

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 (processes or devices for granulating materials in general [B01J 2/00](#); making ceramics by compacting or sintering [C04B](#), e.g. [C04B 35/64](#); for the production of metals as such, see class [C22](#); reduction or decomposition of metal compounds in general [C22B](#); making alloys by powder metallurgy [C22C](#); electrolytic production of metal powder [C25C 5/00](#))

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 following terms or expressions are used with the meanings indicated:
 - "metallic powder" covers powders containing a substantial proportion of non-metallic material;
 - "powder" includes somewhat larger particles which are worked, obtained or behave in a manner similar to powder, e.g. fibres.
3. {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
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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	Special treatment of metallic powder, e.g. to facilitate working, to improve properties {(treatment of powder by mechanical means, e.g. by grinding, milling, rolling B22F 9/04); Metallic powders per se, e.g. mixtures of particles of different composition (C04 , C08 take precedence; {amorphous powder B22F 9/002)}	1/0048	. . . {Spherical powder}
		1/0051	. . . . {Hollow particles}
		1/0055	. . . {Flake form powders}
		1/0059	. . {Metallic powders mixed with a lubricating or binding agent or organic material}
		1/0062	. . . {Powders coated with organic material}
1/0003	. {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)}	2001/0066	. . . {Organic binder comprising a mixture or obtained by reaction of more than one component other than solvent, lubricant}
1/0007	. . {Metallic powder characterised by its shape or structure, e.g. fibre structure}	1/007	. . . {Non-organic or metal salt binders or lubricants}
1/0011	. . . {Metallic powder characterised by size or surface area only}	1/0074	. . . {Organic materials comprising a solvent, e.g. for slip casting}
1/0014	. . . . {by size mixtures or distribution}	1/0077	. . . {Mixtures obtained by warm mixing}
1/0018	. . . . {Nanometer sized particles}	1/0081	. {Special treatment of metallic powder, e.g. to facilitate working, to improve properties (coating with organic material B22F 1/0062)}
1/0022	. . . . . {Dispersions or suspensions thereof}	1/0085	. . {Thermal or thermo-mechanical treatment}
1/0025	. . . . . {Nanofibres or nanotubes}	1/0088	. . {Chemical treatment, e.g. passivation}
2001/0029	. . . . . {Hollow particles, including tubes and shells}	2001/0092	. . . {Making a dispersion}
2001/0033	. . . . . {Flake form nanoparticles}	1/0096	. . {Treatment resulting in the production of agglomerates}
2001/0037	. . . . . {Complex form nanoparticles, e.g.. prism, pyramid, octahedron}	1/02	. comprising coating of the powder {(coating with organic material B22F 1/0062 ; chemical surface treatment B22F 1/0088)}
1/004	. . . {Fibre structure (B22F 1/0025 takes precedence)}	1/025	. . {Metallic coating}
1/0044	. . . {Nanometer size structures}		

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}	5/10	. of articles with cavities or holes, not otherwise provided for in the preceding subgroups
2003/166	. . . . {Surface calibration, blasting, burnishing, sizing, coining}	2005/103	. . {Cavity made by removal of insert}
3/168	. . . . {Local deformation}	5/106	. . {Tube or ring forms}
3/17	. by forging	5/12	. of wires {(of tubes B22F 5/10)}
3/172	. . {Continuous compaction, e.g. rotary hammering (with axial pressure and without reduction of section B22F 3/204)}	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)}
2003/175	. . {by hot forging, below sintering temperature}		. {of porous nature}
3/177	. . {Rocking die forging}	7/002	. . {comprising at least one non-porous part}
3/18	. by using pressure rollers	7/004	. . . {the porous part being obtained by foaming}
2003/185	. . {by hot rolling, below sintering temperature}	7/006	. {characterised by the composition}
3/20	. by extruding	7/008	. of composite layers {(B22F 7/002 takes precedence)}
2003/202	. . {with back pressure}	7/02	
3/204	. . {Continuous compaction with axial pressure and without reduction of section}	7/04	. . with one or more layers not made from powder, e.g. made from solid metal
2003/206	. . {Hydrostatic or hydraulic extrusion}	2007/042	. . . {characterised by the layer forming method}
2003/208	. . {Warm or hot extruding}	2007/045	. . . . {accompanied by fusion or impregnation}
3/22	. for producing castings from a slip	2007/047	. . . . {non-pressurised baking of the paste or slurry containing metal powder}
3/222	. . {by freeze-casting or in a supercritical fluid}	7/06	. of composite workpieces or articles from parts, e.g. to form tipped tools {(B22F 7/002 takes precedence)}
3/225	. . {by injection molding}	7/062	. . {involving the connection or repairing of preformed parts}
3/227	. . {by organic binder assisted extrusion}	7/064	. . . {using an intermediate powder layer}
3/23	. involving a self-propagating high-temperature synthesis or reaction sintering step {(making cermets by reaction sintering C22C 1/058)}	2007/066	. . . {using impregnation}
3/24	. After-treatment of workpieces or articles {(B22F 3/1146 takes precedence)}	2007/068	. . . {repairing articles}
2003/241	. . {Chemical after-treatment on the surface}	7/08	. . with one or more parts not made from powder {(B22F 7/062 takes precedence)}
2003/242	. . . {Coating}	8/00	Manufacture of articles from scrap or waste metal particles
2003/244	. . . {Leaching}	9/00	Making metallic powder or suspensions thereof
2003/245	. . {Making recesses, grooves etc on the surface by removing material}	2009/001	. {from scrap particles}
2003/247	. . {Removing material: carving, cleaning, grinding, hobbing, honing, lapping, polishing, milling, shaving, skiving, turning the surface}	9/002	. {amorphous or microcrystalline}
2003/248	. . {Thermal after-treatment}	9/004	. . {by diffusion, e.g. solid state reaction}
3/26	. . Impregnating {(making ferrous alloys by impregnation C22C 33/0242)}	9/005	. . . {Transformation into amorphous state by milling}
5/00	Manufacture of workpieces or articles from metallic powder characterised by the special shape of the product	9/007	. . {Transformation of amorphous into microcrystalline state}
2005/001	. {Cutting tools, earth boring or grinding tool other than table ware}	9/008	. . {Rapid solidification processing}
2005/002	. {Tools other than cutting tools}	9/02	. using physical processes
5/003	. {Articles made for being fractured or separated into parts}	9/023	. . {Hydrogen absorption}
2005/004	. {Article comprising helical form elements (B22F 5/085 takes precedence)}	9/026	. . {Spray drying of solutions or suspensions}
2005/005	. {Article surface comprising protrusions}	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 }
5/006	. {of flat products, e.g. sheets (B22F 3/1103 takes precedence; by using pressure rollers only see B22F 3/18)}	2009/041	. . . {by mechanical alloying, e.g. blending, milling}
5/007	. {of moulds}	2009/042	. . . {using a particular milling fluid}
5/008	. {of engine cylinder parts or of piston parts other than piston rings (of piston rings B22F 5/02)}	2009/043	. . . {by ball milling}
5/009	. {of turbine components other than turbine blades (of turbine blades B22F 5/04)}	2009/044	. . . {by jet milling}
5/02	. of piston rings	2009/045	. . . {by other means than ball or jet milling}
5/04	. of turbine blades	2009/046	. . . . {by cutting}
5/06	. of threaded articles, e.g. nuts	2009/047	. . . . {by rolling}
5/08	. of toothed articles, e.g. gear wheels; of cam discs	2009/048	. . . {by pulverising a quenched ribbon}
5/085	. . {with helical contours}	2009/049	. . . {by pulverising at particular temperature}

9/06	. .	starting from liquid material
2009/065	. . .	{Melting inside a liquid, e.g. making spherical balls}
9/08	. . .	by casting, e.g. through sieves or in water, by atomising or spraying (using electric discharge B22F 9/14)
2009/0804	. . . .	{Dispersion in or on liquid, other than with sieves}
2009/0808	. . . . .	{Mechanical dispersion of melt, e.g. by sieves}
2009/0812	. . . . .	{Pulverisation with a moving liquid coolant stream, by centrifugally rotating stream}
2009/0816	. . . . .	{by casting with pressure or pulsating pressure on the metal bath}
9/082	. . . . .	{atomising using a fluid (using centrifugal force B22F 9/10)}
2009/0824	. . . . .	{with a specific atomising fluid}
2009/0828	. . . . .	{with water}
2009/0832	. . . . .	{Handling of atomising fluid, e.g. heating, cooling, cleaning, recirculating}
2009/0836	. . . . .	{with electric or magnetic field or induction}
2009/084	. . . . .	{combination of methods}
2009/0844	. . . . .	{in controlled atmosphere}
2009/0848	. . . . .	{Melting process before atomisation}
2009/0852	. . . . .	{Electroslag melting}
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}
2009/0892	. . . . .	{casting nozzle; controlling metal stream in or after the casting nozzle}
2009/0896	. . . . .	{particle transport, separation: process and apparatus}
9/10	. . . .	using centrifugal force
9/12	. .	starting from gaseous material
9/14	. .	using electric discharge
9/16	. .	using chemical processes
2009/165	. .	{Chemical reaction in an Ionic Liquid [IL] (B22F 2009/245 takes precedence)}
9/18	. .	with reduction of metal compounds
9/20	. . .	starting from solid metal compounds
9/22	. . . .	using gaseous reductors
9/24	. . .	starting from liquid metal compounds, e.g. solutions
2009/245	. . . . .	{Reduction reaction in an Ionic Liquid [IL]}
9/26	. . . .	using gaseous reductors
9/28	. . .	starting from gaseous metal compounds
9/30	. .	with decomposition of metal compounds, e.g. by pyrolysis
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

WARNING

Group [B22F 10/10](#) 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](#).

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]

WARNING

Group [B22F 10/12](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/10](#).

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

10/14 . . by jetting of binder onto a bed of metal powder

WARNING

Group [B22F 10/14](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/10](#).

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

10/16 . . by embedding the binder within the powder bed

WARNING

Group [B22F 10/16](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/10](#).

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

10/18 . . by mixing binder with metal in filament form, e.g. fused filament fabrication [FFF]

WARNING

Group [B22F 10/18](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/10](#).

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

- 10/20 . Direct sintering or melting
- WARNING**
- Group [B22F 10/20](#) is incomplete pending reclassification of documents from group [B22F 3/00](#).
- 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.
- 10/22 . . Direct deposition of molten metal
- WARNING**
- 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.
- 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 . . characterised by material

WARNING

Group [B22F 10/43](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/40](#).

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

- 10/47 . . characterised by structural features

WARNING

Group [B22F 10/47](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/40](#).

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

- 10/50 . Treatment of workpieces or articles during build-up, e.g. treatments applied to fused layers during build-up

WARNING

Group [B22F 10/50](#) is incomplete pending reclassification of documents from group [B22F 3/00](#).

Groups [B22F 3/00](#) and [B22F 10/50](#) should be considered in order to perform a complete search.

- 10/60 . Treatment of workpieces or articles after build-up

WARNING

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](#).

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

- 10/62 . . by chemical means

- 10/64 . . by thermal means ([control of energy beam parameters for post heating B22F 10/364](#))

- 10/66 . . by mechanical means

- 10/68 . . Cleaning or washing

WARNING

Group [B22F 10/68](#) is incomplete pending to reclassification of documents from groups [B22F 3/00](#) and [B22F 10/70](#).

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

- 10/70 . Recycling

WARNING

Group [B22F 10/70](#) is incomplete pending to reclassification of documents from group [B22F 3/00](#).

Group [B22F 10/70](#) is also impacted by reclassification into groups [B22F 10/68](#), [B22F 10/73](#) and [B22F 10/77](#).

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

- 10/73 . . of powder

WARNING

Group [B22F 10/73](#) is incomplete pending reclassification of documents from groups [B22F 3/00](#) and [B22F 10/70](#).

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

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>	12/22	<ul style="list-style-type: none"> • {Driving means} <p><u>WARNING</u></p> <p>Groups B22F 12/22 - B22F 12/226 are 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>
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>	12/222	<ul style="list-style-type: none"> • • {for motion along a direction orthogonal to the plane of a layer}
		12/224	<ul style="list-style-type: none"> • • {for motion along a direction within the plane of a layer}
		12/226	<ul style="list-style-type: none"> • • {for rotary motion}
		12/30	<ul style="list-style-type: none"> • Platforms or substrates <p><u>WARNING</u></p> <p>Groups B22F 12/30 - B22F 12/37 are 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>
10/85	<ul style="list-style-type: none"> • • for controlling or regulating additive manufacturing processes 		
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>	12/33	<ul style="list-style-type: none"> • • translatory in the deposition plane
		12/37	<ul style="list-style-type: none"> • • Rotatable
		12/38	<ul style="list-style-type: none"> • {Housings, e.g. machine housings} <p><u>WARNING</u></p> <p>Group B22F 12/38 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>
		12/40	<ul style="list-style-type: none"> • Radiation means <p><u>WARNING</u></p> <p>Groups B22F 12/40 - B22F 12/49 are 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>
12/10	<ul style="list-style-type: none"> • Auxiliary heating means <p><u>WARNING</u></p> <p>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.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>	12/41	<ul style="list-style-type: none"> • • characterised by the type, e.g. laser or electron beam
12/13	<ul style="list-style-type: none"> • • to preheat the material 	12/42	<ul style="list-style-type: none"> • • • Light-emitting diodes [LED]
12/17	<ul style="list-style-type: none"> • • to heat the build chamber or platform 	12/43	<ul style="list-style-type: none"> • • • pulsed; frequency modulated
12/20	<ul style="list-style-type: none"> • Cooling means <p><u>WARNING</u></p> <p>Group B22F 12/20 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>	12/44	<ul style="list-style-type: none"> • • characterised by the configuration of the radiation means
		12/45	<ul style="list-style-type: none"> • • • Two or more
		12/46	<ul style="list-style-type: none"> • • with translatory movement
		12/47	<ul style="list-style-type: none"> • • • parallel to the deposition plane
		12/48	<ul style="list-style-type: none"> • • • in height, e.g. perpendicular to the deposition plane
		12/49	<ul style="list-style-type: none"> • • 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 . Plants, production lines or modules

WARNING

Groups [B22F 12/80](#) - [B22F 12/88](#) 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.

- 12/82 . . Combination of additive manufacturing apparatus or devices with other processing apparatus or devices
 12/84 . . . Parallel processing within single device
 12/86 . . . Serial processing with multiple devices grouped
 12/88 . . Handling of additively manufactured products, e.g. by robots

- 12/90 . Means for process control, e.g. cameras or sensors

WARNING

Group [B22F 12/90](#) 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.

2201/00 Treatment under specific atmosphere

- 2201/01 . Reducing atmosphere
 2201/013 . . Hydrogen
 2201/016 . . NH₃
 2201/02 . Nitrogen
 2201/03 . Oxygen
 2201/04 . CO or CO₂
 2201/05 . Water or water vapour
 2201/10 . Inert gases
 2201/11 . . Argon
 2201/12 . . Helium
 2201/20 . Use of vacuum
 2201/30 . Carburising atmosphere
 2201/32 . Decarburising atmosphere
 2201/40 . Metal compounds
 2201/50 . air

2202/00 Treatment under specific physical conditions

- 2202/01 . Use of vibrations
 2202/03 . Treatment under cryogenic or supercritical conditions
 2202/05 . Use of magnetic field
 2202/06 . Use of electric fields
 2202/07 . by induction
 2202/09 . Use of non-gravitational conditions
 2202/11 . Use of irradiation
 2202/13 . Use of plasma
 2202/15 . Use of fluidised beds
 2202/17 . use of centrifugal or vortex forces

2203/00 Controlling

- 2203/01 . To-be-deleted with administrative transfer to [B22F 2203/00](#)
 2203/03 . for feed-back
 2203/05 . thermal expansion
 2203/11 . temperature, temperature profile
 2203/13 . pressure
 2203/15 . weight

2207/00 Aspects of the compositions, gradients

- 2207/01 . Composition gradients
 2207/03 . . of the metallic binder phase in cermets
 2207/05 . . . eta-phase
 2207/07 . . Particles with core-rim gradient
 2207/11 . Gradients other than composition gradients, e.g. size gradients
 2207/13 . . Size gradients
 2207/15 . . Temperature gradients
 2207/17 . . density or porosity gradients
 2207/20 . Cooperating components

2301/00 Metallic composition of the powder or its coating

- 2301/05 . Light metals
 2301/052 . . Aluminium

2301/054	. . Alkali metals, i.e. Li, Na, K, Rb, Cs, Fr
2301/056	. . Alkaline metals, i.e. Ca, Sr, Ba, Ra
2301/058	. . Magnesium
2301/10	. Copper
2301/15	. Nickel or cobalt
2301/155	. . Rare Earth - Co or -Ni intermetallic alloys
2301/20	. Refractory metals
2301/205	. . Titanium, zirconium or hafnium
2301/25	. Noble metals, i.e. Ag Au, Ir, Os, Pd, Pt, Rh, Ru
2301/255	. . Silver or gold
2301/30	. Low melting point metals, i.e. Zn, Pb, Sn, Cd, In, Ga
2301/35	. Iron
2301/355	. . Rare Earth - Fe intermetallic alloys
2301/40	. Intermetallics other than rare earth-Co or -Ni or -Fe intermetallic alloys
2301/45	. 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	. Boride
2302/10	. Carbide
2302/105	. . Silicium carbide (SiC)
2302/15	. Carbonitride
2302/20	. Nitride
2302/205	. Cubic boron nitride
2302/25	. Oxide
2302/253	. . Aluminum oxide (Al ₂ O ₃)
2302/256	. . Silicium oxide (SiO ₂)
2302/30	. Oxynitride
2302/35	. Complex boride, carbide, carbonitride, nitride, oxide or oxynitride
2302/40	. Carbon, graphite
2302/403	. . Carbon nanotube
2302/406	. . Diamond
2302/45	. Others, including non-metals
2303/00	Functional details of metal or compound in the powder or product,
2303/01	. Main component
2303/05	. Compulsory alloy component
2303/10	. Optional alloy component
2303/15	. Intermetallic
2303/20	. Coating by means of particles
2303/25	. Coating by means of fibres
2303/30	. 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.