

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.

WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC 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
- In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

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](#))

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|--|---|
| <p>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)</p> <p>1/002 . {Making amorphous alloys (processes for making amorphous material by powder metallurgy B22F)}</p> <p>1/005 . {Making alloys with holding in the range of the solid-liquid phase}</p> <p>1/007 . {Preparing arsenides or antimonides, especially of the III-VI-compound type, e.g. aluminium or gallium arsenide}</p> <p>1/02 . by melting (C22C 1/1036 takes precedence)}</p> <p>1/023 . . {Alloys based on nickel}</p> <p>1/026 . . {Alloys based on aluminium}</p> <p>1/03 . . using master alloys</p> | <p>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)</p> <p>1/0408 . . {Light metal alloys}</p> <p>1/0416 . . . {Aluminium-based alloys}</p> <p>1/0425 . . {Copper-based alloys}</p> <p>1/0433 . . {Nickel- or cobalt-based alloys}</p> <p>1/0441 . . . {Alloys based on intermetallic compounds of the type rare earth - Co, Ni}</p> <p>1/045 . . {Alloys based on refractory metals}</p> <p>1/0458 . . . {Alloys based on titanium, zirconium, hafnium}</p> <p>1/0466 . . {Alloys based on noble metals}</p> <p>1/0475 . . {Impregnated alloys}</p> <p>1/0483 . . {Alloys based on the low melting point metals Zn, Pb, Sn, Cd, In or Ga}</p> <p>1/0491 . . {comprising intermetallic compounds (C22C 1/0441 takes precedence)}</p> <p>1/05 . . Mixtures of metal powder with non-metallic powder (C22C 1/08, {C22C 47/00, C22C 49/00} take precedence)</p> |
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- 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%}	29/06	. . based on carbides, but not containing other metal compounds
19/056 {with the maximum Cr content being at least 10% but less than 20%}	29/062	. . . {based on B ₄ C}
19/057 {with the maximum Cr content being less than 10%}	29/065	. . . {based on SiC}
19/058	. . . {without Mo and W}	29/067	. . . {comprising a particular metallic binder}
19/07	. based on cobalt	29/08	. . . based on tungsten carbide
20/00	Alloys based on cadmium	29/10	. . . based on titanium carbide
21/00	Alloys based on aluminium	29/12	. based on oxides
21/003	. {containing at least 2.6% of one or more of the elements: tin, lead, antimony, bismuth, cadmium, and titanium}	29/14	. based on borides
21/006	. {containing Hg}	29/16	. based on nitrides {(containing cubic BN or wurtzitic BN and diamond C22C 26/00)}
21/02	. with silicon as the next major constituent	29/18	. based on silicides
21/04	. . Modified aluminium-silicon alloys	30/00	Alloys containing less than 50% by weight of each constituent
21/06	. with magnesium as the next major constituent	30/02	. containing copper
21/08	. . with silicon	30/04	. containing tin or lead
21/10	. with zinc as the next major constituent	30/06	. containing zinc
21/12	. with copper 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>
21/14	. . with silicon		NOTE
21/16	. . with magnesium		This group comprises also dispersion hardened alloys with less than 5% of dispersed compounds
21/18	. . with zinc		
22/00	Alloys based on manganese		
23/00	Alloys based on magnesium		
23/02	. with aluminium as the next major constituent	32/0005	. {with at least one oxides and at least one of carbides, nitrides, borides or silicides as the main non-metallic constituents}
23/04	. with zinc or cadmium as the next major constituent	32/001	. {with only oxides}
23/06	. with a rare earth metal as the next major constituent	32/0015	. . {with only single oxides as main non-metallic constituents}
24/00	Alloys based on an alkali or an alkaline earth metal	32/0021	. . . {Matrix based on noble metals, Cu or alloys thereof}
25/00	Alloys based on beryllium	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)}
26/00	Alloys containing diamond {or cubic or wurtzitic boron nitride, fullerenes or carbon nanotubes}	32/0031	. . . {Matrix based on refractory metals, W, Mo, Nb, Hf, Ta, Zr, Ti, V or alloys thereof}
2026/001	. {Fullerenes}	32/0036	. . . {Matrix based on Al, Mg, Be or alloys thereof}
2026/002	. {Carbon nanotubes}	32/0042	. . . {Matrix based on low melting metals, Pb, Sn, In, Zn, Cd or alloys thereof}
2026/003	. {Cubic boron nitrides only}	32/0047	. {with carbides, nitrides, borides or silicides as the main non-metallic constituents}
2026/005	. {with additional metal compounds being borides}	32/0052	. . {only carbides}
2026/006	. {with additional metal compounds being carbides}	32/0057	. . . {based on B ₄ C}
2026/007	. {with additional metal compounds being nitrides}	32/0063	. . . {based on SiC}
2026/008	. {with additional metal compounds other than carbides, borides or nitrides}	32/0068	. . {only nitrides}
27/00	Alloys based on rhenium or a refractory metal not mentioned in groups C22C 14/00 or C22C 16/00	32/0073	. . {only borides}
27/02	. Alloys based on vanadium, niobium, or tantalum	32/0078	. . {only silicides}
27/025	. . {alloys based on vanadium}	32/0084	. {carbon or graphite as the main non-metallic constituent}
27/04	. Alloys based on tungsten or molybdenum	32/0089	. {with other, not previously mentioned inorganic compounds as the main non-metallic constituent, e.g. sulfides, glass}
27/06	. Alloys based on chromium	32/0094	. {with organic materials as the main non-metallic constituent, e.g. resin}
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		

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

- 2200/02 . 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

2204/00 End product comprising different layers, coatings or parts of cermet**2200/00 Crystalline structure**