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(54) **COPPER TROLLEY WIRE AND A METHOD OF MANUFACTURING COPPER TROLLEY WIRE**

- 56-044759 \* 4/1981 (JP) .
- 61-023736 \* 2/1986 (JP) .
- 61-023737 \* 2/1986 (JP) .
- 3-56633 3/1991 (JP) .
- 07090430 \* 4/1995 (JP) .
- 07166274 \* 6/1995 (JP) .

(75) Inventors: **Thomas J. Chandler**, Fairfield, CT (US); **John Corrado**, Bayonne, NJ (US)

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(73) Assignee: **Phelps Dodge Industries, Inc.**, Phoenix, AZ (US)

Avitzur, B., *Handbook of Metal-Forming Processes*, John Wiley & Sons, New York, 1983, pp. 35-248.

(\*) 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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(21) Appl. No.: **09/134,907**

"Standard Specification for Copper Trolley Wire—Designation: B47-95a," ASTM Committee on Standards, American Society for Testing and Materials, West Conshohocken, PA, 1995.

(22) Filed: **Aug. 17, 1998**

"How Tough Do You Need It?," Copper Rod Bulletin, Southwire Company, Carrollton, GA, 1996.

**Related U.S. Application Data**

Fisher, H. J.; Hay, D. A.; Finlay, W. L., *Development and Properties of a New High-Conductivity/High-Strength Copper Alloy*, Inst. Metals, Monogr. Rep. Ser. (1970), No. 34, 256-63.\*

(62) Division of application No. 08/884,985, filed on Jun. 30, 1997, now Pat. No. 6,077,364.

(51) **Int. Cl.**<sup>7</sup> ..... **C22F 1/08**

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(52) **U.S. Cl.** ..... **148/681**; 148/684; 29/527.7

*Primary Examiner*—Sikyin Ip

(58) **Field of Search** ..... 148/681, 684; 29/527.7

(74) *Attorney, Agent, or Firm*—Fish & Neave; Jeffrey H. Ingerman; Eric H. Huang

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(57) **ABSTRACT**

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Copper trolley wire consisting essentially of at least 99.90% copper and at most 0.10% of a metal selected from the group consisting of silver, cadmium, tellurium, titanium, magnesium, manganese, chromium, zirconium, tin and combinations thereof, has a minimum tensile strength well exceeding that listed in ASTM Standard B47-95a for copper trolley wire. The copper trolley wire has a uniform fine grain size. The copper trolley wire is manufactured using a process of casting a copper rod of the appropriate composition, hot working or "conforming" the cast rod to reduce its diameter, and then cold working it to form the desired wire by drawing it through one or more dies. Preferably, no annealing step is used.

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**7 Claims, 6 Drawing Sheets**

