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Oishi

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(54) **LEAD-FREE FREE-CUTTING COPPER ALLOYS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(57) **ABSTRACT**

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Related U.S. Application Data

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**⁷ **C22C 9/04; C22F 1/08**

(52) **U.S. Cl.** **148/434; 420/477; 420/479; 420/480; 420/481; 420/482; 420/483**

(58) **Field of Search** **148/434; 420/477; 420/479, 480, 481, 482, 483**

A lead-free free-cutting copper alloy having 69 to 79 percent, by weight, of copper; greater than 3 percent, by weight, of silicon; and a remaining percent, by weight, of zinc. The alloy preferable has greater than 3.0 percent and less than or equal to 4.0 percent, by weight, of silicon; and at least one element selected from among 0.02 to 0.4 percent, by weight, of bismuth, 0.02 to 0.4 percent, by weight, of tellurium, and 0.02 to 0.4 percent, by weight, of selenium. The alloy also preferable has at least one element selected from among 0.3 to 3.5 percent, by weight, of tin, 1.0 to 3.5 percent, by weight, of aluminum, and 0.02 to 0.25 percent, by weight, of phosphorus. In further embodiments, the alloy has at least one element selected from among 0.02 to 0.15 percent, by weight, of antimony, and 0.02 to 0.15 percent, by weight, of arsenic.

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12 Claims, 1 Drawing Sheet

