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We Claim:

1. A hard metal material in the form of a casting comprising greater than 10 and up to ~~5-~~50 volume % particles of a refractory material with particle sizes less than 500 microns dispersed in a host metal,

characterized in that ~~wherein~~ the refractory material ~~comprises~~ consists of

(a) particles of carbides and/or nitrides and/or borides of one of ~~any one or more than one of titanium,~~ zirconium, hafnium, vanadium, niobium, tantalum, chromium, and molybdenum; and/or

(b) particles of a chemical mixture of carbides and/or nitrides and/or borides of any two or more of titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum, and tungsten,

and wherein the particles are insoluble in the host metal at its casting temperature and the host metal comprises a ferrous alloy (such as a steel, a cast iron), a stainless steel, an austenitic-manganese steel) or an iron-based or a nickel-based or a cobalt-based superalloy.

2. The hard metal material casting as claimed in claim 1 wherein the particles of the refractory material are selected from (a) niobium carbide containing refractory particles and (b) particles of a chemical mixture of niobium carbide and titanium carbide.

~~3. The hard metal material casting as claimed in claim 1 or claim 2 wherein the particles of the refractory material also comprise tungsten.~~

~~.4. The hard metal material casting as claimed in any one of claims 1 to 3 comprises 5-40 volume % particles of the refractory material dispersed in the host metal.~~

~~5. The hard metal material casting as claimed in claim 4 comprises greater than 10 volume % and no more than 40 volume % particles of the refractory material dispersed in the host metal.~~

~~6. The hard metal material casting as claimed in claim 5 comprises greater than 15 volume % and no more than 40 volume % particles of the refractory material dispersed in the host metal.~~

~~7. The hard metal material casting as claimed in any one of claims 1 to 3 comprises greater than 10 volume % particles of the refractory material dispersed in the host metal.~~

3.~~8.~~ The hard metal material casting as claimed in any one of claims 1 to 2 ~~claim 7 comprises~~ comprising greater than 15 volume % particles of the refractory material dispersed in the host metal, preferably less than 30 volume % particles of the refractory material dispersed in the host metal, and preferably less than 25 volume % particles of the refractory material dispersed in the host metal.

~~9. The hard metal material casting as claimed in any one of the preceding claims comprises less than 30 volume % particles of the refractory material dispersed in the host metal.~~

~~10. The hard metal material casting as claimed in any one of the preceding claims comprises less than 25 volume % particles of the refractory material dispersed in the host metal.~~

~~11. The hard metal material casting as claimed in any one of the preceding claims wherein the host metal comprises a ferrous alloy (such as a steel or a cast iron), a stainless steel, an austenitic manganese steel, or an iron based or a nickel based or a cobalt based superalloy.~~

~~12. The hard metal material casting as claimed in claim 11, wherein the ferrous alloy is a steel or a cast iron.~~

4.~~13~~. A method of manufacturing a component of a hard metal material comprising:

(a) forming a slurry of a hard metal material comprising greater than 10 and up to ~~5~~ 50 volume % particles of a refractory material with particle sizes less than 500 microns dispersed in a liquid host metal in an inert atmosphere, with the refractory material consisting of ~~that comprises~~ (a) particles of carbides and/or nitrides and/or borides of one of ~~any one or more than one of titanium~~, zirconium, hafnium, vanadium, niobium, tantalum, chromium, and molybdenum; and/or (b) particles of a chemical mixture of carbides and/or nitrides and/or borides of any two or more of titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum, and tungsten,

and wherein the particles are insoluble in the host metal at its casting temperature and the host metal comprises a ferrous alloy (such as a steel, a cast iron), a stainless steel, an austenitic-manganese steel or an iron-based or a nickel-based or a cobalt-based superalloy. ~~with particle sizes less than 500 microns dispersed in a liquid host metal in an inert atmosphere~~, and

(b) pouring the slurry into a mould and forming a casting of the component such as in an inert atmosphere.

5.~~14.~~ The method as claimed in claim 4 ~~13~~ comprises forming the slurry and thereafter forming the casting of the component in a chamber under vacuum conditions which remove air from the chamber and supplying an inert gas, such as argon, into the chamber.

~~15. The method as claimed in claim 13 or claim 14 comprises selecting the production parameters to form the slurry in step (a) with a required fluidity for processing in step (b).~~

~~16. The method as claimed in claim 15 wherein the production parameters comprise any one or more of the particle size, shape, reactivity, density, and solubility of the refractory materials.~~

6.~~17~~. The method as claimed in ~~any one of claims 13 to 16~~ claim 4 or claim 5, wherein the refractory material is less than 400 microns particle size, and preferably less than 150 microns particle size.

~~18. The method as claimed in any one of claims 13 to 17 wherein the refractory material is less than 150 microns particle size.~~

7.~~19.~~ The method as claimed in any one of claims 4 to 6 ~~13 to 18~~ comprises selecting one or more than one of (a) the refractory material to have a smaller thermal contraction than the host metal

~~20. The method as claimed in any one of claims 13 to 19 comprises selecting~~ (b) ~~the~~ density of the refractory material, compared to the density of the host metal in the liquid state to control the dispersion of the particles of the refractory material in the host metal and (c)

~~21. The method as claimed in any one of claims 13 to 20 comprises selecting~~ the refractory material to have minimal solid solubility in the liquid host metal.