

CPC COOPERATIVE PATENT CLASSIFICATION

C22C ALLOYS (flints [C06C 15/00](#); treatment of alloys [C21D](#), [C22F](#))

NOTES

1. In this subclass, the following terms or expressions are used with the meanings indicated:
"alloys" includes also:
 - a. metallic composite materials containing a substantial proportion of fibres or other somewhat larger particles;
 - b. ceramic compositions containing free metal bonded to carbides, diamond, oxides, borides, nitrides or silicides, e.g. cermets, or other metal compounds, e.g. oxynitrides or sulfides, other than as macroscopic reinforcing agents;"based on" requires at least 50% by weight of the specified constituent or of the specified group of constituents.
2. In the absence of an indication to the contrary, in groups [C22C 5/00](#) - [C22C 32/00](#) an alloy is classified in the last appropriate place.
3. In this subclass it is desirable to classify the individual aspects of combinations of processes or materials for powder metallurgy using Combination Sets with symbols chosen from groups [C22C 1/00](#) - [C22C 43/00](#) or from groups [B22F 1/00](#) - [B22F 9/00](#).
4. In this subclass the special database "ALLOYS" is used. This system includes patent documents classified in groups [C22C 1/04](#) and [C22C 5/00](#) - [C22C 49/14](#) and provides information on the composition of the alloys, their uses and characteristics.

Non-ferrous alloys, i.e. alloys based essentially on metals other than iron (master alloys for iron and steel [C22C 35/00](#); alloys containing radioactive material [C22C 43/00](#); amorphous alloys [C22C 45/00](#); alloys containing fibres or filaments [C22C 47/00](#), [C22C 49/00](#))

- 1/00 Making alloys** (powder-metallurgical apparatus or processes, not specially modified for making alloys [B22F](#); by electrothermal methods [C22B 4/00](#); by electrolysis [C25C](#))
- 1/002 . {Making amorphous alloys (processes for making amorphous material by powder metallurgy [B22F](#))}
- 1/005 . {Making alloys with holding in the range of the solid-liquid phase}
- 1/007 . {Preparing arsenides or antimonides, especially of the III-VI-compound type, e.g. aluminium or gallium arsenide}
- 1/02 . by melting {([C22C 1/1036](#) takes precedence)}
- 1/023 . . {Alloys based on nickel}
- 1/026 . . {Alloys based on aluminium}
- 1/03 . . using master alloys
- 1/04 . by powder metallurgy ([C22C 1/08](#), {[C22C 1/05](#), [C22C 1/10](#), [C22C 32/00](#), [C22C 47/00](#), [C22C 49/00](#)} take precedence)
- 1/0408 . . {Light metal alloys}
- 1/0416 . . . {Aluminium-based alloys}
- 1/0425 . . {Copper-based alloys}
- 1/0433 . . {Nickel- or cobalt-based alloys}
- 1/0441 . . . {Alloys based on intermetallic compounds of the type rare earth - Co, Ni}
- 1/045 . . {Alloys based on refractory metals}
- 1/0458 . . . {Alloys based on titanium, zirconium, hafnium}
- 1/0466 . . {Alloys based on noble metals}
- 1/0475 . . {Impregnated alloys}
- 1/0483 . . {Alloys based on the low melting point metals Zn, Pb, Sn, Cd, In or Ga}
- 1/0491 . . {comprising intermetallic compounds ([C22C 1/0441](#) takes precedence)}
- 1/05 . . Mixtures of metal powder with non-metallic powder ([C22C 1/08](#), {[C22C 47/00](#), [C22C 49/00](#)} take precedence)

- 1/051 . . . {Making hard metals based on borides, carbides, nitrides, oxides or silicides; Preparation of the powder mixture used as the starting material}
- 1/053 {with in situ forming of the hard compound ([C22C 1/058](#) takes precedence)}
- 1/055 {using carbon}
- 1/056 {using gas}
- 1/058 . . . {by reaction sintering (i.e. gasless reaction starting from a mixture of solid metal compounds)}
- 1/06 . with the use of special agents for refining or deoxidising
- 1/08 . Alloys with open or closed pores {(by powder metallurgy [B22F 3/11](#))}
- 2001/081 . . {Casting porous metals into porous preform skelet without foaming}
- 2001/082 . . . {with removal of the preform}
- 2001/083 . . {Foaming process in molten metal other than by powder metallurgy}
- 2001/085 . . . {with external pressure or pressure buildup to make porous metals}
- 2001/086 . . . {Gas foaming process}
- 2001/087 . . . {after casting in solidified or solidifying metal to make porous metals}
- 2001/088 . . {Foaming process with solid metal other than by powder metallurgy}
- 1/10 . Alloys containing non-metals ({[C22C 1/05](#)}, [C22C 1/08](#), {[C22C 47/00](#), [C22C 49/00](#)} take precedence)
- 1/1005 . . {Pretreatment of the non-metallic additives (pretreatment of non-metallic fibres [C22C 47/02](#))}
- WARNING**
- Groups [C22C 1/1005](#), [C22C 1/101](#) and [C22C 1/1015](#) are not complete, see also [C22C 1/10](#)
- 1/101 . . . {by coating}
- 1/1015 . . . {by preparing or treating a non-metallic additive preform}
- 2001/1021 {the preform being ceramic}

1/1026	. . {starting from a solution or a suspension of (a) compound(s) of at least one of the alloy constituents}	13/02	. with antimony or bismuth as the next major constituent
1/1031	. . {starting from (a) gaseous compound(s) or (a) vapour(s) of at least one of the constituents}	14/00	Alloys based on titanium
1/1036	. . {starting from a melt (infiltration of sintered ceramic preforms with molten metal C04B 41/51)}	16/00	Alloys based on zirconium
1/1042	. . . {by atomising (atomising molten metal B22F 9/08)}	18/00	Alloys based on zinc
2001/1047	. . . {by mixing and casting liquid metal matrix composites}	18/02	. with copper as the next major constituent
2001/1052	. . . . {by mixing and casting metal matrix composites with reaction}	18/04	. with aluminium as the next major constituent
2001/1057	. . . {Reactive infiltration}	19/00	Alloys based on nickel or cobalt
2001/1063	. . . . {Gas reaction, e.g. lanxide}	19/002	. {with copper as the next major constituent}
1/1068	. . . {Making hard metals based on borides, carbides, nitrides, oxides, silicides}	19/005	. {with Manganese as the next major constituent}
2001/1073	. . . {Infiltration or casting under mechanical pressure, e.g. squeeze casting}	19/007	. {with a light metal (alkali metal Li, Na, K, Rb, Cs; earth alkali metal Be, Mg, Ca, Sr, Ba, Al Ga, Ge, Ti) or B, Si, Zr, Hf, Sc, Y, lanthanides, actinides, as the next major constituent}
1/1078	. . {by internal oxidation of material in solid state}	19/03	. based on nickel
1/1084	. . {by mechanical alloying (blending, milling)}	19/05	. . with chromium
2001/1089	. . {by partial reduction or decomposition of a solid metal compound}	19/051	. . . {and Mo or W}
1/1094	. . {comprising an after-treatment}	19/052	. . . . {with the maximum Cr content being at least 40%}
NOTE		19/053	. . . . {with the maximum Cr content being at least 30% but less than 40%}
Documents classified in group C22C 1/1094 are also classified in subclass C22F		19/055	. . . . {with the maximum Cr content being at least 20% but less than 30%}
3/00	Removing material from alloys to produce alloys of different constitution {separation of the constituents of alloys}	19/056	. . . . {with the maximum Cr content being at least 10% but less than 20%}
3/005	. {Separation of the constituents of alloys}	19/057	. . . . {with the maximum Cr content being less 10%}
5/00	Alloys based on noble metals	19/058	. . . {without Mo and W}
5/02	. Alloys based on gold	19/07	. based on cobalt
5/04	. Alloys based on a platinum group metal	20/00	Alloys based on cadmium
5/06	. Alloys based on silver	21/00	Alloys based on aluminium
5/08	. . with copper as the next major constituent	21/003	. {containing at least 2.6% of one or more of the elements: tin, lead, antimony, bismuth, cadmium, and titanium}
5/10	. . with cadmium as the next major constituent	21/006	. {containing Hg}
7/00	Alloys based on mercury	21/02	. with silicon as the next major constituent
9/00	Alloys based on copper	21/04	. . Modified aluminium-silicon alloys
9/01	. with aluminium as the next major constituent	21/06	. with magnesium as the next major constituent
9/02	. with tin as the next major constituent	21/08	. . with silicon
9/04	. with zinc as the next major constituent	21/10	. with zinc as the next major constituent
9/05	. with manganese as the next major constituent	21/12	. with copper as the next major constituent
9/06	. with nickel or cobalt as the next major constituent	21/14	. . with silicon
9/08	. with lead as the next major constituent	21/16	. . with magnesium
9/10	. with silicon as the next major constituent	21/18	. . with zinc
11/00	Alloys based on lead	22/00	Alloys based on manganese
11/02	. with an alkali or an alkaline earth metal as the next major constituent	23/00	Alloys based on magnesium
11/04	. with copper as the next major constituent	23/02	. with aluminium as the next major constituent
11/06	. with tin as the next major constituent	23/04	. with zinc or cadmium as the next major constituent
11/08	. with antimony or bismuth as the next major constituent	23/06	. with a rare earth metal as the next major constituent
11/10	. . with tin	24/00	Alloys based on an alkali or an alkaline earth metal
12/00	Alloys based on antimony or bismuth	25/00	Alloys based on beryllium
13/00	Alloys based on tin	26/00	Alloys containing diamond {or cubic or wurtzitic boron nitride, fullerenes or carbon nanotubes}
		2026/001	. {Fullerenes}
		2026/002	. {Carbon nanotubes}
		2026/003	. {Cubic boron nitrides only}

- 2026/005 . {with additional metal compounds being borides}
- 2026/006 . {with additional metal compounds being carbides}
- 2026/007 . {with additional metal compounds being nitrides}
- 2026/008 . {with additional metal compounds other than carbides, borides or nitrides}
- 27/00 Alloys based on rhenium or a refractory metal not mentioned in groups [C22C 14/00](#) or [C22C 16/00](#)**
 - 27/02 . Alloys based on vanadium, niobium, or tantalum
 - 27/025 . . {alloys based on vanadium}
 - 27/04 . Alloys based on tungsten or molybdenum
 - 27/06 . Alloys based on chromium
- 28/00 Alloys based on a metal not provided for in groups [C22C 5/00](#) - [C22C 27/00](#)**
- 29/00 Alloys based on carbides, oxides, nitrides, borides, or silicides, e.g. cermets, or other metal compounds, e.g. oxynitrides, sulfides {(C22C 26/00 takes precedence)}**
 - 29/005 . {comprising a particular metallic binder}
 - 29/02 . based on carbides or carbonitrides
 - 29/04 . . based on carbonitrides
 - 29/06 . . based on carbides, but not containing other metal compounds
 - 29/062 . . . {based on B₄C}
 - 29/065 . . . {based on SiC}
 - 29/067 . . . {comprising a particular metallic binder}
 - 29/08 . . . based on tungsten carbide
 - 29/10 . . . based on titanium carbide
 - 29/12 . based on oxides
 - 29/14 . based on borides
 - 29/16 . based on nitrides {(containing cubic BN or wurtzitic BN and diamond [C22C 26/00](#))}
 - 29/18 . based on silicides
- 30/00 Alloys containing less than 50% by weight of each constituent**
 - 30/02 . containing copper
 - 30/04 . containing tin or lead
 - 30/06 . containing zinc
- 32/00 Non-ferrous alloys containing at least 5% by weight but less than 50% by weight of oxides, carbides, borides, nitrides, silicides or other metal compounds, e.g. oxynitrides, sulfides whether added as such or formed in situ**

NOTE

This group comprises also dispersion hardened alloys with less than 5% of dispersed compounds

- 32/0005 . {with at least one oxides and at least one of carbides, nitrides, borides or silicides as the main non-metallic constituents}
- 32/001 . {with only oxides}
- 32/0015 . . {with only single oxides as main non-metallic constituents}
- 32/0021 . . . {Matrix based on noble metals, Cu or alloys thereof}
- 32/0026 . . . {Matrix based on Ni, Co, Cr or alloys thereof; Matrix based on Fe for ODS steels (matrix based on Fe for steels other than ODS [C22C 33/00](#), by powder metallurgy [C22C 33/02](#))}

- 32/0031 . . . {Matrix based on refractory metals, W, Mo, Nb, Hf, Ta, Zr, Ti, V or alloys thereof}
- 32/0036 . . . {Matrix based on Al, Mg, Be or alloys thereof}
- 32/0042 . . . {Matrix based on low melting metals, Pb, Sn, In, Zn, Cd or alloys thereof}
- 32/0047 . {with carbides, nitrides, borides or silicides as the main non-metallic constituents}
- 32/0052 . . {only carbides}
- 32/0057 . . . {based on B₄C}
- 32/0063 . . . {based on SiC}
- 32/0068 . . {only nitrides}
- 32/0073 . . {only borides}
- 32/0078 . . {only silicides}
- 32/0084 . {carbon or graphite as the main non-metallic constituent}
- 32/0089 . {with other, not previously mentioned inorganic compounds as the main non-metallic constituent, e.g. sulfides, glass}
- 32/0094 . {with organic materials as the main non-metallic constituent, e.g. resin}

Ferrous alloys, i.e. alloys based on iron (alloys containing radioactive material [C22C 43/00](#); amorphous alloys [C22C 45/00](#); alloys containing fibres or filaments [C22C 47/00](#), [C22C 49/00](#); heat treatment thereof [C21D](#))

33/00 Making ferrous alloys

- 33/003 . {making amorphous alloys}
- 33/006 . {compositions used for making ferrous alloys}
- 33/02 . by powder metallurgy (working metallic powder [B22F](#))
- 33/0207 . . {Using a mixture of prealloyed powders or a master alloy (mixtures of metal powder in general [B22F 1/0003](#))}
- 33/0214 . . . {comprising P or a phosphorus compound}
- 33/0221 . . . {comprising S or a sulfur compound}
- 33/0228 . . . {comprising other non-metallic compounds or more than 5% of graphite}
- 33/0235 . . {Starting from compounds, e.g. oxides (manufacture of articles starting from powder comprising reducible metal compounds in general [B22F 3/001](#))}
- 33/0242 . . {using the impregnating technique (impregnating articles in general [B22F 3/26](#))}
- 33/025 . . {having an intermetallic of the REM-Fe type which is not magnetic}
- 33/0257 . . {characterised by the range of the alloying elements}
- 33/0264 . . . {the maximum content of each alloying element not exceeding 5%}
- 33/0271 {with only C, Mn, Si, P, S, As as alloying elements, e.g. carbon steel}
- 33/0278 {with at least one alloying element having a minimum content above 5%}
- 33/0285 {with Cr, Co, or Ni having a minimum content higher than 5%}
- 33/0292 {with more than 5% preformed carbides, nitrides or borides}
- 33/04 . by melting
- 33/06 . . using master alloys
- 33/08 . Making cast-iron alloys
- 33/10 . . including procedures for adding magnesium
- 33/12 . . . by fluidised injection

35/00 Master alloys for iron or steel

- 35/005 . {based on iron, e.g. ferro-alloys}

NOTE

In the absence of an indication to the contrary, in groups [C22C 37/00](#) - [C22C 38/00](#) an alloy is classified in the last appropriate place that provides for one of the alloying components.

37/00 Cast-iron alloys

- 37/04 . containing spheroidal graphite
 37/06 . containing chromium
 37/08 . . with nickel
 37/10 . containing aluminium or silicon

38/00 Ferrous alloys, e.g. steel alloys (cast-iron alloys [C22C 37/00](#))

- 38/001 . {containing N}
 38/002 . {containing In, Mg, or other elements not provided for in one single group [C22C 38/001](#) - [C22C 38/60](#)}
 38/004 . {Very low carbon steels, i.e. having a carbon content of less than 0,01%}
 38/005 . {containing rare earths, i.e. Sc, Y, Lanthanides}
 38/007 . {containing silver}
 38/008 . {containing tin}
 38/02 . containing silicon
 38/04 . containing manganese
 38/06 . containing aluminium
 38/08 . containing nickel { [C22C 38/105](#) takes precedence }
 38/10 . containing cobalt
 38/105 . . {containing Co and Ni}
 38/12 . containing tungsten, tantalum, molybdenum, vanadium, or niobium
 38/14 . containing titanium or zirconium
 38/16 . containing copper
 38/18 . containing chromium
 38/20 . . with copper
 38/22 . . with molybdenum or tungsten
 38/24 . . with vanadium
 38/26 . . with niobium or tantalum
 38/28 . . with titanium or zirconium
 38/30 . . with cobalt
 38/32 . . with boron
 38/34 . . with more than 1.5% by weight of silicon
 38/36 . . with more than 1.7% by weight of carbon
 38/38 . . with more than 1.5% by weight of manganese
 38/40 . . with nickel
 38/42 . . . with copper
 38/44 . . . with molybdenum or tungsten
 38/46 . . . with vanadium
 38/48 . . . with niobium or tantalum
 38/50 . . . with titanium or zirconium
 38/52 . . . with cobalt
 38/54 . . . with boron
 38/56 . . . with more than 1.7% by weight of carbon
 38/58 . . . with more than 1.5% by weight of manganese
 38/60 . containing lead, selenium, tellurium, or antimony, or more than 0.04% by weight of sulfur

43/00 Alloys containing radioactive materials**45/00 Amorphous alloys**

- 45/001 . {with Cu as the major constituent}

- 45/003 . {with one or more of the noble metals as major constituent}
 45/005 . {with Mg as the major constituent}
 45/006 . {with Cr as the major constituent}
 45/008 . {with Fe, Co or Ni as the major constituent ([C22C 45/02](#), [C22C 45/04](#) take precedence)}
 45/02 . with Fe as the major constituent
 45/04 . with Ni or Co as the major constituent
 45/06 . with Be as the major constituent
 45/08 . with Al as the major constituent
 45/10 . with Mo, W, Nb, Ta, Ti or Zr {or Hf} as the major constituent

Alloys containing fibres or filaments**WARNING**

The subgroups of [C22C 47/00](#) and [C22C 49/00](#) might be incomplete as some of the patent documents classified [C22C 47/08](#), [C22C 47/16](#) and [C22C 49/00](#) might need reclassification to one or more subgroups or to [C22C 47/02](#) and subgroups

47/00 Making alloys containing metallic or non-metallic fibres or filaments

- 2047/005 . {Working of filaments or rods into fibre reinforced metal by mechanical deformation}
 47/02 . Pretreatment of the fibres or filaments
 47/025 . . {Aligning or orienting the fibres}

WARNING

Not complete, see also [C22C 47/02](#)

- 47/04 . . by coating, e.g. with a protective or activated covering
 47/06 . . by forming the fibres or filaments into a preformed structure, e.g. using a temporary binder to form a mat-like element
 47/062 . . . {from wires or filaments only}

WARNING

Groups [C22C 47/062](#), [C22C 47/064](#), [C22C 47/066](#) and [C22C 47/068](#) are not complete, see also [C22C 47/02](#) or [C22C 47/06](#)

- 47/064 {Winding wires}
 47/066 {Weaving wires}
 47/068 {Aligning wires}
 47/08 . by contacting the fibres or filaments with molten metal, e.g. by infiltrating the fibres or filaments placed in a mould { [C22C 47/16](#) takes precedence }
 47/10 . . Infiltration in the presence of a reactive atmosphere; Reactive infiltration
 47/12 . . Infiltration or casting under mechanical pressure
 47/14 . by powder metallurgy, i.e. by processing mixtures of metal powder and fibres or filaments
 47/16 . by thermal spraying of the metal, e.g. plasma spraying { [atomising molten metal comprising fibres](#) see also [C22C 1/1042](#) }
 47/18 . . using a preformed structure of fibres or filaments
 47/20 . by subjecting to pressure and heat an assembly comprising at least one metal layer or sheet and one layer of fibres or filaments
 2047/205 . . {placing wires inside grooves of a metal layer}

49/00 Alloys containing metallic or non-metallic fibres or filaments

- 49/02 . characterised by the matrix material
 - 49/04 . . Light metals
 - 49/06 . . . Aluminium
 - 49/08 . . Iron group metals
 - 49/10 . . Refractory metals
 - 49/11 . . . Titanium
 - 49/12 . . Intermetallic matrix material
 - 49/14 . characterised by the fibres or filaments
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2200/00 Crystalline structure

- 2200/02 . Amorphous
- 2200/04 . Nanocrystalline
- 2200/06 . Quasicrystalline

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2202/00 Physical properties

- 2202/02 . Magnetic
- 2202/04 . Hydrogen absorbing

2204/00 End product comprising different layers, coatings or parts of cermet