

13

R is the radius of the internal contour of the die at any given point x along the major axis of the die orifice from its entry plane;

$\dot{\epsilon}$  is the natural strain rate;

v is the velocity of the ram of the extrusion press;

$R_o$  is the radius of the billet; and

$r_o$  is the radius of the mandrel.

22. The method of claim 7 wherein the die is used for extruding tubes and has an internal contour which substantially conforms to the formula:

$$R = R_o \left[ \frac{1 + \frac{R_o}{r_o} \frac{\dot{\epsilon}}{v} x}{1 + \frac{\dot{\epsilon}}{v} x} \right]^{\frac{1}{2}}$$

where

R is the radius of the internal contour of the die at any given point x along the major axis of the die orifice from its entry plane;

$\dot{\epsilon}$  is the natural strain rate;

v is the velocity of the ram of the extrusion press;

$R_o$  is the radius of the billet;

$r_o$  is the radius of the mandrel.

23. The method of claim 15 wherein the die is used for extruding rods and has an internal contour which substantially conforms to the formula:

$$R = \sqrt{\frac{R_o}{1 + \frac{\dot{\epsilon}}{v} x}}$$

where

R is the radius of the internal contour of the die at any given point x along the major axis of the die orifice from its entry plane;

$\dot{\epsilon}$  is the natural strain rate;

v is the velocity of the ram of the extrusion press; and

$R_o$  is the radius of the billet.

24. An extruded dispersion strengthened metallic material which is substantially free of texture which metallic material is comprised of one or more metals having one or more refractory compounds dispersed therein.

25. The extruded material of claim 24 wherein the metal constituent is comprised of one or more metals selected from the groups consisting of Group IVA, VA, VIA and VIII of the Periodic Table of the Elements.

14

26. The extruded material of claim 25 wherein the metal constituent is iron or nickel based.

27. The extruded material of claim 26 wherein the one or more refractory compounds are selected from the group consisting of refractory oxides, carbides, nitrides and borides.

28. The extruded material of claim 27 wherein the refractory compound is a metal oxide.

29. The extruded material of claim 28 wherein the metal oxide is selected from the group consisting of thorium, yttria,  $Al_2O_3 \cdot 2Y_2O_3$ ,  $Al_2O_3 \cdot Y_2O_3$ , and  $5Al_2O_3 \cdot 3Y_2O_3$ .

30. The extruded material of claim 29 wherein the oxide is selected from yttria,  $5Al_2O_3 \cdot 3Y_2O_3$ , or a mixture thereof.

31. The extruded material of claim 25 wherein the dispersion strengthened material is comprised of, by weight based on the total weight of the powder, up to about 65% chromium, up to about 8% aluminum, up to about 8% titanium, up to about 40% molybdenum, up to about 20% niobium, up to about 30% tantalum, up to about 40% copper, up to about 2% vanadium, up to about 15% tungsten, up to about 15% manganese, up to about 2% carbon, up to about 1% silicon, up to about 1% boron, up to about 2% zirconium, up to about 0.5% magnesium, up to about 25 vol.% of a refractory oxide, the balance being one or more of the metals selected from the group consisting of iron, nickel, and cobalt, in an amount being at least about 25%.

32. The extruded material of claim 31 wherein the refractory metal oxide is yttria,  $5Al_2O_3 \cdot 3Y_2O_3$ , or mixtures thereof, and is present in an amount from about 0.5% to about 5 vol.%.

33. The extruded material of claim 24 wherein the metal constituent is based on one or more metals selected from Groups IB, IIB except Hg, IIIB except Y, VB, IIA, IIIA except B, and IVA except Si.

34. The extruded material of claim 33 wherein the metal constituent is aluminum or aluminum based.

35. The extruded material of claim 34 wherein the refractory constituent is selected from the group consisting of refractory oxides, carbides, nitrides and borides.

36. The extruded material of claim 35 wherein the refractory is a metal oxide.

37. The extruded material of claim 36 wherein the metal oxide is alumina.

38. The extruded material of claim 37 wherein the alumina is present in an amount from about 0.5 to about 5 volume percent.

\* \* \* \* \*

55

60

65