

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

- 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](#).
- 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.
- 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	9/025	. . {to inner walls of holes by using axially moving tools}
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)	9/04	. Treating or finishing by hammering or applying repeated pressure
6/002	. {Repairing turbine components, e.g. moving or stationary blades, rotors, (B23P 6/045 takes precedence)}	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)
6/005	. . {using only replacement pieces of a particular form}	11/005	. {by expanding or crimping}
6/007	. . {using only additive methods, e.g. build-up welding}	11/02	. by first expanding and then shrinking or <u>vice versa</u> , e.g. by using pressure fluids; by making force fits
6/02	. Pistons or cylinders	11/022	. . {by using pressure fluids}
6/04	. Repairing fractures or cracked metal parts or products, e.g. castings	11/025	. . {by using heat or cold}
6/045	. . {of turbine components, e.g. moving or stationary blades, rotors, etc.}	11/027	. . . {for mounting tools in tool holders}
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	13/00	Making metal objects by operations essentially involving machining but not covered by a single other subclass (making specific objects B23P 15/00)
9/02	. Treating or finishing by applying pressure, e.g. knurling (B23P 9/04 takes precedence)	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 <u>per se</u> F16K)}
		15/002	. . {poppet valves}

- 15/003 . {bearings ([see also F16C 33/00](#))}
- 15/005 . {keys (making keys without essentially removing material, e.g. by punching [B21D 53/42](#); milling grooves in keys [B23C 3/35](#))}
- 15/006 . {turbine wheels}
- 15/007 . {injection moulding tools}
- 15/008 . {Rocket engine parts, e.g. nozzles, combustion chambers}
- 15/02 . turbine or like blades from one piece
- 15/04 . turbine or like blades from several pieces
- 15/06 . piston rings from one piece
- 15/065 . . {from metal strip}
- 15/08 . piston rings from several pieces
- 15/10 . pistons
- 15/105 . . {Enlarging pistons}
- 15/12 . gratings {(making gratings by methods covered by other subclasses [B21D 47/005](#))}
- 15/14 . gear parts, e.g. gear wheels
- 15/16 . plates with holes of very small diameter, e.g. for spinning or burner nozzles
- 15/18 . brake shoes
- 15/20 . railroad requirements, e.g. buffers
- 15/22 . cartridges or like shells
- 15/24 . dies ([B21C 3/18](#), [B21C 25/10](#), [B21D 37/20](#) take precedence)
- 15/243 . . {Honeycomb dies}
- 15/246 . . {Laminated dies}
- 15/26 . heat exchangers {or the like (making heat exchangers by methods covered by other subclasses [B21D 53/02](#))}
- 15/28 . cutting tools (sawing tools [B23D 63/00](#), [B23D 65/00](#); files or rasps [B23D 73/00](#))
- 15/30 . . lathes or like tools
- 15/32 . . twist-drills
- 15/34 . . milling cutters
- 15/36 . . . for thread-cutting
- 15/38 . . planing or slotting tools ([B23P 15/30](#) takes precedence)
- 15/40 . . shearing tools
- 15/403 . . . {razor blades}
- 15/406 . . . {rotary or plane die cutters}
- 15/42 . . broaching tools
- 15/44 . . scraping or shaving tools
- 15/46 . . reaming tools
- 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
- 19/00 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](#))**
- 19/001 . {Article feeders for assembling machines (screws or nuts being carried by a disposable strip or disc [B25B 23/045](#))}
- 19/002 . . {orientating the articles}
- 19/003 . . {Escapement mechanisms used therewith}
- 19/004 . . {Feeding the articles from hoppers to machines or dispensers}
- 19/005 . . . {by using flowing gases}
- 19/006 . . {Holding or positioning the article in front of the applying tool}
- 19/007 . . {Picking-up and placing mechanisms}
- 19/008 . {the parts being continuously transported through the machine during assembling or disassembling}
- 19/02 . for connecting objects by press fit or for detaching same ([B23P 19/10](#) takes precedence)
- 19/021 . . {Railroad wheels on axles}
- 19/022 . . {Extracting or inserting relatively long parts}
- 19/024 . . . {tube bundles}
- 19/025 . . {For detaching only}
- 19/027 . . using hydraulic or pneumatic means ([B23P 19/033](#) takes precedence)
- 19/033 . . using vibration
- 19/04 . for assembling or disassembling parts
- 19/041 . . {for disassembling pallets}
- 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](#))}
- 19/043 . . . {for inserting piston-connecting rods assemblies in cylinders}
- 19/045 . . . {for assembling valve cotters and retainers of engine valves}
- 19/046 . . {Disassembling lids from drums, e.g. by unfolding, for reconditioning or recovery}
- 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](#))}
- 19/048 . . {Springs}
- 19/06 . . Screw or nut setting or loosening machines
- 19/061 . . . {for pipes or pipe-couplings}
- 19/062 . . . {Pierce nut setting machines}
- 19/063 {Deforming the nut only}
- 19/064 {Deforming the support material only, e.g. the sheet or plate}
- 19/065 . . . {Arrangements for torque limiters or torque indicators in screw or nut setting machines (for hand tools [B25B 23/14](#))}
- 19/066 {by electrical means}
- 19/067 . . . {Bolt tensioners (for hand tools [B25B 29/02](#))}
- 19/068 {by using heating means}
- 19/069 . . . {Multi-spindle machines}
- 19/08 . . Machines for placing washers, circlips, or the like on bolts or other members
- 19/082 . . . {for placing washers on nuts}
- 19/084 . . . {for placing resilient or flexible rings, e.g. O-rings, circlips}
- 19/086 {Non-metallic protective bellows}
- 19/088 {Piston rings in piston grooves}
- 19/10 . Aligning parts to be fitted together
- 19/102 . . {using remote centre compliance devices}
- 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
- 2700/11 . Joints, e.g. ball joints, universal joints
- 2700/12 . Laminated parts
- 2700/13 . Parts of turbine combustion chambers
- 2700/14 . Suspension elements of automobile vehicles
- 2700/50 . Other automobile vehicle parts, i.e. manufactured in assembly lines