

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING (NOTES omitted)

SHAPING

B23 MACHINE TOOLS; METAL-WORKING NOT OTHERWISE PROVIDED FOR (NOTES omitted)

B23P METAL-WORKING NOT OTHERWISE PROVIDED FOR; COMBINED OPERATIONS; UNIVERSAL MACHINE TOOLS ([arrangements for copying or controlling B23Q](#))

NOTES

1. This subclass covers:
 - combinations of work-modifying operations covered by different subclasses of classes [B21](#) - [B24](#);
 - combinations of metal-working operations with non-mechanical treatments of metal not provided for elsewhere, for example in [C21D](#), [C22C](#), [C22F](#) or [C23](#).
2. This subclass does not cover
 - non-mechanical operations on non-metallic materials unless such operations are specially mentioned in this subclass;
 - subsidiary operations performed in conjunction with main operations covered by a single subclass, e.g. assembling of parts as an essential feature of a following metal-working operation, since they are not regarded as operations per se.
3. Attention is drawn to the Notes following the title of class [B23](#).

WARNING

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.

5/00	Setting gems or the like on metal parts, e.g. diamonds on tools	9/02	• Treating or finishing by applying pressure, e.g. knurling (B23P 9/04 takes precedence)
6/00	Restoring or reconditioning objects (straightening or restoring form of sheet metal, metal rods, metal tubes, metal profiles, or specific articles made therefrom B21D 1/00, B21D 3/00; repairing defective or damaged objects by casting techniques B22D 19/10; procedures or apparatus covered by a single other subclass, see the relevant subclass)	9/025	• • {to inner walls of holes by using axially moving tools}
6/002	• {Repairing turbine components, e.g. moving or stationary blades, rotors, (B23P 6/045 takes precedence)}	9/04	• Treating or finishing by hammering or applying repeated pressure
6/005	• • {using only replacement pieces of a particular form}	11/00	Connecting or disconnecting metal parts or objects by metal-working techniques not otherwise provided for (connecting sheet metal or metal tubes, rods or profiles B21D 39/00; riveting B21J; soldering, unsoldering, welding B23K; hand tools for connecting wire or strip B25B 25/00; connecting metal parts by adhesives F16B 11/00)
6/007	• • {using only additive methods, e.g. build-up welding}	11/005	• {by expanding or crimping}
6/02	• Pistons or cylinders	11/02	• by first expanding and then shrinking or <u>vice versa</u> , e.g. by using pressure fluids; by making force fits
6/04	• Repairing fractures or cracked metal parts or products, e.g. castings	11/022	• • {by using pressure fluids}
6/045	• • {of turbine components, e.g. moving or stationary blades, rotors, etc.}	11/025	• • {by using heat or cold}
9/00	Treating or finishing surfaces mechanically, with or without calibrating, primarily to resist wear or impact, e.g. smoothing or roughening turbine blades or bearings (treatment covered by a single other subclass, see the relevant subclass, e.g. B24C, C21D 7/00, C22F 1/00); Features of such surfaces not otherwise provided for, their treatment being unspecified	11/027	• • • {for mounting tools in tool holders}
		13/00	Making metal objects by operations essentially involving machining but not covered by a single other subclass (making specific objects B23P 15/00)
		13/02	• in which only the machining operations are important
		13/04	• involving slicing of profiled material
		15/00	Making specific metal objects by operations not covered by a single other subclass or a group in this subclass

15/001	• {valves or valve housings (welding B23K ; valve housings <i>per se</i> F16K)}	19/00	Machines for simply fitting together or separating metal parts or objects, or metal and non-metal parts, whether or not involving some deformation {connecting metal parts or objects by metal-working procedures B21J, B23K}; Tools or devices therefor so far as not provided for in other classes (hand tools in general B25)
15/002	• . {poppet valves}	19/001	• {Article feeders for assembling machines (screws or nuts being carried by a disposable strip or disc B25B 23/045)}
15/003	• {bearings (see also F16C 33/00)}	19/002	• . {orientating the articles}
15/005	• {keys (making keys without essentially removing material, e.g. by punching B21D 53/42 ; milling grooves in keys B23C 3/35)}	19/003	• . {Escapement mechanisms used therewith}
15/006	• {turbine wheels}	19/004	• . {Feeding the articles from hoppers to machines or dispensers}
15/007	• {injection moulding tools}	19/005	• . . {by using flowing gases}
15/008	• {Rocket engine parts, e.g. nozzles, combustion chambers}	19/006	• . {Holding or positioning the article in front of the applying tool}
15/02	• turbine or like blades from one piece	19/007	• . {Picking-up and placing mechanisms}
15/04	• turbine or like blades from several pieces	19/008	• {the parts being continuously transported through the machine during assembling or disassembling}
15/06	• piston rings from one piece	19/02	• for connecting objects by press fit or for detaching same (B23P 19/10 takes precedence)
15/065	• . {from metal strip}	19/021	• . {Railroad wheels on axles}
15/08	• piston rings from several pieces	19/022	• . {Extracting or inserting relatively long parts}
15/10	• pistons	19/024	• . . {tube bundles}
15/105	• . {Enlarging pistons}	19/025	• . {For detaching only}
15/12	• gratings {(making gratings by methods covered by other subclasses B21D 47/005)}	19/027	• . using hydraulic or pneumatic means (B23P 19/033 takes precedence)
15/14	• gear parts, e.g. gear wheels	19/033	• . using vibration
15/16	• plates with holes of very small diameter, e.g. for spinning or burner nozzles	19/04	• for assembling or disassembling parts
15/18	• brake shoes	19/041	• . {for disassembling pallets}
15/20	• railroad requirements, e.g. buffers	19/042	• . {specially adapted for combustion engines (shape of casings adapted to facilitate fitting or dismantling of engine parts for combustion engines F02F 7/0046)}
15/22	• cartridges or like shells	19/043	• . . {for inserting piston-connecting rods assemblies in cylinders}
15/24	• dies (B21C 3/18 , B21C 25/10 , B21D 37/20 take precedence)	19/045	• . . {for assembling valve cotters and retainers of engine valves}
15/243	• . {Honeycomb dies}	19/046	• . {Disassembling lids from drums, e.g. by unfolding, for reconditioning or recovery}
15/246	• . {Laminated dies}	19/047	• . {for flexible profiles, e.g. sealing or decorating strips in grooves or on other profiles by devices moving along the flexible profile (hand tools therefor B25B 27/0092)}
15/26	• heat exchangers {or the like (making heat exchangers by methods covered by other subclasses B21D 53/02)}	19/048	• . {Springs}
15/28	• cutting tools (sawing tools B23D 63/00 , B23D 65/00 ; files or rasps B23D 73/00)	19/06	• . Screw or nut setting or loosening machines
15/30	• . lathes or like tools	19/061	• . . {for pipes or pipe-couplings}
15/32	• . twist-drills	19/062	• . . {Pierce nut setting machines}
15/34	• . milling cutters	19/063	• . . . {Deforming the nut only}
15/36	• . . for thread-cutting	19/064	• . . . {Deforming the support material only, e.g. the sheet or plate}
15/38	• . planing or slotting tools (B23P 15/30 takes precedence)	19/065	• . . {Arrangements for torque limiters or torque indicators in screw or nut setting machines (for hand tools B25B 23/14)}
15/40	• . shearing tools	19/066	• . . . {by electrical means}
15/403	• . . {razor blades}	19/067	• . . {Bolt tensioners (for hand tools B25B 29/02)}
15/406	• . . {rotary or plane die cutters}	19/068	• . . . {by using heating means}
15/42	• . broaching tools	19/069	• . . {Multi-spindle machines}
15/44	• . scraping or shaving tools	19/08	• . Machines for placing washers, circlips, or the like on bolts or other members
15/46	• . reaming tools	19/082	• . . {for placing washers on nuts}
15/48	• . threading tools (milling cutters for thread-cutting B23P 15/36)		
15/50	• . . dies		
15/52	• . . taps		
17/00	Metal-working operations, not covered by a single other subclass or another group in this subclass		
17/02	• Single metal-working processes; Machines or apparatus therefor		
17/04	• characterised by the nature of the material involved or the kind of product independently of its shape		
17/06	• . Making steel wool or the like		

19/084	. . . {for placing resilient or flexible rings, e.g. O-rings, circlips}	2700/11	. Joints, e.g. ball joints, universal joints
19/086 {Non-metallic protective bellows}	2700/12	. Laminated parts
19/088 {Piston rings in piston grooves}	2700/13	. Parts of turbine combustion chambers
19/10	. Aligning parts to be fitted together	2700/14	. Suspension elements of automobile vehicles
19/102	. . {using remote centre compliance devices}	2700/50	. Other automobile vehicle parts, i.e. manufactured in assembly lines
19/105	. . . {using sensing means}		
19/107	. . {using oscillating, rotating or vibrating movements}		
19/12	. . Alignment of parts for insertion into bores		
21/00	Machines for assembling a multiplicity of different parts to compose units, with or without preceding or subsequent working of such parts, e.g. with programme control		
21/002	. {the units stationary whilst being composed}		
21/004	. {the units passing two or more work-stations whilst being composed}		
21/006	. . {the conveying means comprising a rotating table}		
21/008	. {the assembling machines or tools moving synchronously with the units while these are being assembled}		
23/00	Machines or arrangements of machines for performing specified combinations of different metal-working operations not covered by a single other subclass (if the particular kinds of operation are not essential B23Q 37/00 - B23Q 41/00; {working by laser beam combined with other working of metal B23K 26/0093})		
23/02	. Machine tools for performing different machining operations (lathes, e.g. capstan lathes, B23B ; combined horizontal boring and milling machines B23B 39/02)		
23/04	. for both machining and other metal-working operations		
23/06	. Metal-working plant comprising a number of associated machines or apparatus		
25/00	Auxiliary treatment of workpieces, before or during machining operations, to facilitate the action of the tool or the attainment of a desired final condition of the work, e.g. relief of internal stress		
25/003	. {immediately preceding a cutting tool}		
25/006	. . {Heating the workpiece by laser during machining}		
2700/00	Indexing scheme relating to the articles being treated, e.g. manufactured, repaired, assembled, connected or other operations covered in the subgroups		
2700/01	. Aircraft parts		
2700/02	. Camshafts		
2700/03	. Catalysts or parts thereof		
2700/04	. Connecting rods		
2700/05	. Cooking vessels		
2700/06	. Cooling passages of turbine components, e.g. unblocking or preventing blocking of cooling passages of turbine components		
2700/07	. Crankshafts		
2700/08	. Fittings for doors and windows of buildings		
2700/09	. Heat pipes		
2700/10	. Heat sinks		