

CPC COOPERATIVE PATENT CLASSIFICATION

C CHEMISTRY; METALLURGY

(NOTES omitted)

METALLURGY

C22 METALLURGY (of iron [C21](#)); FERROUS OR NON-FERROUS ALLOYS; TREATMENT OF ALLOYS OR NON-FERROUS METALS (production of metals by electrolysis or electrophoresis [C25](#))

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

NOTES

- In this subclass, the following terms or expressions are used with the meanings indicated:
 - "alloys" includes also:
 - metallic composite materials containing a substantial proportion of fibres or other somewhat larger particles;
 - 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.
- 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.
- 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](#).
- 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.

WARNING

The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups:

C22C 101/00 - C22C 101/22	covered by
C22C 111/00 - C22C 111/02	covered by
C22C 121/00 - C22C 121/02	covered by

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}
 - 1/1031 . . {starting from (a) gaseous compound(s) or (a) vapour(s) of at least one of the constituents}
 - 1/1036 . . {starting from a melt (infiltration of sintered ceramic preforms with molten metal C04B 41/51)}
 - 1/1042 . . . {by atomising (atomising molten metal B22F 9/08)}
 - 2001/1047 . . . {by mixing and casting liquid metal matrix composites}
 - 2001/1052 {by mixing and casting metal matrix composites with reaction}
 - 2001/1057 . . . {Reactive infiltration}
 - 2001/1063 {Gas reaction, e.g. lanxide}
 - 1/1068 . . . {Making hard metals based on borides, carbides, nitrides, oxides, silicides}
 - 2001/1073 . . . {Infiltration or casting under mechanical pressure, e.g. squeeze casting}
 - 1/1078 . . {by internal oxidation of material in solid state}
 - 1/1084 . . {by mechanical alloying (blending, milling)}
 - 2001/1089 . . {by partial reduction or decomposition of a solid metal compound}

- 1/1094 . . {comprising an after-treatment}

NOTE

Documents classified in group C22C 1/1094 are also classified in subclass C22F

3/00 Removing material from alloys to produce alloys of different constitution {separation of the constituents of alloys}

- 3/005 . {Separation of the constituents of alloys}

5/00 Alloys based on noble metals

- 5/02 . Alloys based on gold
- 5/04 . Alloys based on a platinum group metal
- 5/06 . Alloys based on silver
- 5/08 . . with copper as the next major constituent
- 5/10 . . with cadmium as the next major constituent

7/00 Alloys based on mercury

9/00 Alloys based on copper

- 9/01 . with aluminium as the next major constituent
- 9/02 . with tin as the next major constituent
- 9/04 . with zinc as the next major constituent
- 9/05 . with manganese as the next major constituent
- 9/06 . with nickel or cobalt as the next major constituent
- 9/08 . with lead as the next major constituent
- 9/10 . with silicon as the next major constituent

11/00 Alloys based on lead

- 11/02 . with an alkali or an alkaline earth metal as the next major constituent
- 11/04 . with copper as the next major constituent
- 11/06 . with tin as the next major constituent
- 11/08 . with antimony or bismuth as the next major constituent
- 11/10 . . with tin

12/00 Alloys based on antimony or bismuth

13/00 Alloys based on tin

- 13/02 . with antimony or bismuth as the next major constituent

14/00 Alloys based on titanium

16/00 Alloys based on zirconium

18/00 Alloys based on zinc

- 18/02 . with copper as the next major constituent
- 18/04 . with aluminium as the next major constituent

19/00 Alloys based on nickel or cobalt

- 19/002 . {with copper as the next major constituent}
- 19/005 . {with Manganese as the next major constituent}
- 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}
- 19/03 . based on nickel
- 19/05 . . with chromium
- 19/051 . . . {and Mo or W}
- 19/052 {with the maximum Cr content being at least 40%}
- 19/053 {with the maximum Cr content being at least 30% but less than 40%}
- 19/055 {with the maximum Cr content being at least 20% but less than 30%}

19/056	. . . . {with the maximum Cr content being at least 10% but less than 20% }	29/065	. . . . {based on SiC}
19/057	. . . . {with the maximum Cr content being less 10% }	29/067	. . . . {comprising a particular metallic binder}
19/058	. . . . {without Mo and W}	29/08	. . . . based on tungsten carbide
19/07	. based on cobalt	29/10	. . . . based on titanium carbide
20/00	Alloys based on cadmium	29/12	. based on oxides
21/00	Alloys based on aluminium	29/14	. based on borides
21/003	. {containing at least 2.6% of one or more of the elements: tin, lead, antimony, bismuth, cadmium, and titanium}	29/16	. based on nitrides { (containing cubic BN or wurtzitic BN and diamond C22C 26/00) }
21/006	. {containing Hg}	29/18	. based on silicides
21/02	. with silicon as the next major constituent	30/00	Alloys containing less than 50% by weight of each constituent
21/04	. . Modified aluminium-silicon alloys	30/02	. containing copper
21/06	. with magnesium as the next major constituent	30/04	. containing tin or lead
21/08	. . with silicon	30/06	. containing zinc
21/10	. with zinc as the next major constituent	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 <u>in situ</u>
21/12	. with copper as the next major constituent		NOTE
21/14	. . with silicon		This group comprises also dispersion hardened alloys with less than 5% of dispersed compounds
21/16	. . with magnesium		
21/18	. . with zinc		
22/00	Alloys based on manganese		
23/00	Alloys based on magnesium	32/0005	. {with at least one oxides and at least one of carbides, nitrides, borides or silicides as the main non-metallic constituents}
23/02	. with aluminium as the next major constituent	32/001	. {with only oxides}
23/04	. with zinc or cadmium as the next major constituent	32/0015	. . {with only single oxides as main non-metallic constituents}
23/06	. with a rare earth metal as the next major constituent	32/0021	. . . {Matrix based on noble metals, Cu or alloys thereof}
24/00	Alloys based on an alkali or an alkaline earth metal	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) }
25/00	Alloys based on beryllium	32/0031	. . . {Matrix based on refractory metals, W, Mo, Nb, Hf, Ta, Zr, Ti, V or alloys thereof}
26/00	Alloys containing diamond {or cubic or wurtzitic boron nitride, fullerenes or carbon nanotubes}	32/0036	. . . {Matrix based on Al, Mg, Be or alloys thereof}
2026/001	. {Fullerenes}	32/0042	. . . {Matrix based on low melting metals, Pb, Sn, In, Zn, Cd or alloys thereof}
2026/002	. {Carbon nanotubes}	32/0047	. {with carbides, nitrides, borides or silicides as the main non-metallic constituents}
2026/003	. {Cubic boron nitrides only}	32/0052	. . {only carbides}
2026/005	. {with additional metal compounds being borides}	32/0057	. . . {based on B ₄ C}
2026/006	. {with additional metal compounds being carbides}	32/0063	. . . {based on SiC}
2026/007	. {with additional metal compounds being nitrides}	32/0068	. . {only nitrides}
2026/008	. {with additional metal compounds other than carbides, borides or nitrides}	32/0073	. . {only borides}
27/00	Alloys based on rhenium or a refractory metal not mentioned in groups C22C 14/00 or C22C 16/00	32/0078	. . {only silicides}
27/02	. Alloys based on vanadium, niobium, or tantalum	32/0084	. {carbon or graphite as the main non-metallic constituent}
27/025	. . {alloys based on vanadium}	32/0089	. {with other, not previously mentioned inorganic compounds as the main non-metallic constituent, e.g. sulfides, glass}
27/04	. Alloys based on tungsten or molybdenum	32/0094	. {with organic materials as the main non-metallic constituent, e.g. resin}
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 B ₄ C}		
			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 iron as the major constituent
- 45/04 . with nickel or cobalt as the major constituent
- 45/06 . with beryllium as the major constituent
- 45/08 . with aluminium as the major constituent
- 45/10 . with molybdenum, tungsten, niobium, tantalum, titanium, or zirconium {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

2200/00 Crystalline structure

2200/02 . . . Amorphous

2200/04 . . . Nanocrystalline

2200/06 . . . Quasicrystalline

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](#))

2202/00 Physical properties

2202/02 . . . Magnetic

2202/04 . . . Hydrogen absorbing