

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING (NOTES omitted)

SHAPING

B22 CASTING; POWDER METALLURGY

B22F WORKING METALLIC POWDER; MANUFACTURE OF ARTICLES FROM METALLIC POWDER; MAKING METALLIC POWDER (making alloys by powder metallurgy C22C); APPARATUS OR DEVICES SPECIALLY ADAPTED FOR METALLIC POWDER

NOTES

1. This subclass covers the making of metallic powder only insofar as powder with specific physical characteristics is made.
2. In this subclass, the term "powder" includes somewhat larger particles which are worked, obtained or behave in a manner similar to powder, e.g. fibres.
3. In this subclass, the expression "metallic powder" covers:
 - powders consisting of metal particles;
 - powders consisting of coated metal particles;
 - powders consisting of metal-coated non-metallic particles;
 - mixtures of powders of the kinds mentioned above;
 - powders of the kinds mentioned above as the main component mixed with or containing non-metallic material, e.g. lubricating or binding agents or organic material.
4. {In this subclass, combination sets (C-Sets) are used. Detailed information about C-Sets construction and the associated syntax rules is found in the definitions for B22F.}

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
B22F 3/035 covered by B22F 3/03
2. 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.

1/00 Metallic powder; Treatment of metallic powder, e.g. to facilitate working or to improve properties

WARNING

Group B22F 1/00 is incomplete pending reclassification of documents from group B22F 1/0003.

Group B22F 1/00 is also impacted by reclassification into groups B22F 1/08 and B22F 1/12.

All groups listed in this Warning should be considered in order to perform a complete search.

1/0003 (Frozen) . {Metallic powders per se; Mixtures of metallic powders; Metallic powders mixed with a lubricating or binding agent (making ferrous alloys using a mixture of prealloyed powders C22C 33/0207)}

WARNING

Group B22F 1/0003 is no longer used for the classification of documents as of January 1, 2022.

The content of this group is being reclassified into groups B22F 1/00, B22F 1/08, B22F 1/09 and B22F 1/12.

All groups listed in this Warning should be considered in order to perform a complete search.

- 1/0007 . . {Metallic powder characterised by its shape or structure, e.g. fibre structure}
(Frozen)

WARNING

Group [B22F 1/0007](#) is no longer used for the classification of documents as of January 1, 2022.

The content of this group is being reclassified into groups [B22F 1/06](#), [B22F 1/07](#) and [B22F 1/08](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 1/05 . . Metallic powder characterised by the size or surface area of the particles

WARNING

Group [B22F 1/05](#) is impacted by reclassification into group [B22F 1/08](#).

Groups [B22F 1/05](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/052 . . characterised by a mixture of particles of different sizes or by the particle size distribution

WARNING

Group [B22F 1/052](#) is impacted by reclassification into group [B22F 1/08](#).

Groups [B22F 1/052](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/054 . . Nanosized particles

WARNING

Group [B22F 1/054](#) is impacted by reclassification into groups [B22F 1/056](#) and [B22F 1/08](#).

Groups [B22F 1/054](#), [B22F 1/056](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/0545 . . . Dispersions or suspensions of nanosized particles

WARNING

Group [B22F 1/0545](#) is impacted by reclassification into group [B22F 1/08](#).

Groups [B22F 1/0545](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/0547 . . . {Nanofibres or nanotubes}

WARNING

Group [B22F 1/0547](#) is impacted by reclassification into group [B22F 1/08](#).

Groups [B22F 1/0547](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/0549 . . . {Hollow particles, including tubes and shells}

WARNING

Group [B22F 1/0549](#) is impacted by reclassification into group [B22F 1/08](#).

Groups [B22F 1/0549](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/0551 . . . {Flake form nanoparticles}

WARNING

Group [B22F 1/0551](#) is impacted by reclassification into group [B22F 1/08](#).

Groups [B22F 1/0551](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/0553 . . . {Complex form nanoparticles, e.g. prism, pyramid, octahedron}

WARNING

Group [B22F 1/0553](#) is impacted by reclassification into group [B22F 1/08](#).

Groups [B22F 1/0553](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/056 . . . {Submicron particles having a size above 100 nm up to 300 nm}

WARNING

Group [B22F 1/056](#) is incomplete pending reclassification of documents from group [B22F 1/054](#).

Groups [B22F 1/054](#) and [B22F 1/056](#) should be considered in order to perform a complete search.

- 1/06 . . Metallic powder characterised by the shape of the particles (nanosized particles [B22F 1/054](#))

WARNING

Group [B22F 1/06](#) is incomplete pending reclassification of documents from group [B22F 1/0007](#).

Groups [B22F 1/0007](#) and [B22F 1/06](#) should be considered in order to perform a complete search.

- 1/062 . . Fibrous particles

WARNING

Group [B22F 1/062](#) is impacted by reclassification into group [B22F 1/08](#).

Groups [B22F 1/062](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/065 . . Spherical particles

WARNING

Group [B22F 1/065](#) is impacted by reclassification into group [B22F 1/08](#).

Groups [B22F 1/065](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/0655 . . . Hollow particles
- WARNING**
- Group [B22F 1/0655](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/0655](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/068 . . Flake-like particles
- WARNING**
- Group [B22F 1/068](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/068](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/07 . . Metallic powder characterised by particles having a nanoscale microstructure ([nanosized particles B22F 1/054](#))
- WARNING**
- Group [B22F 1/07](#) is incomplete pending reclassification of documents from group [B22F 1/0007](#).
- Groups [B22F 1/0007](#) and [B22F 1/07](#) should be considered in order to perform a complete search.
- 1/08 . . Metallic powder characterised by particles having an amorphous microstructure
- WARNING**
- Group [B22F 1/08](#) is incomplete pending reclassification of documents from groups [B22F 1/00](#), [B22F 1/0003](#), [B22F 1/0007](#), [B22F 1/05](#), [B22F 1/052](#), [B22F 1/054](#), [B22F 1/0545](#), [B22F 1/0547](#), [B22F 1/0549](#), [B22F 1/0551](#), [B22F 1/0553](#), [B22F 1/062](#), [B22F 1/065](#), [B22F 1/0655](#), [B22F 1/068](#), [B22F 1/10](#), [B22F 1/102](#), [B22F 1/103](#), [B22F 1/105](#), [B22F 1/107](#), [B22F 1/108](#), [B22F 1/14](#), [B22F 1/142](#), [B22F 1/145](#), [B22F 1/147](#), [B22F 1/148](#), [B22F 1/16](#) and [B22F 1/17](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 1/09 . . {Mixtures of metallic powders}
- WARNING**
- Group [B22F 1/09](#) is incomplete pending reclassification of documents from group [B22F 1/0003](#).
- Groups [B22F 1/0003](#) and [B22F 1/09](#) should be considered in order to perform a complete search.
- 1/10 . . Metallic powder containing lubricating or binding agents; Metallic powder containing organic material
- WARNING**
- Group [B22F 1/10](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/10](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/102 . . Metallic powder coated with organic material
- WARNING**
- Group [B22F 1/102](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/102](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/103 . . containing an organic binding agent comprising a mixture of, or obtained by reaction of, two or more components other than a solvent or a lubricating agent
- WARNING**
- Group [B22F 1/103](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/103](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/105 . . containing inorganic lubricating or binding agents, e.g. metal salts
- WARNING**
- Group [B22F 1/105](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/105](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/107 . . containing organic material comprising solvents, e.g. for slip casting
- WARNING**
- Group [B22F 1/107](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/107](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/108 . . {Mixtures obtained by warm mixing}
- WARNING**
- Group [B22F 1/108](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/108](#) and [B22F 1/08](#) should be considered in order to perform a complete search.

- 1/12 . Metallic powder containing non-metallic particles (containing lubricating or binding agents or organic material [B22F 1/10](#))
- WARNING**
- Group [B22F 1/12](#) is incomplete pending reclassification of documents from groups [B22F 1/00](#) and [B22F 1/0003](#).
- Groups [B22F 1/00](#), [B22F 1/0003](#) and [B22F 1/12](#) should be considered in order to perform a complete search.
- 1/14 . Treatment of metallic powder (mixing with lubricating or binding agents or with organic material [B22F 1/10](#))
- WARNING**
- Group [B22F 1/14](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/14](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/142 . . Thermal or thermo-mechanical treatment
- WARNING**
- Group [B22F 1/142](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/142](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/145 . . Chemical treatment, e.g. passivation or decarburisation
- WARNING**
- Group [B22F 1/145](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/145](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/147 . . . {Making a dispersion}
- WARNING**
- Group [B22F 1/147](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/147](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/148 . . Agglomerating
- WARNING**
- Group [B22F 1/148](#) is impacted by reclassification into group [B22F 1/08](#).
- Groups [B22F 1/148](#) and [B22F 1/08](#) should be considered in order to perform a complete search.
- 1/16 . Metallic particles coated with a non-metal (coated with lubricating or binding agents or with organic material [B22F 1/10](#))
- WARNING**
- Group [B22F 1/16](#) is impacted by reclassification into groups [B22F 1/08](#) and [B22F 1/18](#).
- Groups [B22F 1/16](#), [B22F 1/08](#) and [B22F 1/18](#) should be considered in order to perform a complete search.
- 1/17 . Metallic particles coated with metal
- WARNING**
- Group [B22F 1/17](#) is impacted by reclassification into groups [B22F 1/08](#) and [B22F 1/18](#).
- Groups [B22F 1/17](#), [B22F 1/08](#) and [B22F 1/18](#) should be considered in order to perform a complete search.
- 1/18 . Non-metallic particles coated with metal
- WARNING**
- Group [B22F 1/18](#) is incomplete pending reclassification of documents from groups [B22F 1/16](#) and [B22F 1/17](#).
- Groups [B22F 1/16](#), [B22F 1/17](#) and [B22F 1/18](#) should be considered in order to perform a complete search.
- 3/00 Manufacture of workpieces or articles from metallic powder characterised by the manner of compacting or sintering; Apparatus specially adapted therefor {; Presses and furnaces}**
- WARNING**
- Group [B22F 3/00](#) is impacted by reclassification into groups [B22F 10/00](#) - [B22F 12/90](#).
- Groups [B22F 3/00](#) and [B22F 10/00](#) - [B22F 12/90](#) should be considered in order to perform a complete search.
- 3/001 . {Starting from powder comprising reducible metal compounds (making ferrous alloys starting from compounds [C22C 33/0235](#))}
- 3/002 . {Manufacture of articles essentially made from metallic fibres}
- 3/003 . {Apparatus, e.g. furnaces (in general [F27B](#))}
- 3/004 . {Filling molds with powder (feeding material to presses in general [B30B 15/302](#))}
- 3/005 . {Loading or unloading powder metal objects (transport in general [B65G](#))}
- 3/006 . {Amorphous articles}
- 3/007 . . {by diffusion starting from non-amorphous articles prepared by powder metallurgy}
- 3/02 . Compacting only
- 2003/023 . . {Lubricant mixed with the metal powder}
- 2003/026 . . {Mold wall lubrication or article surface lubrication}
- 3/03 . . Press-moulding apparatus therefor
- 2003/031 . . . {with punches moving in different directions in different planes}
- 2003/033 . . . {with multiple punches working in the same direction}
- 3/04 . . by applying fluid pressure {, e.g. by cold isostatic pressing [CIP]}

- 3/045 . . . {Semi-isostatic pressure}
- 3/06 . . by centrifugal forces
- 3/08 . . by explosive forces {(generating shock waves in general [G10K 15/043](#))}
- 3/087 . . using high energy impulses, e.g. magnetic field impulses
- 3/093 . . using vibrations {or friction}
- 3/10 . Sintering only
- 3/1003 . . {Use of special medium during sintering, e.g. sintering aid}
- 3/1007 . . . {Atmosphere ([B22F 3/1021](#) takes precedence)}
- 3/101 {Changing atmosphere}
- 2003/1014 . . . {Getter}
- 3/1017 . . {Multiple heating or additional steps ([B22F 3/101](#) takes precedence)}
- 3/1021 . . . {Removal of binder or filler (removal of binder from ceramics [C04B 35/638](#))}
- 3/1025 {not by heating only}
- 3/1028 . . . {Controlled cooling}
- 2003/1032 . . {comprising a grain growth inhibitor}
- 3/1035 . . {Liquid phase sintering}
- 3/1039 . . {by reaction ([B22F 3/001](#), [B22F 3/23](#) take precedence)}
- 2003/1042 . . {with support for articles to be sintered}
- 2003/1046 . . . {with separating means for articles to be sintered}
- 3/105 . . by using electric current {other than for infra-red radiant energy}, laser radiation or plasma ([B22F 3/11](#) takes precedence); by ultrasonic bonding ([B22F 3/115](#) takes precedence)}
- 2003/1051 . . . {by electric discharge}
- 2003/1052 . . . {assisted by energy absorption enhanced by the coating or powder}
- 2003/1053 . . . {by induction}
- 2003/1054 . . . {by microwave}
- 3/11 . . Making porous workpieces or articles
- 3/1103 . . . {with particular physical characteristics}
- 2003/1106 {Product comprising closed porosity}
- 3/1109 {Inhomogenous pore distribution (composite layers of porous nature [B22F 7/002](#))}
- 3/1112 {comprising hollow spheres or hollow fibres}
- 3/1115 {comprising complex forms, e.g. honeycombs}
- 3/1118 {comprising internal reinforcements}
- 3/1121 . . . {by using decomposable, meltable or sublimatable fillers}
- 3/1125 {involving a foaming process}
- 2003/1128 {Foaming by expansion of dissolved gas, other than with foaming agent}
- 2003/1131 {Foaming in a liquid suspension and decomposition}
- 3/1134 {Inorganic fillers (carbonaceous or paper filler [B22F 3/1121](#))}
- 3/1137 {by coating porous removable preforms}
- 3/114 . . . {the porous products being formed by impregnation ([B22F 3/1137](#), [B22F 3/26](#) take precedence)}
- 3/1143 . . . {involving an oxidation, reduction or reaction step}
- 3/1146 . . . {After-treatment maintaining the porosity ([B22F 3/114](#) takes precedence)}
- 3/115 . . by spraying molten metal, i.e. spray sintering, spray casting
- 3/12 . . Both compacting and sintering (by forging [B22F 3/17](#))
- 3/1208 . . . {Containers or coating used therefor}
- 3/1216 {Container composition}
- 3/1225 {Glass}
- 3/1233 {Organic material}
- 3/1241 {layered}
- 3/125 . . . {Initially porous container}
- 3/1258 . . . {Container manufacturing}
- 3/1266 {by coating or sealing the surface of the preformed article, e.g. by melting}
- 3/1275 {by coating a model and eliminating the model before consolidation}
- 3/1283 {Container formed as an undeformable model eliminated after consolidation}
- 3/1291 {Solid insert eliminated after consolidation}
- 3/14 . . simultaneously
- 2003/145 . . . {by warm compacting, below debinding temperature}
- 3/15 . . . Hot isostatic pressing
- 2003/153 {apparatus specific to HIP}
- 3/156 {by a pressure medium in liquid or powder form}
- 3/16 . . in successive or repeated steps
- 3/162 . . . {Machining, working after consolidation}
- 3/164 . . . {Partial deformation or calibration}
- 2003/166 {Surface calibration, blasting, burnishing, sizing, coining}
- 3/168 {Local deformation}
- 3/17 . . by forging
- 3/172 . . {Continuous compaction, e.g. rotary hammering (with axial pressure and without reduction of section [B22F 3/204](#))}
- 2003/175 . . {by hot forging, below sintering temperature}
- 3/177 . . {Rocking die forging}
- 3/18 . . by using pressure rollers
- 2003/185 . . {by hot rolling, below sintering temperature}
- 3/20 . . by extruding
- 2003/202 . . {with back pressure}
- 3/204 . . {Continuous compaction with axial pressure and without reduction of section}
- 2003/206 . . {Hydrostatic or hydraulic extrusion}
- 2003/208 . . {Warm or hot extruding}
- 3/22 . . for producing castings from a slip
- 3/222 . . {by freeze-casting or in a supercritical fluid}
- 3/225 . . {by injection molding}
- 3/227 . . {by organic binder assisted extrusion}
- 3/23 . . involving a self-propagating high-temperature synthesis or reaction sintering step {(making cermets by reaction sintering [C22C 1/051](#))}
- 3/24 . . After-treatment of workpieces or articles {([B22F 3/1146](#) takes precedence)}
- 2003/241 . . {Chemical after-treatment on the surface}
- 2003/242 . . . {Coating}
- 2003/244 . . . {Leaching}
- 2003/245 . . {Making recesses, grooves etc on the surface by removing material}
- 2003/247 . . {Removing material: carving, cleaning, grinding, hobbing, honing, lapping, polishing, milling, shaving, skiving, turning the surface}
- 2003/248 . . {Thermal after-treatment}

3/26	. . Impregnating {(making ferrous alloys by impregnation C22C 33/0242)}	9/00	Making metallic powder or suspensions thereof
5/00	Manufacture of workpieces or articles from metallic powder characterised by the special shape of the product	2009/001	. {from scrap particles}
2005/001	. {Cutting tools, earth boring or grinding tool other than table ware}	9/002	. {amorphous or microcrystalline}
2005/002	. {Tools other than cutting tools}	9/004	. . {by diffusion, e.g. solid state reaction}
5/003	. {Articles made for being fractured or separated into parts}	9/005	. . . {Transformation into amorphous state by milling}
2005/004	. {Article comprising helical form elements (B22F 5/085 takes precedence)}	9/007	. . {Transformation of amorphous into microcrystalline state}
2005/005	. {Article surface comprising protrusions}	9/008	. . {Rapid solidification processing}
5/006	. {of flat products, e.g. sheets (B22F 3/1103 takes precedence; by using pressure rollers only see B22F 3/18)}	9/02	. using physical processes
5/007	. {of moulds}	9/023	. . {Hydrogen absorption}
5/008	. {of engine cylinder parts or of piston parts other than piston rings (of piston rings B22F 5/02)}	9/026	. . {Spray drying of solutions or suspensions}
5/009	. {of turbine components other than turbine blades (of turbine blades B22F 5/04)}	9/04	. . starting from solid material, e.g. by crushing, grinding or milling ({ C22C 1/1084 takes precedence}; crushing, grinding or milling, in general, see the relevant subclasses, e.g. B02C)}
5/02	. of piston rings	2009/041	. . . {by mechanical alloying, e.g. blending, milling}
5/04	. of turbine blades	2009/042	. . . {using a particular milling fluid}
5/06	. of threaded articles, e.g. nuts	2009/043	. . . {by ball milling}
5/08	. of toothed articles, e.g. gear wheels; of cam discs	2009/044	. . . {by jet milling}
5/085	. . {with helical contours}	2009/045	. . . {by other means than ball or jet milling}
5/10	. of articles with cavities or holes, not otherwise provided for in the preceding subgroups	2009/046	. . . . {by cutting}
2005/103	. . {Cavity made by removal of insert}	2009/047	. . . . {by rolling}
5/106	. . {Tube or ring forms}	2009/048	. . . {by pulverising a quenched ribbon}
5/12	. of wires {(of tubes B22F 5/10)}	2009/049	. . . {by pulverising at particular temperature}
7/00	Manufacture of composite layers, workpieces, or articles, comprising metallic powder, by sintering the powder, with or without compacting {wherein at least one part is obtained by sintering or compression (application of coating layers by use of metal powders, see C23C)}	9/06	. . starting from liquid material
7/002	. {of porous nature}	2009/065	. . . {Melting inside a liquid, e.g. making spherical balls}
7/004	. . {comprising at least one non-porous part}	9/08	. . . by casting, e.g. through sieves or in water, by atomising or spraying (using electric discharge B22F 9/14)
7/006	. . . {the porous part being obtained by foaming}	2009/0804	. . . . {Dispersion in or on liquid, other than with sieves}
7/008	. {characterised by the composition}	2009/0808	. . . . . {Mechanical dispersion of melt, e.g. by sieves}
7/02	. of composite layers {(B22F 7/002 takes precedence)}	2009/0812	. . . . . {Pulverisation with a moving liquid coolant stream, by centrifugally rotating stream}
7/04	. . with one or more layers not made from powder, e.g. made from solid metal	2009/0816	. . . . . {by casting with pressure or pulsating pressure on the metal bath}
2007/042	. . . {characterised by the layer forming method}	9/082	. . . . . {atomising using a fluid (using centrifugal force B22F 9/10)}
2007/045	. . . . {accompanied by fusion or impregnation}	2009/0824	. . . . . {with a specific atomising fluid}
2007/047	. . . . {non-pressurised baking of the paste or slurry containing metal powder}	2009/0828	. . . . . {with water}
7/06	. of composite workpieces or articles from parts, e.g. to form tipped tools {(B22F 7/002 takes precedence)}	2009/0832	. . . . . {Handling of atomising fluid, e.g. heating, cooling, cleaning, recirculating}
7/062	. . {involving the connection or repairing of preformed parts}	2009/0836	. . . . . {with electric or magnetic field or induction}
7/064	. . . {using an intermediate powder layer}	2009/084	. . . . . {combination of methods}
2007/066	. . . {using impregnation}	2009/0844	. . . . . {in controlled atmosphere}
2007/068	. . . {repairing articles}	2009/0848	. . . . . {Melting process before atomisation}
7/08	. . with one or more parts not made from powder {(B22F 7/062 takes precedence)}	2009/0852	. . . . . {Electroslag melting}
8/00	Manufacture of articles from scrap or waste metal particles	2009/0856	. . . . . {Skull melting}
		2009/086	. . . . . {Cooling after atomisation}
		2009/0864	. . . . . {by oil, other non-aqueous fluid or fluid-bed cooling}
		2009/0868	. . . . . {by injection of solid particles in the melt stream}
		2009/0872	. . . . . {by water}
		2009/0876	. . . . . {by gas}
		2009/088	. . . . . {Fluid nozzles, e.g. angle, distance}
		2009/0884	. . . . . {Spiral fluid}

2009/0888	. . . . . {casting construction of the melt process, apparatus, intermediate reservoir, e.g. tundish, devices for temperature control}	10/14	. . by jetting of binder onto a bed of metal powder
2009/0892	. . . . . {casting nozzle; controlling metal stream in or after the casting nozzle}		WARNING
2009/0896	. . . . . {particle transport, separation: process and apparatus}		Group B22F 10/14 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/10 .
9/10	. . . . . using centrifugal force		All groups listed in this Warning should be considered in order to perform a complete search.
9/12	. . starting from gaseous material		
9/14	. . using electric discharge		
9/16	. . using chemical processes	10/16	. . by embedding the binder within the powder bed
2009/165	. . {Chemical reaction in an Ionic Liquid [IL] (B22F 2009/245 takes precedence)}		WARNING
9/18	. . with reduction of metal compounds		Group B22F 10/16 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/10 .
9/20	. . . starting from solid metal compounds		All groups listed in this Warning should be considered in order to perform a complete search.
9/22	. . . . . using gaseous reductors		
9/24	. . . starting from liquid metal compounds, e.g. solutions		
2009/245	. . . . {Reduction reaction in an Ionic Liquid [IL]}	10/18	. . by mixing binder with metal in filament form, e.g. fused filament fabrication [FFF]
9/26	. . . . . using gaseous reductors		WARNING
9/28	. . . starting from gaseous metal compounds		Group B22F 10/18 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/10 .
9/30	. . with decomposition of metal compounds, e.g. by pyrolysis		All groups listed in this Warning should be considered in order to perform a complete search.
9/305	. . . {of metal carbonyls}		
10/00	Additive manufacturing of workpieces or articles from metallic powder (apparatus or devices therefor B22F 12/00)		
	WARNING		
	Group B22F 10/00 is incomplete pending reclassification of documents from group B22F 3/00 .		
	Groups B22F 3/00 and B22F 10/00 should be considered in order to perform a complete search.		
10/10	. Formation of a green body	10/20	. Direct sintering or melting
	WARNING		WARNING
	Group B22F 10/10 is incomplete pending reclassification of documents from group B22F 3/00 .		Group B22F 10/20 is incomplete pending reclassification of documents from group B22F 3/00 .
	Group B22F 10/10 is also impacted by reclassification into groups B22F 10/12 - B22F 10/18 .		Group B22F 10/20 is also impacted by reclassification into groups B22F 10/22 - B22F 10/28 .
	All groups listed in this Warning should be considered in order to perform a complete search.		All groups listed in this Warning should be considered in order to perform a complete search.
10/12	. . by photopolymerisation, e.g. stereolithography [SLA] or digital light processing [DLP]	10/22	. . Direct deposition of molten metal
	WARNING		WARNING
	Group B22F 10/12 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/10 .		Group B22F 10/22 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/20 .
	All groups listed in this Warning should be considered in order to perform a complete search.		All groups listed in this Warning should be considered in order to perform a complete search.
		10/25	. . Direct deposition of metal particles, e.g. direct metal deposition [DMD] or laser engineered net shaping [LENS]
			WARNING
			Group B22F 10/25 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/20 .
			All groups listed in this Warning should be considered in order to perform a complete search.

- 10/28 . . Powder bed fusion, e.g. selective laser melting [SLM] or electron beam melting [EBM]

WARNING

Group [B22F 10/28](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/20](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 10/30 . Process control

WARNING

Group [B22F 10/30](#) is incomplete pending reclassification of documents from group [B22F 3/00](#).

Group [B22F 10/30](#) is also impacted by reclassification into groups [B22F 10/31](#) - [B22F 10/39](#), [B22F 10/80](#) and [B22F 10/85](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 10/31 . . Calibration of process steps or apparatus settings, e.g. before or during manufacturing

WARNING

Group [B22F 10/31](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/30](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 10/32 . . of the atmosphere, e.g. composition or pressure in a building chamber

WARNING

Groups [B22F 10/32](#) and [B22F 10/322](#) are incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/30](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 10/322 . . . of the gas flow, e.g. rate or direction

- 10/34 . . of powder characteristics, e.g. density, oxidation or flowability

WARNING

Group [B22F 10/34](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/30](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 10/36 . . of energy beam parameters

WARNING

Groups [B22F 10/36](#), [B22F 10/362](#), [B22F 10/364](#), [B22F 10/366](#) and [B22F 10/368](#) are incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/30](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 10/362 . . . for preheating

- 10/364 . . . for post-heating, e.g. remelting

- 10/366 . . . Scanning parameters, e.g. hatch distance or scanning strategy

- 10/368 . . . Temperature or temperature gradient, e.g. temperature of the melt pool

- 10/37 . . of powder bed aspects, e.g. density

WARNING

Group [B22F 10/37](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/30](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 10/38 . . to achieve specific product aspects, e.g. surface smoothness, density, porosity or hollow structures

WARNING

Groups [B22F 10/38](#) and [B22F 10/385](#) are incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/30](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 10/385 . . . {Overhang structures}

- 10/39 . . Traceability, e.g. incorporating identifier into a workpiece or article

WARNING

Group [B22F 10/39](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/30](#).

Groups [B22F 3/00](#), [B22F 10/30](#) and [B22F 10/39](#) should be considered in order to perform a complete search.

- 10/40 . Structures for supporting workpieces or articles during manufacture and removed afterwards

WARNING

Group [B22F 10/40](#) is incomplete pending reclassification of documents from group [B22F 3/00](#).

Group [B22F 10/40](#) is also impacted by reclassification into groups [B22F 10/43](#) and [B22F 10/47](#).

All groups listed in this Warning should be considered in order to perform a complete search.

10/43	<ul style="list-style-type: none"> characterised by material <p><u>WARNING</u></p> <p>Group B22F 10/43 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/40.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>	10/70	<ul style="list-style-type: none"> Recycling <p><u>WARNING</u></p> <p>Group B22F 10/70 is incomplete pending to reclassification of documents from group B22F 3/00.</p> <p>Group B22F 10/70 is also impacted by reclassification into groups B22F 10/68, B22F 10/73 and B22F 10/77.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>
10/47	<ul style="list-style-type: none"> characterised by structural features <p><u>WARNING</u></p> <p>Group B22F 10/47 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/40.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>	10/73	<ul style="list-style-type: none"> of powder <p><u>WARNING</u></p> <p>Group B22F 10/73 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/70.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>
10/50	<ul style="list-style-type: none"> Treatment of workpieces or articles during build-up, e.g. treatments applied to fused layers during build-up <p><u>WARNING</u></p> <p>Group B22F 10/50 is incomplete pending reclassification of documents from group B22F 3/00.</p> <p>Groups B22F 3/00 and B22F 10/50 should be considered in order to perform a complete search.</p>	10/77	<ul style="list-style-type: none"> of gas <p><u>WARNING</u></p> <p>Group B22F 10/77 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/70.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>
10/60	<ul style="list-style-type: none"> Treatment of workpieces or articles after build-up <p><u>WARNING</u></p> <p>Groups B22F 10/60, B22F 10/62, B22F 10/64 and B22F 10/66 are incomplete pending reclassification of documents from group B22F 3/00.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>	10/80	<ul style="list-style-type: none"> Data acquisition or data processing <p><u>WARNING</u></p> <p>Groups B22F 10/80 and B22F 10/85 are incomplete pending reclassification of documents from groups B22F 3/00 and B22F 10/30.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>
10/62	<ul style="list-style-type: none"> by chemical means 	10/85	<ul style="list-style-type: none"> for controlling or regulating additive manufacturing processes
10/64	<ul style="list-style-type: none"> by thermal means (control of energy beam parameters for post heating B22F 10/364) 	12/00	<p>Apparatus or devices specially adapted for additive manufacturing; Auxiliary means for additive manufacturing; Combinations of additive manufacturing apparatus or devices with other processing apparatus or devices</p> <p><u>WARNING</u></p> <p>Group B22F 12/00 is incomplete pending to reclassification of documents from group B22F 3/00.</p> <p>Group B22F 12/00 is also impacted by reclassification into groups B22F 12/10 - B22F 12/90.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>
10/66	<ul style="list-style-type: none"> by mechanical means 		
10/68	<ul style="list-style-type: none"> Cleaning or washing <p><u>WARNING</u></p> <p>Group B22F 10/68 is incomplete pending to reclassification of documents from groups B22F 3/00 and B22F 10/70.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>		

- 12/10 . Auxiliary heating means

WARNING

Groups [B22F 12/10](#), [B22F 12/13](#) and [B22F 12/17](#) are incomplete pending to reclassification of documents from groups [B22F 3/00](#) and [B22F 12/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 12/13 . . to preheat the material
12/17 . . to heat the build chamber or platform
12/20 . Cooling means

WARNING

Group [B22F 12/20](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 12/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 12/22 . {Driving means}

WARNING

Groups [B22F 12/22](#) - [B22F 12/226](#) are incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 12/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 12/222 . . {for motion along a direction orthogonal to the plane of a layer}
12/224 . . {for motion along a direction within the plane of a layer}
12/226 . . {for rotary motion}
12/30 . Platforms or substrates

WARNING

Groups [B22F 12/30](#) - [B22F 12/37](#) are incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 12/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 12/33 . . translatory in the deposition plane
12/37 . . Rotatable
12/38 . {Housings, e.g. machine housings}

WARNING

Group [B22F 12/38](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 12/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 12/40 . Radiation means

WARNING

Groups [B22F 12/40](#) - [B22F 12/49](#) are incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 12/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 12/41 . . characterised by the type, e.g. laser or electron beam
12/42 . . . Light-emitting diodes [LED]
12/43 . . . pulsed; frequency modulated
12/44 . . characterised by the configuration of the radiation means
12/45 . . . Two or more
12/46 . . with translatory movement
12/47 . . . parallel to the deposition plane
12/48 . . . in height, e.g. perpendicular to the deposition plane
12/49 . . Scanners
12/50 . Means for feeding of material, e.g. heads

WARNING

Groups [B22F 12/50](#) - [B22F 12/58](#) are incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 12/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 12/52 . . Hoppers
12/53 . . Nozzles
12/55 . . Two or more means for feeding material
12/57 . . Metering means
12/58 . . for changing the material composition, e.g. by mixing
12/60 . Planarisation devices; Compression devices

WARNING

Groups [B22F 12/60](#), [B22F 12/63](#) and [B22F 12/67](#) are incomplete pending to reclassification of documents from groups [B22F 3/00](#) and [B22F 12/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 12/63 . . Rollers
12/67 . . Blades
12/70 . Gas flow means

WARNING

Group [B22F 12/70](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 12/00](#).

All groups listed in this Warning should be considered in order to perform a complete search.

12/80	<ul style="list-style-type: none"> Plants, production lines or modules <p>WARNING</p> <p>Groups B22F 12/80 - B22F 12/88 are incomplete pending to reclassification of documents from groups B22F 3/00 and B22F 12/00.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>	2203/13	<ul style="list-style-type: none"> pressure
		2203/15	<ul style="list-style-type: none"> weight
		2207/00	Aspects of the compositions, gradients
		2207/01	<ul style="list-style-type: none"> Composition gradients
		2207/03	<ul style="list-style-type: none"> of the metallic binder phase in cermets
		2207/05	<ul style="list-style-type: none"> eta-phase
		2207/07	<ul style="list-style-type: none"> Particles with core-rim gradient
		2207/11	<ul style="list-style-type: none"> Gradients other than composition gradients, e.g. size gradients
12/82	<ul style="list-style-type: none"> Combination of additive manufacturing apparatus or devices with other processing apparatus or devices 	2207/13	<ul style="list-style-type: none"> Size gradients
12/84	<ul style="list-style-type: none"> Parallel processing within single device 	2207/15	<ul style="list-style-type: none"> Temperature gradients
12/86	<ul style="list-style-type: none"> Serial processing with multiple devices grouped 	2207/17	<ul style="list-style-type: none"> density or porosity gradients
12/88	<ul style="list-style-type: none"> Handling of additively manufactured products, e.g. by robots 	2207/20	<ul style="list-style-type: none"> Cooperating components
12/90	<ul style="list-style-type: none"> Means for process control, e.g. cameras or sensors <p>WARNING</p> <p>Group B22F 12/90 is incomplete pending reclassification of documents from groups B22F 3/00 and B22F 12/00.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>		
2201/00	Treatment under specific atmosphere		
2201/01	<ul style="list-style-type: none"> Reducing atmosphere 		
2201/013	<ul style="list-style-type: none"> Hydrogen 		
2201/016	<ul style="list-style-type: none"> NH₃ 		
2201/02	<ul style="list-style-type: none"> Nitrogen 		
2201/03	<ul style="list-style-type: none"> Oxygen 		
2201/04	<ul style="list-style-type: none"> CO or CO₂ 		
2201/05	<ul style="list-style-type: none"> Water or water vapour 		
2201/10	<ul style="list-style-type: none"> Inert gases 		
2201/11	<ul style="list-style-type: none"> Argon 		
2201/12	<ul style="list-style-type: none"> Helium 		
2201/20	<ul style="list-style-type: none"> Use of vacuum 		
2201/30	<ul style="list-style-type: none"> Carburising atmosphere 		
2201/32	<ul style="list-style-type: none"> Decarburising atmosphere 		
2201/40	<ul style="list-style-type: none"> Metal compounds 		
2201/50	<ul style="list-style-type: none"> air 		
2202/00	Treatment under specific physical conditions		
2202/01	<ul style="list-style-type: none"> Use of vibrations 		
2202/03	<ul style="list-style-type: none"> Treatment under cryogenic or supercritical conditions 		
2202/05	<ul style="list-style-type: none"> Use of magnetic field 		
2202/06	<ul style="list-style-type: none"> Use of electric fields 		
2202/07	<ul style="list-style-type: none"> by induction 		
2202/09	<ul style="list-style-type: none"> Use of non-gravitational conditions 		
2202/11	<ul style="list-style-type: none"> Use of irradiation 		
2202/13	<ul style="list-style-type: none"> Use of plasma 		
2202/15	<ul style="list-style-type: none"> Use of fluidised beds 		
2202/17	<ul style="list-style-type: none"> use of centrifugal or vortex forces 		
2203/00	Controlling		
2203/01	<ul style="list-style-type: none"> To-be-deleted with administrative transfer to B22F 2203/00 		
2203/03	<ul style="list-style-type: none"> for feed-back 		
2203/05	<ul style="list-style-type: none"> thermal expansion 		
2203/11	<ul style="list-style-type: none"> temperature, temperature profile 		
		2203/13	<ul style="list-style-type: none"> pressure
		2203/15	<ul style="list-style-type: none"> weight
		2207/00	Aspects of the compositions, gradients
		2207/01	<ul style="list-style-type: none"> Composition gradients
		2207/03	<ul style="list-style-type: none"> of the metallic binder phase in cermets
		2207/05	<ul style="list-style-type: none"> eta-phase
		2207/07	<ul style="list-style-type: none"> Particles with core-rim gradient
		2207/11	<ul style="list-style-type: none"> Gradients other than composition gradients, e.g. size gradients
		2207/13	<ul style="list-style-type: none"> Size gradients
		2207/15	<ul style="list-style-type: none"> Temperature gradients
		2207/17	<ul style="list-style-type: none"> density or porosity gradients
		2207/20	<ul style="list-style-type: none"> Cooperating components
		2301/00	Metallic composition of the powder or its coating
		2301/05	<ul style="list-style-type: none"> Light metals
		2301/052	<ul style="list-style-type: none"> Aluminium
		2301/054	<ul style="list-style-type: none"> Alkali metals, i.e. Li, Na, K, Rb, Cs, Fr
		2301/056	<ul style="list-style-type: none"> Alkaline metals, i.e. Ca, Sr, Ba, Ra
		2301/058	<ul style="list-style-type: none"> Magnesium
		2301/10	<ul style="list-style-type: none"> Copper
		2301/15	<ul style="list-style-type: none"> Nickel or cobalt
		2301/155	<ul style="list-style-type: none"> Rare Earth - Co or -Ni intermetallic alloys
		2301/20	<ul style="list-style-type: none"> Refractory metals
		2301/205	<ul style="list-style-type: none"> Titanium, zirconium or hafnium
		2301/25	<ul style="list-style-type: none"> Noble metals, i.e. Ag Au, Ir, Os, Pd, Pt, Rh, Ru
		2301/255	<ul style="list-style-type: none"> Silver or gold
		2301/30	<ul style="list-style-type: none"> Low melting point metals, i.e. Zn, Pb, Sn, Cd, In, Ga
		2301/35	<ul style="list-style-type: none"> Iron
		2301/355	<ul style="list-style-type: none"> Rare Earth - Fe intermetallic alloys
		2301/40	<ul style="list-style-type: none"> Intermetallics other than rare earth-Co or -Ni or -Fe intermetallic alloys
		2301/45	<ul style="list-style-type: none"> Rare earth metals, i.e. Sc, Y, Lanthanides (57-71)
		2302/00	Metal Compound, non-Metallic compound or non-metal composition of the powder or its coating
		2302/05	<ul style="list-style-type: none"> Boride
		2302/10	<ul style="list-style-type: none"> Carbide
		2302/105	<ul style="list-style-type: none"> Silicium carbide (SiC)
		2302/15	<ul style="list-style-type: none"> Carbonitride
		2302/20	<ul style="list-style-type: none"> Nitride
		2302/205	<ul style="list-style-type: none"> Cubic boron nitride
		2302/25	<ul style="list-style-type: none"> Oxide
		2302/253	<ul style="list-style-type: none"> Aluminum oxide (Al₂O₃)
		2302/256	<ul style="list-style-type: none"> Silicium oxide (SiO₂)
		2302/30	<ul style="list-style-type: none"> Oxynitride
		2302/35	<ul style="list-style-type: none"> Complex boride, carbide, carbonitride, nitride, oxide or oxynitride
		2302/40	<ul style="list-style-type: none"> Carbon, graphite
		2302/403	<ul style="list-style-type: none"> Carbon nanotube
		2302/406	<ul style="list-style-type: none"> Diamond
		2302/45	<ul style="list-style-type: none"> Others, including non-metals
		2303/00	Functional details of metal or compound in the powder or product,
		2303/01	<ul style="list-style-type: none"> Main component
		2303/05	<ul style="list-style-type: none"> Compulsory alloy component
		2303/10	<ul style="list-style-type: none"> Optional alloy component
		2303/15	<ul style="list-style-type: none"> Intermetallic
		2303/20	<ul style="list-style-type: none"> Coating by means of particles
		2303/25	<ul style="list-style-type: none"> Coating by means of fibres
		2303/30	<ul style="list-style-type: none"> Coating alloy

- 2303/35 . Molten metal infiltrating a metal preform
- 2303/40 . Layer in a composite stack of layers, workpiece or article
- 2303/405 . . Support layer
- 2303/45 . Part of a final mixture to be processed further

2304/00 Physical aspects of the powder

- 2304/05 . Submicron size particles
- 2304/052 . . Particle size below 1nm
- 2304/054 . . Particle size between 1 and 100 nm
- 2304/056 . . Particle size above 100 nm up to 300 nm
- 2304/058 . . Particle size above 300 nm up to 1 micrometer
- 2304/10 . Micron size particles, i.e. above 1 micrometer up to 500 micrometer
- 2304/15 . Millimeter size particles, i.e. above 500 micrometer

2998/00 Supplementary information concerning processes or compositions relating to powder metallurgy

NOTE

In this group, C-Sets are used. Detailed information about C-Sets construction and the associated syntax rules is found in the Definitions.

- 2998/10 . Processes characterised by the sequence of their steps

NOTE

In this group, C-Sets are used. Detailed information about C-Sets construction and the associated syntax rules is found in the Definitions.

2999/00 Aspects linked to processes or compositions used in powder metallurgy

NOTE

In this group, C-Sets are used. Detailed information about C-Sets construction and the associated syntax rules is found in the Definitions.