

CPC COOPERATIVE PATENT CLASSIFICATION

B23P OTHER WORKING OF METAL; 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](#).

5/00	Setting gems or the like on metal parts, e.g. diamonds on tools	11/00	Connecting metal parts or objects by metal-working techniques, not covered wholly by either B21J or B23K (connecting sheet metal or metal tubes, rods, or profiles B21D 39/00; {objects produced by methods not important <u>per se</u>, see the relevant subclasses dealing with the objects, e.g. B21F 15/00; B21L 19/00}; hand tools for connecting wire or strip B25B 25/00; connecting metal parts by adhesives F16B 11/00)
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)		
6/002	. {Repairing turbine components, e.g. moving or stationary blades, rotors, (B23P 6/045 takes precedence)}	11/005	. {by expanding or crimping}
6/005	. . {using only replacement pieces of a particular form}	11/02	. by first expanding and then shrinking or <u>vice versa</u> , e.g. by using pressure fluids; by making force fits
6/007	. . {using only additive methods, e.g. build-up welding}	11/022	. . {by using pressure fluids}
6/02	. Pistons or cylinders	11/025	. . {by using heat or cold}
6/04	. Repairing fractures or cracked metal parts or products, e.g. castings	11/027	. . . {for mounting tools in tool holders}
6/045	. . {of turbine components, e.g. moving or stationary blades, rotors, etc.}	13/00	Making metal objects by operations essentially involving machining but not covered by a single other subclass (making specific objects B23P 15/00)
9/00	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	13/02	. in which only the machining operations are important
9/02	. Treating or finishing by applying pressure, e.g. knurling (B23P 9/04 takes precedence)	13/04	. involving slicing of profiled material
9/025	. . {to inner walls of holes by using axially moving tools}	15/00	Making specific metal objects by operations not covered by a single other subclass or a group in this subclass
9/04	. Treating or finishing by hammering or applying repeated pressure	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 . . . lathe 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 metal and non-metal parts, whether or not involving some deformation (connecting metal parts or objects by metal-working procedures [B23P 11/00](#), [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
- 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 preceeding 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