

CPC**COOPERATIVE PATENT CLASSIFICATION****B23P**

**OTHER WORKING OF METAL; COMBINED OPERATIONS;
UNIVERSAL MACHINE TOOLS** (arrangements for copying or controlling
[B23Q](#))

NOTE

1. This subclass does not cover non-mechanical operations on non-metallic materials unless such operations are specially mentioned in this subclass.
2. In this subclass, the following expressions are used with the meanings indicated:

"combined operations" excludes the assembling of parts if it is an essential feature of the next metal-working operation, since it is not regarded as an operation per se.
 "working of metal" and equivalent expressions include non-mechanical treatment of metal so far as it is not provided for in any other class or subclass, for example in [C21D](#), [C22C](#), [C22F](#), [C23](#). Thus, combinations of such non-mechanical treatment with other metal-working are classified in this subclass.
3. Attention is drawn to the Notes following the title of class [B23](#).

B23P 5/00

Setting gems or the like on metal parts, e.g. diamonds on tools

B23P 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)

B23P 6/002

- . {Repairing turbine components, e.g. moving or stationary blades, rotors, ([B23P 6/045](#) takes precedence)}

B23P 6/005

- .. {using only replacement pieces of a particular form}

B23P 6/007

- .. {using only additive methods, e.g. build-up welding}

B23P 6/02

- . Pistons or cylinders

B23P 6/04

- . Repairing fractures or cracked metal parts or products, e.g. castings

B23P 6/045

- .. {of turbine components, e.g. moving or stationary blades, rotors, etc.}

B23P 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**

B23P 9/02

- . Treating or finishing by applying pressure, e.g. knurling ([B23P 9/04](#) takes precedence)

B23P 9/025

- .. {to inner walls of holes by using axially moving tools}

B23P 9/04

- . Treating or finishing by hammering or applying repeated pressure

B23P 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 per se, 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)
B23P 11/005	. {by expanding or crimping}
B23P 11/02	. by first expanding and then shrinking or <u>vice versa</u> , e.g. by using pressure fluids; by making force fits
B23P 11/022	.. {by using pressure fluids}
B23P 11/025	.. {by using heat or cold}
B23P 11/027	... {for mounting tools in tool holders}
B23P 13/00	Making metal objects by operations essentially involving machining but not covered by a single other subclass (making specific objects B23P 15/00)
B23P 13/02	. in which only the machining operations are important
B23P 13/04	. involving slicing of profiled material
B23P 15/00	Making specific metal objects by operations not covered by a single other subclass or a group in this subclass
B23P 15/001	. {valves or valve housings (welding B23K ; valve housings per se F16K)}
B23P 15/002	.. {poppet valves}
B23P 15/003	. {bearings (see also F16C 33/00)}
B23P 15/005	. {keys (making keys without essentially removing material, e.g. by punching B21D 53/42 ; milling grooves in keys B23C 3/35)}
B23P 15/006	. {turbine wheels}
B23P 15/007	. {injection moulding tools}
B23P 15/008	. {Rocket engine parts, e.g. nozzles, combustion chambers}
B23P 15/02	. turbine or like blades from one piece
B23P 15/04	. turbine or like blades from several pieces
B23P 15/06	. piston rings from one piece
B23P 15/065	.. {from metal strip}
B23P 15/08	. piston rings from several pieces
B23P 15/10	. pistons
B23P 15/105	.. {Enlarging pistons}
B23P 15/12	. gratings {(making gratings by methods covered by other subclasses B21D 47/005)}
B23P 15/14	. gear parts, e.g. gear wheels
B23P 15/16	. plates with holes of very small diameter, e.g. for spinning or burner nozzles
B23P 15/18	. brake shoes
B23P 15/20	. railroad requirements, e.g. buffers
B23P 15/22	. cartridges or like shells
B23P 15/24	. dies (B21C 3/18 , B21C 25/10 , B21D 37/20 take precedence)
B23P 15/243	.. {Honeycomb dies}

B23P 15/246	.. {Laminated dies}
B23P 15/26	. heat exchangers {or the like (making heat exchangers by methods covered by other subclasses B21D 53/02)}
B23P 15/28	. cutting tools (sawing tools B23D 63/00 , B23D 65/00 ; files or rasps B23D 73/00)
B23P 15/30	.. lathe or like tools
B23P 15/32	.. twist-drills
B23P 15/34	.. milling cutters
B23P 15/36	... for thread-cutting
B23P 15/38	.. planing or slotting tools (B23P 15/30 takes precedence)
B23P 15/40	.. shearing tools
B23P 15/403	... {razor blades}
B23P 15/406	... {rotary or plane die cutters}
B23P 15/42	.. broaching tools
B23P 15/44	.. scraping or shaving tools
B23P 15/46	.. reaming tools
B23P 15/48	.. threading tools (milling cutters for thread-cutting B23P 15/36)
B23P 15/50	... dies
B23P 15/52	... taps
B23P 17/00	Metal-working operations, not covered by a single other subclass or another group in this subclass
B23P 17/02	. Single metal-working processes; Machines or apparatus therefor
B23P 17/04	. characterised by the nature of the material involved or the kind of product independently of its shape
B23P 17/06	.. Making steel wool or the like
B23P 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)
B23P 19/001	. {Article feeders for assembling machines (screws or nuts being carried by a disposable strip or disc B25B 23/045)}
B23P 19/002	.. {orientating the articles}
B23P 19/003	.. {Escapement mechanisms used therewith}
B23P 19/004	.. {Feeding the articles from hoppers to machines or dispensers}
B23P 19/005	... {by using flowing gases}
B23P 19/006	.. {Holding or positioning the article in front of the applying tool}
B23P 19/007	.. {Picking-up and placing mechanisms}
B23P 19/008	. {the parts being continuously transported through the machine during assembling or disassembling}
B23P 19/02	. for connecting objects by press fit or for detaching same
B23P 19/021	.. {Railroad wheels on axles}

B23P 19/022	.. {Extracting or inserting relatively long parts}
B23P 19/024	... {tube bundles}
B23P 19/025	.. {For detaching only}
B23P 19/027	.. using hydraulic or pneumatic means (B23P 19/033 takes precedence)
B23P 19/033	.. using vibration
B23P 19/04	. for assembling or disassembling parts
B23P 19/041	.. {for disassembling pallets}
B23P 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)}
B23P 19/043	... {for inserting piston-connecting rods assemblies in cylinders}
B23P 19/045	... {for assembling valve cotters and retainers of engine valves}
B23P 19/046	.. {Disassembling lids from drums, e.g. by unfolding, for reconditioning or recovery}
B23P 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)}
B23P 19/048	.. {Springs}
B23P 19/06	.. Screw or nut setting or loosening machines
B23P 19/061	... {for pipes or pipe-couplings}
B23P 19/062	... {Pierce nut setting machines}
B23P 19/063 {Deforming the nut only}
B23P 19/064 {Deforming the support material only, e.g. the sheet or plate}
B23P 19/065	... {Arrangements for torque limiters or torque indicators in screw or nut setting machines (for hand tools B25B 23/14)}
B23P 19/066 {by electrical means}
B23P 19/067	... {Bolt tensioners (for hand tools B25B 29/02)}
B23P 19/068 {by using heating means}
B23P 19/069	... {Multi-spindle machines}
B23P 19/08	.. Machines for placing washers, circlips, or the like on bolts or other members
B23P 19/082	... {for placing washers on nuts}
B23P 19/084	... {for placing resilient or flexible rings, e.g. O-rings, circlips}
B23P 19/086 {Non-metallic protective bellows}
B23P 19/088 {Piston rings in piston grooves}
B23P 19/10	. Aligning parts to be fitted together
B23P 19/102	.. {using remote centre compliance devices}
B23P 19/105	... {using sensing means}
B23P 19/107	.. {using oscillating, rotating or vibrating movements}
B23P 19/12	.. Alignment of parts for insertion into bores
B23P 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
B23P 21/002	. {the units stationary whilst being composed}
B23P 21/004	. {the units passing two or more work-stations whilst being composed}

B23P 21/006	. . {the conveying means comprising a rotating table}
B23P 21/008	. {the assembling machines or tools moving synchronously with the units while these are being assembled}
B23P 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 to B23Q 41/00; { working by laser beam combined with other working of metal B23K 26/0093})
B23P 23/02	. Machine tools for performing different machining operations (lathes, e.g. capstan lathes, B23B ; combined horizontal boring and milling machines B23B 39/02)
B23P 23/04	. for both machining and other metal-working operations
B23P 23/06	. Metal-working plant comprising a number of associated machines or apparatus
B23P 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
B23P 25/003	. {immediately preceeding a cutting tool}
B23P 25/006	. . {Heating the workpiece by laser during machining}
B23P 2700/00	Indexing scheme relating to the articles being treated, e.g. manufactured, repaired, assembled, connected or other operations covered in the subgroups
B23P 2700/01	. Aircraft parts
B23P 2700/02	. Camshafts
B23P 2700/03	. Catalysts or parts thereof
B23P 2700/04	. Connecting rods
B23P 2700/05	. Cooking vessels
B23P 2700/06	. Cooling passages of turbine components, e.g. unblocking or preventing blocking of cooling passages of turbine components
B23P 2700/07	. Crankshafts
B23P 2700/08	. Fittings for doors and windows of buildings
B23P 2700/09	. Heat pipes
B23P 2700/10	. Heat sinks
B23P 2700/11	. Joints, e.g. ball joints, universal joints
B23P 2700/12	. Laminated parts
B23P 2700/13	. Parts of turbine combustion chambers
B23P 2700/14	. Suspension elements of automobile vehicles
B23P 2700/50	. Other automobile vehicle parts, i.e. manufactured in assembly lines