofore considerable trouble has been met in such devices in the stripping of threads and pulling off of the heads of bolts when they were set up tight with a wrench. This trouble is greatly reduced with this improved alloy.

It is also of course adapted for many other uses where these improved properties are desirable.

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 67% to 91% copper, 0.35% to 4% lead, 0.15% to 0.5% phosphorus, and balance zinc.

2. A copper base alloy composed of about 80% to 90% copper, 0.35% to 4% lead, 0.15% to 0.5% phosphorus, and balance zinc.

3. A copper base alloy composed of about 90% copper, 1.75% lead, 0.15% to 0.5% phosphorus, and balance zinc.

4. A copper base alloy composed of about 85% copper, 1.75% lead, 0.15% to 0.5% phosphorus, and balance zinc.

5. A machined article made from an alloy composed of about 67% to 91% copper, 0.35% to 4% lead, 0.15% to 0.5% phosphorus, and balance zinc.

6. A machined article made from an alloy composed of about 80% to 90% copper, 0.35% to 4% lead, 0.15% to 0.5% phosphorus, and balance zinc.

7. A machined article made from an alloy composed of about 90% copper, 1.75% lead, 0.15% to 0.5% phosphorus and balance zinc.

8. A machined article made from an alloy composed of about 85% copper, 1.75% lead, 0.15% to 0.5% phosphorus, and balance zinc.

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