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(54) **METHODS OF FORMING ALUMINUM-COMPRISING PHYSICAL VAPOR DEPOSITION TARGETS; SPUTTERED FILMS; AND TARGET CONSTRUCTIONS**

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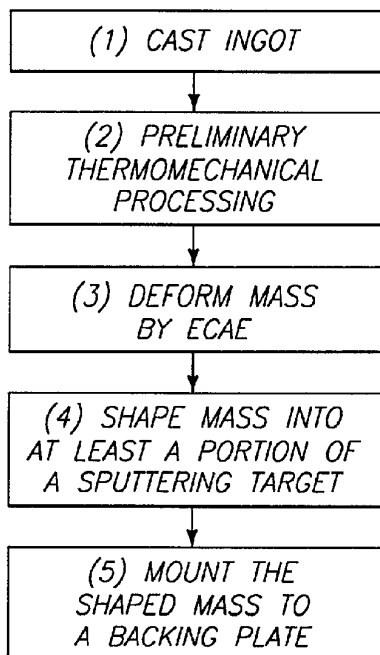**Morristown, NJ 07962 (US)**

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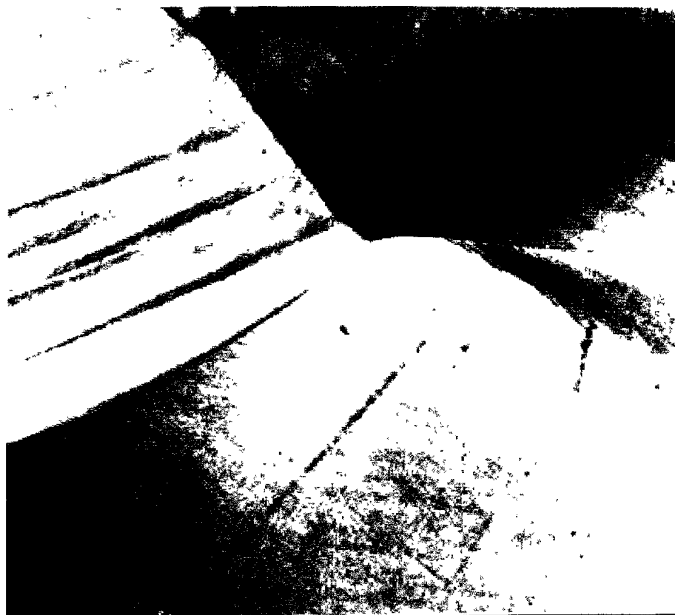
(52) **U.S. Cl.** **148/437**; 72/256; 148/438; 148/439; 148/440

(57)   **ABSTRACT**

The invention includes a method of forming an aluminum-comprising physical vapor deposition target. An aluminum-comprising mass is deformed by equal channel angular extrusion. The mass is at least 99.99% aluminum and further comprises less than or equal to about 1,000 ppm of one or more dopant materials comprising elements selected from the group consisting of Ac, Ag, As, B, Ba, Be, Bi, C, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Lu, Mg, Mn, Mo, N, Nb, Nd, Ni, O, Os, P, Pb, Pd, Pm, Po, Pr, Pt, Pu, Ra, Rf, Rh, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Ti, Tl, Tm, V, W, Y, Yb, Zn and Zr. After the aluminum-comprising mass is deformed, the mass is shaped into at least a portion of a sputtering target. The invention also encompasses a physical vapor deposition target consisting essentially of aluminum and less than or equal to 1,000 ppm of one or more dopant materials comprising elements selected from the group consisting of Ac, Ag, As, B, Ba, Be, Bi, C, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Lu, Mg, Mn, Mo, N, Nb, Nd, Ni, O, Os, P, Pb, Pd, Pm, Po, Pr, Pt, Pu, Ra, Rf, Rh, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Ti, Ti, Tm, V, W, Y, Yb, Zn and Zr. Additionally, the invention encompasses thin films.

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┌─────────────────────────┐
│   (1) CAST INGOT        │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  (2) PRELIMINARY        │
│  THERMOMECHANICAL       │
│  PROCESSING             │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  (3) DEFORM MASS        │
│  BY ECAE                │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  (4) SHAPE MASS INTO    │
│  AT LEAST A PORTION OF  │
│  A SPUTTERING TARGET    │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  (5) MOUNT THE          │
│  SHAPED MASS TO         │
│  A BACKING PLATE        │
└─────────────────────────┘
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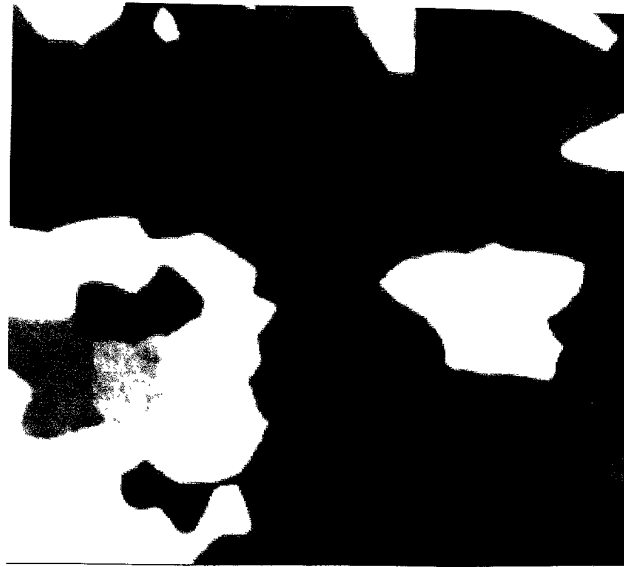
FIG 1
PRIOR ART

FIG 2
PRIOR ART

FIG 3
PRIOR ART
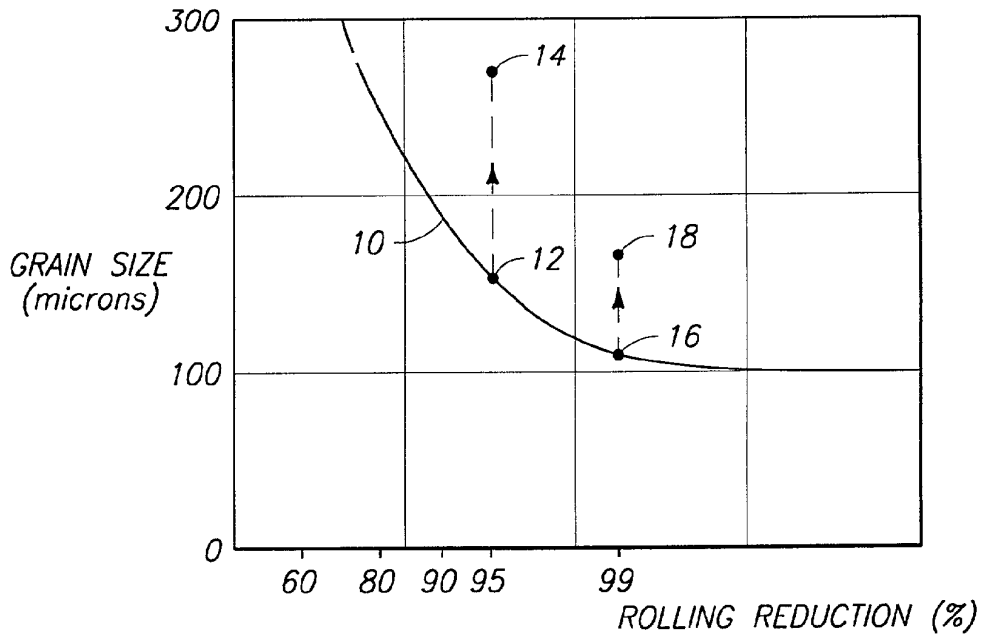
FIG 4
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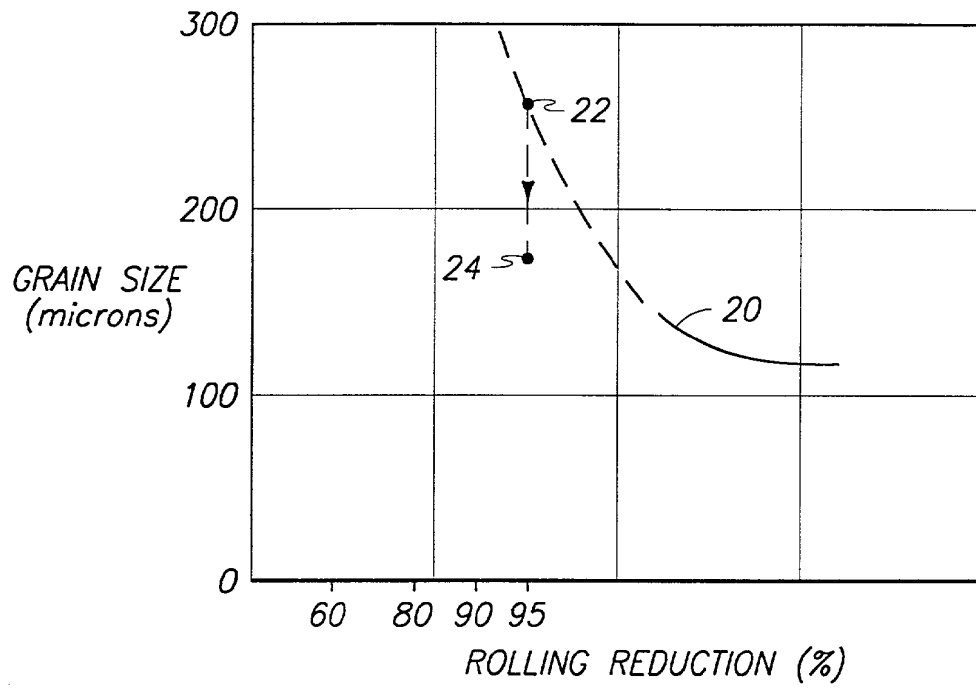
Fig 5
PRIOR ART
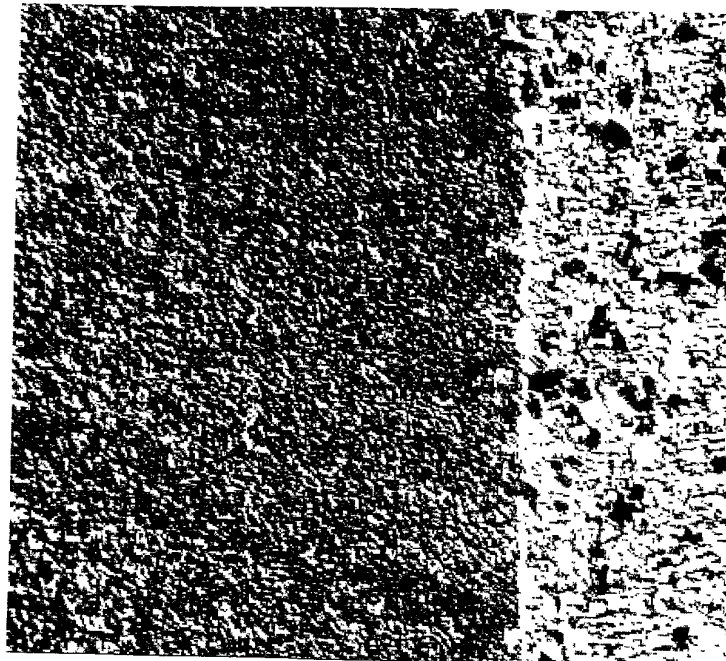
Fig 6
PRIOR ART
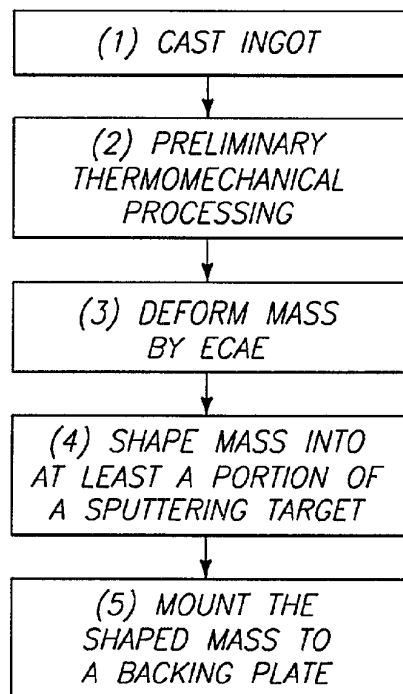
Fig 1
PRIOR ART

(1) CAST INGOT

(2) PRELIMINARY THERMOMECHANICAL PROCESSING

(3) DEFORM MASS BY ECAE

(4) SHAPE MASS INTO AT LEAST A PORTION OF A SPUTTERING TARGET

(5) MOUNT THE SHAPED MASS TO A BACKING PLATE

Fig 8

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